Autobiography of a Maquoketa Boy

by

Richard B. Wells

One must not always think so much about
what one should do, but rather what one should be.
– Meister Eckhart

Dedicated to the heroes of my youth: William E. Wells, Jr., James Bittner, Ben Cooper, Erhard Ketelsen, Bill Hewlett, and Dave Packard

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Photos and Pictures

I. Changing Times

The latter half of the twentieth century and the opening of the twenty-first was a time of many changes in America. The cultural, societal, and technological landscape today is so different from what it was in the 1950s that it can rightly be said a societal revolution has taken place. I suspect most younger people today would find incredible the degree and scope of these changes in what is, at least to those of us who are older than they, such a brief period of time. In the years to come no doubt many scholars of history, sociology, and political science will write numerous books and papers chronicling and commenting on this period. History is rarely written by those who lived it, and sociological context is usually viewed from a comfortable perspective made possible by knowledge of what followed later. They will study the archives and try to glean from the old records, news reels, newspapers, books, letters, and diaries what the time was like and what those living that time thought, felt, and did. Often these analyses will be insightful and accurate; sometimes they will not be. It can only help the efforts of these scholars-to-come to make available the eyewitness testimony of those who were present at the events, and this is the main purpose of these memoirs.

It can be said 20th century America saw not one but two societal revolutions, one before and one after the second world war. Much has already been written about the first. Its great defining events include: the rise of the labor unions, which came into being to counter what really was the amassing of undue and unjust power in the hands of a small number of ultra-wealthy industrialists; the technological innovations of the airplane, automobile, radio, the proper birth of electronics, and other scientific advances; the rise of gangland crime during the Prohibition era and the creation of federal law enforcement agencies to combat it; the immense hardships and dislocations of the Great Depression; and the emergence of strong federal bureaucracies to address, really for the first time, domestic issues of national importance. I and others of my generation were not witness to these events; they belong to the time of our parents and grandparents and we learned about them in school and elsewhere as we were growing up.

It is of the time of the second revolution I write. Were I a professional historian or sociologist I would probably be tempted to describe these times as a parade of dry facts, statistics, and sweeping trends. That is, at least, how most such records are written now and perhaps explains their general unpopularity among schoolchildren. But I am neither historian nor sociologist. It has been the accident of my life to have spent most of it as an engineer and a scientist. For me the second revolution has been what I lived, what I witnessed, and, so far as I am a member of my society, took some part in. I do not claim – nor, I think, can any other truthfully claim – to speak for an entire generation. Humanity is far too diverse to be boiled down into any one-size-fits-all stereotype. I do not even think one can speak truthfully of “the” American society or “the” American culture. In my life I have never found just one society or just one culture in the America I know. Instead there are many, and of all of them I can really only write with any degree of insight about the one I have lived. This one is middle class, white, and mostly small town and small city. Where I have come into contact with the other cultures I can relate anecdotes; but I leave it to better representatives of these cultures to record their viewpoints, mores, and folkways. I will share the impressions and judgments I formed about people I have known as they looked to my eyes, but I make no judgments about these cultures themselves. I am content to accept that the views their representatives hold are their true evaluations seen from their own perspectives, and if my own views and perspectives are different, at least these differences are honest ones. Perhaps some day scholars will find a way to reconcile differences and develop ways to teach reconciliations to all the generations to follow. If that can be done, it will be an accomplishment in which great pride can be taken. All I can offer is to contribute one of the many points of view to be taken into account in such a future synthesis.

I was born in rural small-town Iowa during the first year of the Eisenhower administration. Yes, this means what you might think: I am one of those called members of the “baby boom” generation, sometimes called “the ‘me’ generation.” It is an epithet that in many ways fits and in other ways does not fit myself and all those others born between 1946 and 1964. Perhaps there will be some who read this record and say, “You see? Wells is a textbook case of the ‘me’ generation; he only writes about himself.”

To this I answer, "Who would you have me write about? My own life is the only one I have lived, the only one I can report on directly, and the only one I know in a way impossible to know about anyone else." I can and do write about the people I have known, our common experiences, and the nature of our associations and interactions; but I cannot get inside other people's heads and neither can you. You might not like everything you read here. You might not like anything you read here. But, like it or not, this is the America I know, the America I have seen, and the only one I am competent to report. It is and can be only one small piece of post-war America. There are other pieces truthfully reported elsewhere, and all I can say is the sum-total of this and these others – contradictions included – makes up the overall true picture. America is not a monolithic abstraction as some people appear to believe. America is all of us, every person who lives within those borders drawn on the globe, taken in total with all the commonalities and differences that attend her.

In these memoirs I divide my story into different epochs marked by recollections of events and trends I have come to view as watershed. Scholars may – and likely will – affix different dates and different periods when they come to write the histories not yet written. I define these epochs on the basis of when I came to be aware of them as distinguishable and when in retrospect I could perceive their beginnings. I haven't seen very many events that could rightfully be called clean breaks marking decisive turning points. Living history is lived, and that means one becomes aware of most changes and trends slowly and by degrees. What I have done is ask: What happened? I try to answer this as best I can and I try to do this in words that describe the events as they appeared and felt to me at the time. I try to bring you the little boy, the adolescent, the young man, the older man, and the old man. Others have had other experiences and would have seen things from other perspectives. The greater truths and the greater understandings must come from the collective witnesses and not just from any one person's memories and feelings.

It is said a picture is worth a thousand words. In the narrative that follows I have included a number of old photographs taken at the times being described. I think this is a necessary part of the narrative because I doubt if any mere words can suffice to capture the flavor of the times or communicate the ordinary lives of the people who lived them. Greater history has a certain grandeur to it; living histories have a certain beauty. I think only a visual record can convey depth in this beauty and add understanding. These memoirs are mostly about people who are not and never will be famous, whose lives will inspire no great novels or movies. They are about places most people have never seen and will never see, or which no longer exist to be visited and seen as they were. By use of these old photographs, I hope to let you see who is talking to you at that point in time. I hope to present the past as a new kind of museum welcoming those who desire to know the feel and flavor of the times and some of the people in them.

II. The Eisenhower Years

I was born in September of 1953 at the Jackson County Public Hospital in Maquoketa, Iowa, the third child and second son of William Earle and Luella Wells. When I was a baby our family lived in a little farm house on about five acres of land just east of Maquoketa. Dad was forty years old when I was born, while Mom was thirty-six. Eleven years separated me from my brother Bill, Jr. (born November 13, 1942) and twelve years separated me from my older sister, Sherri Jo (born June 22, 1941 – the day Hitler invaded Russia). These age differences meant that for me my older sister and brother always seemed more like junior parents to me than sister and brother. They were both role models for me all the time I was growing up and no one could ask for better ones.

Five acres isn't a farm. Dad had been a Ferguson tractor dealer in the small town of Emeline, where Grandpa Wells ran a general store. Dad's side of the family are long-time Iowa residents. Dad was born in West Union, Iowa, and was a great-great grandson of the founder of the town (1849). He was the youngest of Harry and Mabel Wells' four children. Like his father, Dad worked at a number of trades in his life, including baker, salesman, and mechanic. Of these, Dad liked being a baker the best. The family ran the Morning Glory Bakery in Maquoketa during the Great Depression from 1932 to 1946, although Dad left to join the Navy and Uncle Wayne left to build tanks when the war came to America.

Grandpa Harry and Grandma Mabel Wells

Mom was also an Iowa native, born in the tiny, tiny town of Fulton, Iowa, on August 18, 1917. She was the second daughter of Ernie and Iva Teters. Grandma and Grandpa Teters still lived in Fulton until near the end of the 1950s. To say Fulton was rustic is rather like saying the Rocky Mountains are scenic. Even into the early 1960s, Fulton's streets were dirt streets, and the house Grandma and Grandpa lived in did not have an indoor toilet. Instead there was an outhouse in the back yard. Mom grew up in Fulton, attended a one-room schoolhouse, and graduated valedictorian of her class.

Unlike Dad's side of the family, there was a bit more wanderlust on Mom's side. Grandpa Teters had lived for years in Oklahoma in what was at the time called the Indian Territory. He never told us kids any stories of those days, not even the name of the tribe he lived with. He could speak the language, although he never told us exactly which language, and when we used to beg him to "teach us how to speak Indian" he would always say it was a long time ago and he couldn't remember any of it. That little bit of fiction was exposed when an Indian baseball team came to town. Grandpa went up to one of them and they just started chatting in "Indian" – we still never learned which language it was – as if Grandpa had only moved away earlier that week. Rumor also had it that Grandpa knew the outlaw Frank James and didn't like him, but I never heard Grandpa talk about him.

Fulton school in 1928. The girl second from the left in the back row is my Mom. The blond-haired boy in the second row two over from the teacher is my Uncle Marvin, and the blond-haired boy fourth from the right in the front row is my Uncle Chet.

1890s picture of Grandpa Teters as a boy (far right) with his parents, brothers, and sister

In terms of personality, Grandpa Wells and Grandpa Teters were pretty much opposites. Grandpa Wells tended to be serious and business-like. One time I heard him tell one of my older cousins, "Don't stop looking for work after you find a job." Good advice, really. All four of his kids took after him in the serious department. Not that he or they were unfriendly or aloof (well, Aunt Mimi was a bit aloof, come to think of it). They were serious in a warm sort of way some people didn't quite know what to make of. Folks in Maquoketa even had a saying: "That's a Wells for you." I didn't realize how many friends Dad had until his funeral. I lost count of how many people came to the funeral home for the visitation after one hundred and fifty. It was a pretty good turnout for a town of six thousand.

Grandpa Teters, on the other hand, had a well-earned reputation of being a bit of a prankster and a first-rate teaser. When Aunt Sylvie (Mom's older sister) was sixteen, she brought a boyfriend

home to supper one night. Apparently the boy was a bit shy, and she had sternly warned Grandpa beforehand that he'd better be on his very best behavior. Somewhat to her surprise, supper went smoothly and afterwards Grandpa, Sylvie, and the boyfriend adjourned to the living room for some polite conversation. (That's the way it was done in those days, kids). Soon it was getting on in the evening and Grandpa got up, yawned, and said, "Well, I guess I'd best get off to bed so you young people can start sucking tongues and smelling armpits." *Boom!* Out of the room he went. Aunt Sylvie was so mad she was fit to be tied.

Mom issued a similar stern warning to Grandpa before she brought Dad home to supper the first time. Dad was doing his best to impress his future father in law and all was well until he asked someone to pass the meat for seconds. With a completely deadpan expression, Grandpa handed him the bread basket. "Eat some bread," he said gruffly. "It don't cost as much." Mom said Dad's jaw dropped open so far it almost bounced on the table. Then he realized Grandpa was kidding and laughed. The two of them got along great their whole lives.

Grandma Wells and Grandma Teters were also very different from one another, at least by the time I was old enough to know them. Grandma Teters was very quiet and stern looking. In the most vivid memory I have of her, she is sitting in a rocking chair in a black ankles-to-neck dress. She always seemed to me to be cold and distant and markedly different from the rest of Mom's side of the family, which, except for Uncle Bun, was gregarious and active. I was always a little bit scared of her. In later years I commented on this to Mom. It was then I learned Grandma Teters had a severe heart condition and she had been very different when she was younger. In those days there was no such thing as "routine" heart surgery and no such thing as an artificial heart or a heart transplant. She died when I was still a little boy.

Grandma Wells was a storybook grandmother, loving and cuddly and fun. When I was in grade school I would often walk or ride my bicycle over to her house just to visit. I never needed any prompting from anybody to pay Grandma a visit. She was the first person to teach me how to play cards, a pastime that was always popular in my family. "Sweet" was a word that definitely applied to Grandma. You wouldn't have thought the word "tough" would apply, but here there was more than met the eye. When Dad was a little boy he came home one day proudly carrying "a pretty worm that wants to play with me." It was a rattlesnake and it had bitten him. Grandma sucked the poison out and saved Dad's life. □

Mom and me in 1953 shortly after coming home from the hospital

I have no memory of living in the farmhouse, but Mom kept a photo album with a lot of pictures from those days. Most of what I know about those days I heard from my sister Sherri, although I don't always believe the stories she tells. At the time we had a little dog named Puddles (you can probably guess how that name came about). Mom never liked animals very much, so the very fact we had a dog says a lot about Sherri's abilities as a salesman. When Mom and Dad brought me home for the first time, Puddles lifted up on her hind legs and looked at me as I was lying in my crib. She gave me a sniff then laid down directly under the crib and stood guard. Puddles wouldn't let anyone who wasn't family or with a family member come near me when I was a baby.

My parents promised Sherri and my brother Bill that if I was a girl Sherri could name me and if I was a boy then Bill could name me. So it was that I was named after Bill's best friend (Richard) and the actor who played Hopalong Cassidy (Boyd). Because Bill was born in November, he was just shy of his eleventh birthday when he named me. When my younger sister, Melody Ann, came along two years later, Sherri named her. This was pretty characteristic of my parents. They hardly ever made any promises to us kids, but those they did make they always kept. We were all brought up the same way. In my family, a promise is never something to be made lightly, but once made it is to be kept no matter what. No matter

what. 'Situational ethics' didn't exist in the 1950s. Not many Americans, including my parents, had ever heard of Immanuel Kant, the great 18th century philosopher, or his categorical imperative, but nonetheless the system of ethics we were brought up by were Kantian ethics. My parents never outsourced the responsibility for the moral upbringing of their children – not to the schools, not to the church, not to anyone. As I look around today, it seems to me that the people who beat the drum the hardest to try to get Sunday school moved into the public school system are the people with the least understanding of what morals and ethics are. Ethics are to live by, not to preach. You teach by example. □

Aunt Hazel and me in 1953

My sister Melody and I in a way really had two sets of parents: Mom and Dad, and Aunt Hazel and Uncle Wayne. Uncle Wayne was the third of Grandma's and Grandpa's children and was two years older than Dad. He and Hazel were married in 1939, about one year before Mom and Dad got married. Aunt Hazel was a Maquoketa native and after they were married Uncle Wayne went into business with his father in law in the plumbing and heating business. They had two children of their own, Bonnie (born in 1942) and Brent (born in 1945).

Aunt Hazel and Mom were best friends and when I was little I spent almost as much time at Wayne's and Hazel's house as I did at home. Aunt Hazel said many times that she considered Melody and me to be half hers. Her favorite story she liked to tell about me happened when I was two years old. I was at her house one day when she was painting the kitchen. That's a lot of work for one person to do, and so you might imagine what it could be like to try to do it and keep an eye on a toddler at the same time. Her solution was to take advantage of the fact that I wanted to 'help.' She gave me an empty pail, a dry paint brush and an appointed place to stand. I stood in that one spot, 'painting' a single piece of wall, while jabbering away at her all day long. We had a delightful if somewhat one-sided conversation.

Uncle Wayne caught napping (mid-1980s)

I always thought, and still do, that Uncle Wayne had a gentle soul. For as long as I knew him, Uncle Wayne was bald. I used to sit on his lap and he would let me painstakingly inspect the top of his head looking for signs of hair. If I saw anything that could even remotely be taken as a sign of peach fuzz, I would tell him I could see hair growing there. This never failed to amuse and delight him, even though he knew it wasn't true. He had a soft voice in the tenor range and when he laughed his laughter was a sort of prolonged chuckling unlike anyone else's laugh I've ever heard. It's hard to describe the sound of it; it was as if the individual chuckles were somehow soft and rounded at the edges and flowed into one another like the whitecaps in a whitewater river. I loved to hear him laugh, and I always did pretty much anything I could think of to get him to laugh. Delightfully, this wasn't too hard. Dad had a similar laugh only it was more staccato and when he laughed he always had a sort of look on his face as if laughter puzzled him.

If you are getting the idea Melody and I never suffered from want of attention as babies, you're right. In the 1950s there were no daycare centers, no preschools, nor any other kind of modern day temporary orphanage kids now experience. Neither was television all that common in the early 1950s where we lived, and there were no electronic gadgets to take the place of baby-to-grownup interaction. With two older siblings and two sets of parents, I had plenty of interactions. The same was true for Melody except that she had three older siblings. One of these, it is true, wasn't all that much older than her and our sister, Sherri, married and moved into a home of her own when Melody was still two.

Life is full of wonders. Me in 1953.

The Nintendo™ technology of the 1950s was called "Mommy." For as far back as I can remember (and even before that according to what I've been told), Mom made it a constant practice to read to us. Melody or I or both of us would sit on Mom's lap and she would read stories to us. The books I remember had pictures, so the whole experience was visual, tactile, and verbal as well as merely auditory. What the book said wasn't important in and of itself to me, but the close contact and plain old sense of well-being were.

Dad giving me walking lessons in early 1954

With Dad the interactions were more physical. He wasn't what you'd call a "bookish" man. He did finish high school, although from the rare stories of his boyhood he occasionally told us a person might easily wonder how. He was a powerful man with huge arms, and a lot of his sense of self came from what he could physically accomplish. I think that might be one reason he liked being a baker so much. In those days that was tough, physically-demanding work and involved a lot of long hours, most of it on your feet. As a young man he was a skilled boxer, though not a professional, and he saw to it Bill and I both knew how to box.

How was this man able to eat? Dad watching me play with his breakfast in 1953.

But he was also a cuddly man, particularly when we kids were very small. In the evenings after supper I think he liked nothing better than to watch TV with one of his little ones curled up in his lap. If the family went somewhere and didn't get home until late ("late" meant after 9:30 in our family), it was Dad who would pick up the sleeping children from the back seat of the car, being careful not to wake us up, and carry us off to bed. After I was ten years old he didn't do this any more. I think at that age he felt behaviors like this were embarrassing. In those days men (and school-age little boys) didn't display this kind of physical intimacy with anyone but very little kids and girlfriends and wives. With other men and with older boys, an arm around the shoulder or a pat on the back was as far as it went. Men didn't slap other men on the rump the way football players today do either. On my high school football team the nearest equivalent to that was a good, hard open-hand slap to the side of the helmet with plenty of juice behind it. Numb skulls made for pretty good *esprit de corps* but were not always the best recipe for the correct execution of plays. Maybe that's why my football coach used to (affectionately) call us defensive linemen, "you knuckleheads."

Today we know from numerous scientific studies that this kind of intimate, one-on-one interaction with babies and toddlers, involving lots of physical contact and closeness, is extremely important for a child's mental and emotional development. Dr. Stanley Greenspan, a clinical psychiatrist who was very well known for his work with autistic children in the 1970s, used precisely this kind of therapy to successfully treat a large number of cases of very severe autism. Babies do not reason; they *feel*. The work of Greenspan and others strongly suggests that interaction and physical contact with the primary caregivers are essential in getting a child to turn outward from being wrapped up in himself to engage in the kinds of experiences key to cognitive and intellectual development. In recent years there has been a growing level of concern in this country about whether cases of autism are on the rise. I don't know whether that's actually true or not, but if it is we're probably looking in the wrong places for a cause.

Instead of buying your baby an electronic babysitter, try letting him splash your Wheaties all over the breakfast table. The table won't mind. Want your three-month-old to do well in school? Read to him. Today. Every day. Until he can read for himself. Little kids, both boys and girls, *love* to learn. You get to decide *what* they love to learn. Choose wisely. Then be a part of it. But I'm lecturing; sorry. I'll stop. □

A favorite summer pastime in 1955. Note the environmentally friendly clothes drier in the background.

The young men and women who are my students today have never known a world not powered and dominated by electricity. On the infrequent occasions I point out to them that there was a time when not everyone had electric washers and driers they mostly think I'm talking about the Civil War days. Since they're pretty sure I never knew Abraham Lincoln personally, they think I'm kidding if I tell them we didn't have these appliances when I was little. Out at the farmhouse, and even for a few years after that, Mom had an old fashioned washboard with two tubs and a hand cranked wringer. Our drier was an environmentally friendly appliance called a clothesline. I don't think in later years she ever missed them after affordable appliances came along.

Television was another thing that wasn't a familiar at our house until around 1958 or 59, although I'm pretty sure Aunt Hazel and Uncle Wayne had one before then. What we did have was a radio. One nice thing about a radio is you can do other things while you listen to it. Our radio picked up AM stations (ask your grandpa what AM is, kids). Radios brought the news and entertainment in the form of music. Every once in a great while President Eisenhower would give a radio address and everyone would listen to it. In the 1950s my favorite singer wasn't Elvis. It was a guy named Burl Ives. There were two songs of his in particular, "Goober Peas" and "Waltzing Matilda," that when either came on I'd stop whatever I was doing and sing along with him. Burl and I made a great duet. There was another musician I liked, too, a fellow named Hank Williams. Radio then lacked something it has now; it didn't pollute the air by broadcasting the rants of a bunch of opinionated big mouths. Yes, Virginia, there was a time when there was no talk radio.

Sherri, Bill, me, and Mom in the spring of 1954

Most of what I did in the 50s I did with and around other people. With two older siblings, two cousins from Wayne and Hazel (Bonnie and Brent), three from Dad's eldest brother, Uncle Foryst (Phylis, Dee, and Corky) plus an innumerable horde of cousins and second cousins large enough to rival the army of Genghis Khan from Mom's side of the family, it would have been pretty tough to ever get lonely. Corky, whose given name is Harold, probably doesn't count quite as much as the others. He was born in 1936 and by the time I came along he pretty much counted as one of the grownups. But he was a big influence on Bill and, through him, had an indirect influence on me.

My first engineering project (1955). Sherri tells me I was trying to take this toy apart.

When we had visitors at the house, I would usually play on the floor in whatever room the grownups were gathered in while listening to them talk. I liked the feeling of having them around, even if what I was doing didn't involve any of them at all. They were there and I was there in the thick of things, and that was how I liked it.

Usually the adults would just assume I was oblivious to their presence, but in this they were mistaken. Like with the radio, you can

listen and do something else at the same time. But that doesn't necessarily mean you get everything right, as grownups sometimes found out. Another of Aunt Hazel's favorite stories was when I was spending the day at her house and, as usual, chattering away nonstop. Abruptly I asked her, "Aunt Hazel, don't you have any brains?" She was a bit taken aback. "Well, I think I do. Why?" she replied. "My daddy says you don't have any brains," I announced. That night the folks had some explaining to do. It turns out I'd gotten two different conversations mixed up. Some guy my folks knew had done something or other that turned out to be pretty dumb and Dad had remarked, "Sometimes he just doesn't have any brains." I'd gotten this one crossed up with another one about Aunt Hazel. All that came from it in the end was an instruction from Mom to me not to repeat anything I heard them say about anyone and a story Aunt Hazel loved to tell for years and years afterwards.

I should probably mention that by 'instruction' just now, I really do mean 'instruction.' My parents never scolded me about anything. If I did something I shouldn't, Mom would just tell me I couldn't or shouldn't do that. "Okay," I'd say and that would be that. Scolding makes me combative, not penitent.

Melody Ann and me in spring 1956

Something new was added to the family the day after Christmas in 1955 and her name is Melody Ann. After two years of being the baby of the family, I now had a baby sister of my own.

The night Dad took Mom to the hospital to deliver Melody, he woke Sherri up and told her to watch me while he was gone. I still slept in a crib at the time, and Sherri went to sleep on the bed beside it. When Dad got back from the hospital, he laid down on the other side of the bed and went to sleep.

When Sherri, who was fourteen at the time, woke up and found out Dad had slept there, she had a conniption. Someone had told her that if you "slept with somebody" you got pregnant. She started yelling at Dad in full fury because now she was going to be pregnant. "Well Je-SUS Christ!" was Dad's response and explanation. When Mom got home, Sherri asked her how you knew if you were pregnant. Mom, greatly unsettled by the question, replied with "What have you been doing you shouldn't have been?"

Such was sex education in the 1950s. The folks never explained "the birds and the bees" to any of us.

Melody and me in the autumn of 1956

Melody started out as a pretty good sized baby to begin with, and she grew mighty fast. By the time I turned three, Melody, still not a year old, was only about a head shorter than me. She still wasn't walking under her own steam yet, but she started to not long after that. She's always been my little sister, but you could say she didn't spend a lot of time being my baby sister. It made it tough for me to be for her what Bill was for me, the wiser big brother.

1956 was the last year we lived in the farmhouse. Some time early in 57 we moved into town to a little house on Anderson Street. Aunt Hazel and Uncle Wayne lived one block over and you could walk across our back yard to theirs. There were no fences dividing the lots.

Or, if you had the skill, you could ride a bicycle between their house and ours. I couldn't ride one but Bill could. One day he lifted me onto the seat of his bicycle, stood on the pedals, and gave me a ride from our house to Aunt Hazel's. It was my first bike ride and, although it wasn't exactly the *Tour de France*, for me it was the greatest thrill in the world. I wrapped both arms around Bill's waist and we bumped our way through the dirt and grass to Aunt Hazel's back door. If you're wondering, bicycle helmets hadn't

been invented yet and the wind blew my hair back as we bounced along.

Melody and me in front of the Anderson St. house in 1957

Melody started walking that year, which was the occasion for the first profound shock of my life. I had a little three-wheeled car – basically a kind of tricycle with a metal body wrapped around it – which I spent a lot of time driving on the sidewalk in front of the house. Sidewalks were something towns had that farm houses didn't, and I thought it was pretty neat that they would build streets for little kids to drive on. It seemed natural to me that big streets were for grownups and little streets were for kids.

I was out there one bright, sunny day 'motoring' along when the shocking event happened: The door to our house opened and Melody came out *by herself*. The fact she was by herself was what was shocking. Melody had been outside plenty of times before, but someone had always been with her, either carrying her or holding her by the arms as she toddled along. In my universe at that time, Melody-by-herself was completely and totally an inside-the-house phenomenon. But here was Melody-by-herself *outside* the house. It violated the natural order of things. Life would never be the same again. This was something too big even for President Eisenhower. Mom would have to be told. I went running into the house yelling, "Mommy! Melody is outside!" Mom took it in stride. "Make sure she stays in the yard," she said.

Oh. Okay. I'm on it. I went running back outside and watched her like a hawk. After all, I *was* the big brother. This was my job. □

Another memorable event that year was called Sputnik. I had turned four about a month before and heard about it that night when we were over to Grandma Wells' house. The grownups were talking about it. I had no idea what a Sputnik was, but I gathered that it belonged to somebody named the Russians who lived a long way away, not even in Iowa. Maybe they lived near President Eisenhower's white house. I already knew President Eisenhower lived in a white house; that was where his radio was. Whatever a Sputnik was, it flew because somebody said it was going to fly overhead in a little while.

We all went outside to see it pass overhead. Dad pointed it out to me. It was a teeny little star moving across the sky. That was something special! Stars didn't move. "What is it, Daddy?" I asked. He told me it was a man-made moon. I looked from it to the regular moon and back again.

"It isn't very big," was all I said. Sputnik had turned out to be pretty much a disappointment. □

There was an incident at the Anderson Street house that passed into the annals of family folklore. Sherri was sixteen at the time and a senior in high school. The story, as she tells it, goes like this.

> I walked past you (referring to me) and you kicked me. I decided to smack you and raised my hand to do it, but I decided that maybe I had better not. You bawled anyway. Mom turned around and yelled at me and told me to leave 'my sweet little baby brother alone.' You were doing a performance that would qualify for any Oscar, complete with big sobs and giant tears. When Mom turned around, you gave me this evil little grin. I banged the kitchen cupboard door in disgust and Dad came in and spanked me and sent me to my room.

There is a bit of a dispute in the family as to whether this is the way it really happened. The other side being, according to Mom and Dad, that she really did slap me. Both sides, though, agree on the spanking part. Sherri tells me this last spanking she ever got was a great indignity for a sixteen-year-old.

What is the truth of it? Senator, I have no recollection of that incident. □

I should probably mention – before the quack pop psychologists in the audience come unglued – that spankings were very, very rare in our family. I only remember getting one, when I was five, and I probably wouldn't have gotten that one if Mom hadn't been to the dentist that morning and gotten all her

teeth pulled out. Pain medication then wasn't what it is now and Mom was, to put it mildly, in a very bad mood that day. Like Sherri, I claim to be innocent of all charges. But I do remember the spanking quite well – three swift open-hand swats on the bottom. It didn't even hurt, but I was so surprised I cried anyway. The message was loud and clear; I'd done something so naughty it brought down the ultimate punishment. I'm still not sure exactly what I did; if ever I deserved a spanking it should have been for the time two of my little friends and I took an ax and chopped up all Dad's paint cans in the shed. Fortunately, Mom was wearing dentures by then. I don't think it was the abstract artwork all over the floor of the shed that impressed her (or Dad, for that matter). I don't think she ever got all the paint out of my shirt and pants. My feet were an interesting color for awhile after that too.

I'm not entirely sure Mom herself was convinced of the justness of the justice meted out. After the spanking and a long prison sentence (about 20 minutes confinement to bed in my room), Mom let me come back out and gave me a hug, a kiss, and an apology. I was happy to forgive her. □

The Anderson Street house was also where my personal, lifelong war with the wasps began. I woke up one peaceful, beautiful spring morning to the sound of birds singing and bright morning sunshine streaming through the window. Then I saw the terrorist invader. Perched on the nose of my teddy bear was the biggest, ugliest, yellowiest insect I'd ever seen. You could tell it was evil and up to no good just by looking at it. Teddy was in danger! I had to save him! Without hesitating, I delivered a death blow to that agent of evil with the palm of my mighty right hand.

That turned out not to be a very smart thing to do. It was the first time I had ever been stung, and my screaming brought Mom rushing to the rescue like the marines hitting the beach. With all the commotion I was making she must have thought the house was on fire or something. She cuddled and rocked me while I sobbed out the dreadful story of what had happened and showed her the ugly red wound. She said, "I'll kiss it and make it better." Strangely enough, that did make it better. Not a lot better, but a little. Enough at least for me to stop crying. Pain, it turns out, is a peculiar thing.

Teddy survived the incident unscathed. □

One big difference between living in the farm house and living in Maquoketa was this novel thing of having neighbors living only a few feet away. If the neighbors were Aunt Hazel, Uncle Wayne, and cousins Bonnie and Brent, this was very, very neat. Brent kept aquariums full of fish in the basement, which for me was better than television by miles and miles. He also had a ham radio set and could talk to people who lived far, far away. In this Brent was almost like President Eisenhower! On the other hand, our next door neighbor was an old biddy I didn't like very much. One day she snidely asked Mom how come all her children looked different. Mom coolly replied, "We lived in different neighborhoods." For some reason Sherri found this answer hilarious. Mom didn't take any lip from anybody.

We only lived on Anderson St. about a year. Early in 1958 we moved to a different house on North 5th St. It was called "the Regenwether house" after the man who owned it. It was the only house I've ever lived in that had a name of its own. I was four, Melody two, Bill fifteen, and Sherri sixteen when we moved there. It was a two-story house with a covered front porch, a big back yard with room for a garden, a separate shed (where some trouble-maker paint cans came to live), and was heated by a coal burning furnace. There was a big coal chute where they would deliver the coal for the furnace. The Regenwether house sat about two blocks from the Briggs Elementary School, which was shortly to enter my life.

Without a doubt the second biggest event that year (there are those who would say it was the biggest event) was Sherri's wedding. Sherri graduated from high school that spring and about ten or so days after she turned seventeen she married a handsome young man named Gary Hicks, her high school sweetheart. The wedding was held in the Regenwether house and, to the best of my recollection, this was the first time I met Gary. Grandma's and Grandpa's old custom of the suitor coming to supper had lapsed by then. I'm pretty sure Mom and Dad knew who he was, though. People kept calling him "the groom"; I didn't know exactly what a groom was, but whatever it was couldn't have been too good. I'd never seen anyone

sweat like he was sweating. Somebody should have followed him around with a mop and a bucket.

I had known for a couple of days that something was happening. There was a lot of bustling going on in the house. Sherri was edgy and kind of remote and kept dashing off here or there. Mom went on such a cleaning blitz you'd think President Eisenhower was coming. Melody developed some strange fixation and kept practicing singing the same song over and over again. Bill disappeared altogether. All the talk at the supper table was about strange and mysterious grownup things I couldn't begin to follow. Something was going on all right. It all had something to do with something called a "wedding" but I had no idea what that was. Everybody else seemed to know so I didn't want to ask. I would soon find out.

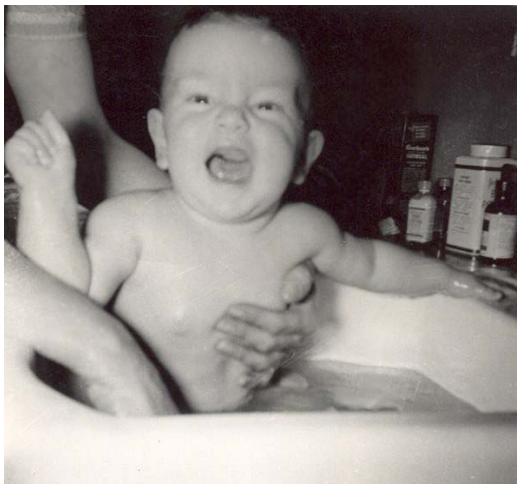
It turned out that a wedding is a kind of home invasion. An enormous mob of people descended on the house, both relatives and a lot of strangers. It was like going to Aunt Sylvie's house except that at Aunt Sylvie's house the great majority of people were kids – almost all of them older than me – but on the day of Sherri's wedding almost all the people were grownups Sherri's age and even older. Who were all these people and what were they doing here? When you only stand a little shy of belt buckle high, nobody thinks to properly introduce you to anyone. Oh, somebody might point at you and tell some stranger, "This is Sherri's little brother." That usually gets you either a compliment on how cute you look in your little suit or else a pinch on the cheek. (I don't know why they call it a 'pinch' instead of a 'pinch and shake'). But they never tell *you* who this suddenly-overly-familiar stranger is. Telling you, "This is Mrs. So-and-So" doesn't tell you who she *is*, just what to call her. In this regard I thought the old-time Indian names were better. You'd know to be extra careful around somebody named Crazy Horse. I'd have made it a point to get very chummy with somebody named Reads To Little Boys. It really wasn't fair. They knew who *I* was, but I didn't know who *they* were.

The only good part about it is they ignore you after a couple of seconds. I tried to become invisible and I hoped these people weren't going to stay forever. I could have really, really used a friend during all this. I don't think I said one word during the whole wedding thing. No, wait. That isn't true. Some gabby stranger did try to get me to talk but I didn't know what to say. Finally she asked, "What's the matter, dear? The cat got your tongue?" Huh? "We don't have a cat," I said.

Missing in all this bedlam was Sherri herself. She and cousin Bonnie were upstairs hiding from everyone. Finally somebody made everyone gather in the living room and everyone quieted down. Some kind of ceremony began. There was one guy standing up front – I guess he was some kind of minister – and they made poor Gary stand up there in front of him and everyone. A steady stream of water kept running off the end of his nose, which distracted the minister a lot. A deafening hush fell over the house and then Melody started singing that song of hers. "Here comes the bride. Here comes the bride . . ."

There was some thumping and bumping on the stairs and, sure enough, Sherri appeared with Bonnie right behind her. Sherri had a strange look on her face and she was all kind of stiff-like. I don't think she would have moved an inch but Bonnie was kind of pushing her along with one hand, a big grin on her face. Bonnie really knows how to grin. Sherri's eyes were wide open, but I'm not too sure she really saw anybody. Bonnie made her come all the way to the front and stand next to Gary. Melody stopped singing and the minister started talking. And talking. And talking. Water continued to pour off Gary.

After he'd talked for a long time the minister asked Gary something. It was a real long question and the gist of it seemed to be that he was asking if Gary had taken something. It must have been serious because he stood there as stiff as he could be. Whatever it was, he must have taken it because he said he did. Then he asked Sherri the same thing. Apparently she was in on it too. Then he made the two of them kiss in front of everybody. Yuck! I hid my eyes. Everybody started clapping and moving around again. I think Sherri was mad because she had a bunch of flowers she'd been holding and she threw them at some other girls. It took *forever* but finally this wedding thing was over. There was a big party right afterwards. We had a big cake with lots of icing on it and Sherri and Gary cut it up and served it. I got to have *two* pieces. That's when I decided this Gary guy, whoever he was, was okay. It was the best part of the whole day. □




Bath technology in late 1953 (left) and early 1958 (right)

There were a lot of signs I became aware of in the Regenwether house marking my new status as little boy instead of baby, but probably the biggest one was bathroom privacy. In those days, and for a long time after that still, most houses had only one bathroom containing a commode and a tub (tubs with showers built in weren't common yet. Neither had idea of having a second private bathroom off the master bedroom come to Maquoketa yet). But, although the bathroom had to be shared, when you had it, it was *yours*. Babies didn't get the use the bathroom. If you were a baby you had your baths in a small portable tub and it was anything but a private affair. As for the other hygiene function, babies had to use the portable potty and, again, it was anything but private. By these standards, Melody was still a baby.

I, on the other hand, was now the proud part owner of the bathroom. Mom initiated me into the Signs and Dialogues of bathroom use. If the door was open you could go on it, closing the door tightly behind you. When you were through, you left the door open. If the door was closed, you knocked and waited for the response, "It's busy." If the matter was urgent, you replied, "Please hurry up in there." You never, never went in while it was busy, even if you had to stand on one foot while you were waiting.

At least you weren't supposed to. I experienced two bathroom invasions during 1958 and both happened during bath time. Bath time had become a very fun thing. The bathtub was like our inflatable rubber swimming pool except that it was hard, didn't have to be inflated, and came with its own supply of water. Although its main purpose was to wash in, you also got to play in the water and you could do it year-round, not just in the summer. For me it was this second function that was the more important. I was happily engaged in it one day when all of a sudden the door flew open and there was Dad. He had a big grin on his face and was holding the camera in his hands. Yikes! I didn't have any clothes on so I tried to hide under the water to prevent the camera from seeing me. If ever you try this at home, here's an important tip: take a deep breath *before* you put your face into the water. I was outraged at this egregious violation of the sacred bathroom etiquette and refused to talk to Dad for almost an hour.

Mom committed the second invasion. Again, I was happily playing away, oblivious to the ominous rumblings of approaching thunder. Suddenly the door burst open and there was Mom. "Get out of the tub," she commanded. "There's a storm coming." I must not have moved fast enough because she grabbed me under the arms and lifted me out of the tub. There followed the fastest – and wettest – toweling off I've ever experienced and the hastiest dressing I've ever known. Mom took Melody and me down into the basement, where we waited until the storm passed. Luckily, it didn't develop into a twister and Mom had been more concerned about the bathroom being hit by lightning with me in the tub than about the tornado watch broadcast over the Maquoketa radio station.

People on the east and west coasts don't seem to know very much about tornados and tornado weather. In Iowa a tornado watch is a cause for apprehension and watchfulness but not fear. They happen all the

time every year during tornado season. A tornado watch (these days called a 'severe storm watch') generally takes in several counties and usually results in nothing more than higher-than-usual wind speeds and an awful lot of rain, thunder, and lightning. It was a normal part of growing up in eastern Iowa and most people do not bother to take shelter during a tornado watch. With two small children in the house, Mom tended to err on the side of caution when Dad wasn't at home. After Melody and I were older we never bothered with this extra precaution when it was only a tornado watch.

A tornado *warning*, on the other hand, is a different matter. A warning means a twister has actually touched down somewhere nearby. Trailer parks seemed to be popular with tornados for some reason. People do take shelter during tornado warnings. Most houses in Maquoketa at that time had basements and these generally served as a storm shelter. Mostly it was only the farms that might have a separate storm cellar like you see in *The Wizard of Oz*. Years later when I was living in California, every once and awhile one of the natives would ask me if we weren't afraid the tornado would make the house collapse into the basement. No, that isn't what happens. A tornado doesn't blow your house down; it makes it explode. That's *why* you go down into the basement (if you have one). When I was a kid they would teach us all about tornados in grade school so we'd know what to do if one happened when we were by ourselves. What they *didn't* teach was this "duck and cover" pabulum TV these days seems to think was ubiquitous in the 1950s. Parents and teachers both knew you couldn't survive a direct hit by an atomic bomb so they never even brought it up. No point in scaring the kids about something you couldn't do anything about if it happened. There were a few official fallout shelters in Maquoketa, but not one single bomb shelter. If the grownups were scared of the bomb I never knew it. I don't think most people wasted much of any time worrying about it. Not in Maquoketa at any rate. Maybe they did in California. But California has always been known all my life as a place where a lot of silly, feckless things get started.

If you're waiting for an adventure tale of that day down in the basement, sorry. Nothing memorable happened. Melody didn't even know anything was going on. Because I wasn't generally allowed to go down into the basement, for me it was just an opportunity to explore its many mysteries. Mom spent most of her time keeping me from playing with the dirty coal. She spent the rest of it keeping Melody from playing with the coal. Ah, nothing is as tempting as the forbidden fruit. Most of the time Mom was pretty careful to tell us what we *could* do instead of what we *couldn't* do. For example, on Anderson St. I had been told I *could* ride my little car on the sidewalk. That's what made it the street for little kids. She *didn't* tell me I *couldn't* ride it in the street, so I was never even tempted to. The grownups had their street and I had mine. But Dad had slipped up the first time I was ever allowed in the basement and had told me I *couldn't* play with the coal. Fascinating stuff, coal. It's a rock that burns and how neat is that? □

It was in the Regenwether house that first year when I suddenly knew myself. More accurately, what I became aware of was what the word 'me' really meant. One of my little pastimes was to go on great hiking adventures in the house. You could travel in a full circle from the living room into the dining room, turn left down the hallway toward the front door, turn left again into the room where the TV was, and turn left again back into the living room. I would march this route over and over, usually singing some little song or babbling nonsense poetry I'd make up just for the pure pleasure of finding words that rhymed. Lewis and Clark never had as much fun as I did on my little expeditions. I was doing this one day and just as I was entering the dining room I chanted something like "the *rock* and the *tree* they be-*long* to *me!"* when suddenly I *felt* the word 'me.' I'd never felt a word before, and it stopped me dead in my tracks. I looked down at myself, having a pretty good view of my belly, legs and feet. What had just happened? I said the word, *"Me!"* and felt it again. There was something underneath my skin; I could feel it move when I said "me!" I started saying it over and over, *"Meee! . . . Meee! . . . Meee!"* Mom came in from the kitchen and gave me a puzzled look for a few seconds. I was way too busy to pay attention to her just then. You see, the universe had just changed. I wasn't sure how it had changed, but for the first time I really *knew* it was made up of two parts, the part that was *"me!"* and the part that wasn't. Metaphysically, it was a golden moment. I had found myself. □

I was slated to start kindergarten in the fall, and that made the late summer of 1958 vaccination time.

Our family doctor at the time was a general practitioner and surgeon named Dr. Swift. For reasons that will soon be apparent, he wasn't my favorite person in the world. Dr. Swift was a reasonably young looking man with dark hair and a bedside manner that was serious bordering on gloomy. He had delivered both myself and Melody. Doctors in those days made house calls. For those of you who can't remember anything before the mid-1960s, a house call was what the name implied. If you were sick, the doctor would come to your house to treat you. You had to be either in really, really bad shape or else giving birth to a baby to go to the hospital. (Why that system ever changed I don't actually know; I do know all the doctors quit making house calls at pretty much the same time. When companies act this way it's called 'conspiracy in restraint of trade' and, when the Republicans aren't in office, it's against the law).

But being sick is one thing; getting a vaccination shot is another. For shots you had to go to the doctor's office. Dr. Swift never seemed to talk very much, but Mom regarded every word he said as the absolute gospel truth. If the Hebrews had listened to Moses the way Mom listened to Dr. Swift, they wouldn't have had to spend all those years wandering in the desert. Dr. Swift said I needed vaccinations and so vaccinations it had to be.

Mom explained all this very carefully to me before the first visit to the office. It turns out there are tiny little things called germs that are so small you can't even see them. But they make little boys very, very sick so they don't feel good at all. To keep the bad germs from hurting little boys you had to have a very special kind of medicine called a 'vaccine.' This medicine is so special you can only get it at the doctor's office. It's even so special you can't swallow it. To get this good medicine to keep the bad germs away you had to go to the doctor and have something called a 'shot.'

"Okay, Mommy." I didn't know what a 'shot' was, and I didn't like the sound of it. But these germ things sounded pretty bad and if Mommy said getting a 'shot' would keep them away, then that's what it had to be.

The next day off we went in the car to Dr. Swift's office. I was still a little apprehensive over this 'shot' business but a little boy's got to do what a little boy's got to do. When we got there my first impressions of a doctor's office didn't exactly relax my mood. First of all, the place smelled funny. It didn't exactly stink, but it wasn't any flower bed either. Then you had to sit in a room – appropriately enough called 'the waiting room' – where, guess what, you waited. And waited. And waited. And waited. They make you wait there *forever*. While we were waiting, I could occasionally hear the sounds of little kids crying coming from the back. I started really not liking this place.

Finally a woman whose name was 'Nurse' came and said we could now go to 'the examination room.' The examination room was in the back. Where the little kids had been crying. If Mommy hadn't been there holding my hand, I would have turned tail and run right then. But Mommy was there, so I took a deep breath and, as bravely as I could, I marched on back there following Mrs. Nurse.

It turned out there were a lot of rooms back there. Mrs. Nurse led us to an empty one and ushered us in. It was a strange room, all shiny with a lot of metal things. There were picture frames hanging on the walls but they didn't have pictures in them. Instead they had paper showing a lot of weird things in them. Mrs. Nurse said to set me on 'the examination table.' It didn't look like a table. It looked more like a bed but it was too weird to be a bed. It was hard and it was cold. Mrs. Nurse asked Mom a lot of questions about me, strange sounding questions that didn't mean anything to me, and she wrote the answers down on a piece of paper attached to a clipboard. She put this in a thing by the door and said, "The doctor will see you shortly." Then she closed the door and she was gone. So we waited. And waited. And waited. And waited. They made us wait forever *again*. Nearby another little kid started crying. Mommy sat down next to me on the cold, hard bed thing that wasn't a bed and put her arms around me. I snuggled up as close as I could get and looked up into her eyes. "Germs are bad?" I asked in a little voice, just to be sure. She kissed my forehead and hugged me. Germs were bad. They made little boys sick.

Finally the door opened and Dr. Swift came in. Mommy stood up to greet him. "Good morning, Mrs.

Wells," he said. "Good morning, Richard." I nodded hello to him, but he had taken the clipboard from the wall thing and was looking at it. He asked Mom a couple more things then said, "Well, this won't take long." He got a tiny little bottle of something from a drawer and then pulled out a huge pointy thing. My mouth dropped open; my eyes must have been as wide as saucers. "What are you gonna do with that?" I squeaked.

He stuck the huge pointy thing into the little bottle and filled it with a liquid. "This is a hypodermic needle," he said. "I'm going to give you a shot." I think I whimpered because he said, "It's just one tiny little prick on your bottom. You'll hardly feel it."

I'd seen the sewing needles Mom used in her sewing machine. And I'd seen what the sewing machine did. This thing was a million-million times bigger than a sewing needle. Wouldn't feel it? Who did he think he was kidding? That thing was going to go all the way through me. And on my bottom? Nobody had said anything about having to take my pants off. Now I was scared *and* mad.

I clung with both arms around Mommy in a death grip and closed my eyes as tightly as I could while Dr. Swift slipped my pants down. Tempered steel isn't as rigid as I was right then. He rubbed something cold, wet and smelly on a spot on my bottom. Then came the shot.

Oooooow! It hurt! It was worse than the wasp sting. It was worse than anything. I let out a howl and started crying, all the indignity of my exposed bare bottom suddenly of no importance. Dr. Swift swabbed something else on me right where it hurt. "My, my, Richard! You have *very* good red blood," he said cheerfully.

Huh? "I do?" I squeaked in a very high pitched, teary voice.

"You have the best red blood I've ever seen," he said. "No wonder you're such a brave little boy."

I sniffled. My face was all wet, but I stopped crying. Brave boys don't cry, and I had been brave. Dr. Swift had just said so.

I strutted out of that office with my head held high. My bottom was very tender, but I was proud. I had the very best red blood there was. □

The kindergartener (age 5)

I turned five in early September and started kindergarten. There are very important things you have to know before you can start kindergarten. Mom taught them to me. You have to know how to write your name. Mom taught me what my name looked like and together we practiced writing it until I could do it all by myself. You have to know how to count to twelve. That is very important because you also have to know how to tell time. You can't tell time if you can't count to twelve. Mom taught me how to tell time by looking at the big clock on the wall in the dining room. I had wondered what that thing was. Telling time was easy. There is a big hand and a little hand. When the little hand is on ten and the big hand is on twelve it is exactly ten o'clock. When the little hand is on ten and the big hand is on six, it is half past ten. All the other times work the same way.

There are very important Rules, too. The most important Rule is you always have to listen to the teacher all the time. Another important Rule is you have to raise your hand before you talk. You raise your hand and wait for the teacher to call on you. Then you can talk. The third Rule is you can never ever get in a car with a stranger no matter what. Never ever. Those are the Rules for going to school.

The school was run by the PTA. The PTA was all the mommies and daddies and teachers. Together they decided what all the little kids were going to learn in school. PTA meetings were very big deals. Everybody dressed up in their church clothes to go to them. Just before school began in 1958 the PTA decided the mommies and daddies would all bring their little kids to the school building one night to meet

their teachers. We walked from our house to the school building. Dad carried Melody and I walked holding hands with Mom. It was a very big place. Mom told me it was named after the first Governor of Iowa, Mr. Briggs. The school building had a lot of very long hallways with rooms set at regular spaces. It was the biggest place I'd ever seen, and it was a little bit scary. There were no pictures on the walls.

Dad found my room. It was on the left at the very end of one of the hallways. The door was open, the room was brightly lit, and there were people inside. We went in and I met my teacher, Mrs. Weingard. Mrs. Weingard looked like a grandma and she was very nice. I liked her. While Mom and Dad and Mrs. Weingard talked about PTA things, I explored the room. There were big windows all along the back side. There were pictures and drawings and other things on all the walls. The room was full of little desks and chairs, and they were just the right size for little kids. I thought it would be alright to sit in one of them, so I did. Nobody minded. The desk had a flat top that opened up. It was empty inside, but there was plenty of room for my pencils and other things. Mom and I had gone uptown a few days earlier to buy school things; there were pencils and erasers and paper and lots of other neat things, and they all smelled brand new. There was only one grownup's desk and one grownup's chair in the room; they belonged to Mrs. Weingard.

There was another little boy in the room. He was the same size as me, and his name was Roger. He was going to kindergarten, too, in this very same room. Kindergarten was only a half day long, and Roger and I were both going to be going to the morning kindergarten. We very quickly became buddies.

When school started the first thing I learned was just how much I really, really didn't like big crowds of strangers. I had thought Mom's side of the family, with all those countless cousins, was big. That was nothing compared to the school yard the first day. I never knew there were that many kids in the whole world. Almost all of them were bigger than me and, except for Roger, I didn't know any of them.

Even the kindergarten class was big. Although there probably were less than thirty of us, when I walked into the classroom there might as well have been a thousand as far as my first impression was concerned. I didn't know how to count past twelve yet and there were a lot more than twelve. They were uncountable. Mrs. Weingard called out our names one by one and told each of us where to sit. Roger and I ended up on opposite sides of the room with a sea of strangers in between. The whole thing was just overwhelming and I felt absolutely miserable. I tried to ask Mrs. Weingard if I could please sit next to Roger, but I couldn't even force the words past my throat. She was very nice about it, but if you can't talk you can't ask. I stayed where I had been assigned. It was a long first morning.

Slowly, slowly, slowly as the days passed it got better. I recovered my voice the second day and one by one starting making a few friends. Roger turned out to be a popular boy who made friends easily, and my new friends were usually his friends first. In the meantime there was plenty to do. Kindergarten seemed to mostly be arts and crafts stuff. Learning how to draw things, listening to stories Mrs. Weingard would read to us, answering questions. Signing your name a lot. That sort of thing. Looking back much later, I came to think what kindergarten was about more than anything was learning to socialize with the other kids in a group and getting used to doing things in organized routines. At home I always knew what was expected of me. Thrown in with a big group of kids from all over town I didn't know, it wasn't at all clear what was expected. That was the most important thing I had to learn how to figure out. And I was a slow learner in that department. In comparison, the classroom lessons were easy.

Most disappointing to me was: Mrs. Weingard didn't teach us how to read. That's what I wanted more than anything. So, all in all, I didn't really like kindergarten very much. But it never occurred to me to hate school. School was very, very important. Mom and Dad both said so. I didn't see why any of this stuff was important, but that didn't matter. I had it from the very highest authority that it was important, and that was enough.

In the morning the kids would gather outside the school building on both the big asphalt plaza in front of the building and in the city park that immediately adjoined this plaza. When it was time to go in they

would ring a bell and there would be a mad stampede toward the doors. Since I didn't like kindergarten all that much, I usually walked rather than ran when that bell would ring. One morning a few weeks after the school year started, I was walking toward the door when one of the big girls ran by me at full speed. She bumped into my back as she went by and I went flying. I landed on my left knee right on the asphalt and it really stung. I got up and limped into the school building, muttering under my breath. She hadn't even slowed down long enough to apologize for knocking me down. Dad blasted strangers. (I'd learned that word from cousin Brent).

Everybody else was already in their seats by the time I limped through the classroom door. Mrs. Weingard took one look at the bloody stain oozing down my pant leg and rushed me to the nurse's office. I hadn't even realized I was bleeding. But when Mrs. School-nurse rolled up my pant leg there sure wasn't any doubt about it. I was shocked at the sight. This was definitely not good. It was strange, though, how something so bad looking could hurt so little. I was a bit concerned about all that blood but not really too worried about it. After all, it didn't hurt very much although it was a shame to waste my good blood.

While the nurse wrapped yards and yards of bandages around my knee, someone called Mom. In no time at all I found myself in the emergency room of the hospital. The doctor there wasn't Dr. Swift, which was alright with me. He made me take my pants off – again! – but he let me leave my underpants on so it wasn't quite as bad. I sat on another of those bed things that weren't beds – this one was covered with some strange kind of tissue paper – while he gently unwrapped all those bandages. He let out a whistle. "This is going to need stitches," he said.

Uh-oh. I knew what stitches were. I'd seen the sewing machine sew them. *Now* I was worried.

The doctor turned and looked me right in the eyes. "Richard," he said matter-of-factly, "I'm going to give you three shots of anesthetic and then I'm going to sew your knee back together."

"Anna's what?" I said nervously. "I don't want any shots."

He grinned. "Anesthetic. And yes you do. The shots make it so it doesn't hurt when I sew you up."

"I don't want you to sew me!" I shouted. Both my fists were bunched up tight. Now I was really scared, for the first time since the whole thing started, and this guy was about to get a punch in the nose.

Mommy put her hand on my shoulder. "You have to do this, Richard," she said in her no-nonsense voice. "It's the only way to heal the cut."

I wanted to argue, but I knew that voice. There was to be no getting out of this. Scared and resigned to being sewed, I took a deep breath, laid down on my back, and stared at the ceiling. My whole body was as rigid as a tree. "Okay," I squeaked. "Get it over with."

The first shot was just as bad as Dr. Swift's and I howled with pain. Then came another one, even worse, and I howled again. I was all tense, waiting for the third. It didn't come and it didn't come and it didn't come. Waiting for it was worse than the shots themselves and I lost my temper. *"What are you waiting for!?!"* I screamed at him.

The doctor laughed out loud. "It's all done!" he said. I sat up in disbelief and looked at my knee. There they were: three stitches. I hadn't felt a thing. In fact my knee didn't even hurt any more. It was all over. I looked at the doctor in amazement, my mouth hanging open.

He laughed at me again. I didn't see what was so funny. I was just glad it was over, and I was still in awe about the magic of Anna's thing. It was too bad it didn't work the first time, though. The doctor didn't seem to care that he'd hadn't gotten it right the first time, but it mattered to me that he didn't.

Still, it was over now and it hadn't been that bad mostly. Mom was smiling, he was smiling, even I was smiling. Then he said to Mom, "Take him to Dr. Swift in about a week to have the stitches removed."

Uh-oh. □

Christmas time

Christmas was always a big event at our house, but Christmas of 1958 was the biggest event of the year, no matter what Sherri might have thought. That was the Christmas Melody and I actually saw Santa Claus. For real. In person. In *our* house.

We always opened Christmas presents on Christmas Eve. Christmas Day was for playing with them and eating turkey with mashed potatoes and gravy. (It was for other stuff, too, like they taught us in Sunday School, but that, as far as I was concerned, was secondary). So when I heard Dad call my name from downstairs that Christmas Eve I knew it was time to open presents. I came dashing down the stairs, around the corners and into the living room where the tree was. Melody was already there, Bill and Mom and Dad were there – and *Santa was there!* I knew it was Santa right away. Red suit, red stocking cap, furry white beard, big belly like a bowlful of jelly – it was Santa all right. This was the biggest surprise since Dad had taken my picture in the bathtub. "Ho! Ho! Ho! Merrrrry Christmas, Richard!" he said. I squealed with delight. Mom and Dad and Bill grinned at each other. I wasn't surprised Santa knew me. Santa had a list of all the little kids and he checked it twice to find out who was naughty and who was nice. Everybody knew that. It was even in one of the Christmas songs Mrs. Weingard taught us.

Melody, who wouldn't turn three until the day after Christmas, didn't seem too impressed. She did accept her presents from Santa with polite grace and dignity, all the while staring at him intently. I, on the other hand, could barely restrain myself. After all, this was *Santa!* There were a million things I wanted to ask him. For instance, while we had a chimney it went straight down to the furnace. We didn't have a fireplace. How had he gotten in? Where were the eight tiny reindeer? Did he need any helpers for the rest of tonight? But you don't interrogate Santa. Besides, everybody knew Santa was magic. How else could he visit all the little kids all over the world in one night? I understood when Santa couldn't stay too long.

The next Christmas Eve I was determined to camp out next to the Christmas tree until Santa showed up. I wanted to see how he got in without a fireplace. I wanted to see the sleigh land. I wanted to pet the reindeer. This year I'd be ready! About seven o'clock in the evening Mom said to me, "Come with me to Grandma's house for a minute." Grandma and Grandpa Teters had moved to Maquoketa and were living in the house right next door. I put on my coat and my boots and over to Grandma's we went. We weren't there very long, and nothing that went on seemed very important. I was impatient to get back to my post. Mom and I returned home and when we did Dad told us we'd just missed Santa. He had been there and gone while we were at Grandma's house. It was a big disappointment.

I was determined that nothing would go wrong the Christmas after that. I decided to bring Melody in on the plan. One or the other of us would be next to that tree all night long if we had to be. I carefully explained the plan to her.

"That was Uncle Marvin," she said.

Huh? Uncle Marvin was Mom's brother. Melody was crazy. "That was Santa," I told her.

"That was Uncle Marvin dressed up like Santa," she repeated.

"It was not!"

She rolled her eyes at me. *"Honestly,* Richard!" she said contemptuously and stalked away.

Melody was never one to suffer fools. □

1958 turned into 1959. I learned how to ride a sled and throw snowballs and all the other pastimes that were usual when Iowa lay beneath the thick blankets of snow that came every winter in those days. Riding sleds was the only time I was allowed to play in the street. The sleds were made of wood with

steel runners. You would lie down on them and steer using a long wooden handle at the front. Just north of the Regenwether house 5th Street had a sharp downhill drop and this was where we'd hold our sled races. At the bottom of the hill you had to make a sharp right turn to avoid shooting across the street and into the big snow bank on the other side. It was never a good idea to go plowing full speed, head first into that snow bank. The snow there was as hard as a rock wall. Making this turn was also a good idea in case there was a car coming along the east-west street at the bottom. But cars almost never drove past 5th street down there in the winter and one of us was always at the bottom of the hill as a lookout. The snow on the streets was packed down, hard and shiny and you could go really fast on your sled. The sleds didn't have any brakes and they stopped when they stopped. We'd compete both for who could go the fastest and who could go the farthest. Usually whoever won the first also won the second.

That was also the winter Uncle Bun tried to give me a ride home from school. Uncle Bun was Mom's bashful brother. His real name was Len but no one ever called him that. Mom's other brothers, Marvin and Chet, were outgoing and boisterous, especially Uncle Chet. Uncle Marvin could be serious but Uncle Chet was always full of laughter and contagious joy that surrounded him like a cloud. The only problem with Uncle Chet was that whenever he'd see me he'd tickle me until I couldn't stand it anymore. It turns out there *can* be too much of a good thing.

Uncle Bun was as different as could be. Pretty much the only times I ever saw him were in Grandma and Grandpa Teters' house or in Aunt Sylvie's house. No matter how much bedlam might be going on, he would sit in a chair by himself and watch and smile and never talk. If you came over and talked to him, he'd just grin at you until you talked yourself out and went away. Uncle Bun was a real big listener.

School had just finished for the day and I had just started walking home when I heard somebody call my name. Parked on the street next to the sidewalk was a car and there was a man in it behind the driver's wheel asking me if I wanted a ride home. He *looked* like Uncle Bun, but something wasn't right here. This man wore a cap; Uncle Bun *never* wore a cap. This man wore a coat; Uncle Bun *never* wore a coat. This man was in a car; Uncle Bun *never* rode in cars. This man talked; Uncle Bun *never, never* talked. My house was only two blocks away; people *never* used a car to only go two blocks. Cars were only used to go a long way. I decided this man was a stranger. You can never ever get in a car with a stranger no matter what. Never ever. That was a Rule. I refused to speak to him and walked away.

I never told Mom about this. After all, you don't brag about following a Rule; you just followed them. But Uncle Bun must have told her about it because a few days later she told me it was okay to ride with Uncle Bun. But he never offered again. Besides, that man wasn't Uncle Bun. He was a stranger. □

That spring the tree next to our back door became infested with giant hideous worms. They were a pukey white color and made of ring-like segments bigger around than my fingers. They lived on the leaves of the tree but sometimes they would drop off and land in my hair. *Yich!!* They were the most disgusting things in the whole world. They looked like macaroni. I was never able to eat macaroni again. They were so disgusting that worms in general lost their appeal for me. I hated *every* kind of worm after that. They disgusted me so much I'd feel like my stomach was full of the slimy, squirmy things.

Worms became for me what pumpkin pie became for Uncle Wayne. Pumpkin pie is the best thing in the world and everybody liked it, especially Uncle Wayne. But Aunt Hazel would never eat pumpkin pie. We were at their house one time for supper and Uncle Wayne was eating his pumpkin pie with gusto. Aunt Hazel refused to have any and Uncle Wayne was riding her about it: This is good; you don't know what you're missing; why won't you try this? Aunt Hazel snapped back at him, *"Because it looks like baby poop."* Uncle Wayne turned pale and had to run down the hall to the bathroom. He could never eat pumpkin pie after that.

Uncle Wayne knew how to make two things. One was just awful and the other was just wonderful. The awful thing was catfish bait. Everybody agreed Uncle Wayne's catfish bait was the best catfish bait there ever was. Everybody who went catfishing wanted to use Uncle Wayne's catfish bait. But Uncle

Wayne's catfish bait smelled really, really, really bad. Catfish loved it, but that only proves there's something basically wrong with catfish. I never smelled anything so awful until the time the teacher took us all down to see the cheese processing works at the Mississippi Valley Milk Producer's Association building. That smelled pretty bad, too. Catfish would probably like it.

The wonderful thing was this teeny, tiny popcorn. It would pop into the smallest pieces of popcorn you ever saw. But how good it was! There was never ever any other popcorn that could compare to it. It was the very best popcorn in the whole world. And the only place you could get it was at Aunt Hazel's and Uncle Wayne's house. □

That summer Dad made two changes to our back yard. The first was the swing set. Dad came home one day lugging a whole bunch of strange looking pipes into the back yard, where he started putting them together. The next thing I knew, there was a swing set with multiple swings. Melody and I were thrilled. We soon discovered that when all the swings were occupied and everyone swung in unison back and forth you could make the front legs of the swing set come off the ground. It wasn't much – just an inch or two – but there for awhile the contest was to see who could make them come up the highest. Two of the best swingers were my new friends, the Benhart sisters who lived just down the block and around the corner. It hadn't been explained to me by the other boys yet that girls couldn't be friends. When I did find out about that rule I thought it was pretty silly. Except for the obvious fact girls were girls – you could always tell because they wore dresses instead of pants – I didn't see anything the boys could do that the girls couldn't. Oh, there were differences. Boys could throw the ball better than girls and girls could do somersaults and tumbling and were more acrobatic on the monkey bars than the boys. And girls didn't fight fair; they would kick you, which every boy knew was against the rules. But that was about it. I always liked girls, but I had to keep that a secret from the other boys. Older girls had a similar rule about boys, so the Benhart sisters were the only friends who were girls I had for a long time. Rules are rules, but that rule just never made any sense to me.

The other change was the garden. Dad put in a small garden that summer and Melody and I helped. He showed us how to put the little seeds in the rows and cover them with *just* the right amount of dirt. In no time at all there was corn and peas and other things galore all grown up. When the peas were ready Dad showed me how they were hidden inside the pod. That might have been a mistake. I showed Melody and it didn't take us long to figure out that we could open the pods with our fingernails and eat the peas raw in the garden. Peas right out of the pod are great. To this day I like raw peas in the pod the best. I never understood why anyone would want to ruin good peas by cooking them. Not that Mom ever got much of a chance to cook them. It's the same with carrots except with carrots you have to wash the dirt off first. But it doesn't work that way with corn. □

The first grader (age 6)

Fall came and I started the first grade. First grade was different from kindergarten in many ways. I guess the PTA decided not to have a special night to meet the teacher because the first time I met Miss Young was on the first day of school. You had to go to an office first to find out where your room was. It was confusing and there was a lot of bedlam, but I did manage to find the room on time. There were some kids from my kindergarten class in first grade, but there were also a lot of kids I didn't know. They must have come from afternoon kindergarten. It wasn't quite as bad as the first day of kindergarten had been, but in first grade you had to go to school all day long. That took some getting used to.

But Miss Young made up for it by *teaching us to read!* Finally! We started off by learning the ABCs. Miss Young taught us a song to use to remember our ABCs and the whole class would sing it together. There might have been other things she taught us too, but as far as I was concerned learning to read was everything.

Miss Young *was* young so she had the right name. Not young next to us, of course. But she was young next to mommies and daddies and next to Mrs. Weingard. She was also pretty. Not as pretty as cousin Bonnie of course; nobody was as pretty as cousin Bonnie. But she was pretty. Miss Young was kind of serious like and sometimes she made me nervous because she didn't smile a whole lot. Cousin Bonnie smiled all the time; Bonnie made the sun come out.

After we learned our ABCs Miss Young gave us some little books to learn to read from. They were strange books. The stories in them were all stuff like

> See Spot.
> See Spot run.
> Run Spot run.
>
> See Tom.
> See Tom run.
> Run Tom run.

Nobody talks like this. I never did figure out why they were running or who they were running from.

But at least I was learning how reading worked. It turned out that words were made of put-together letters. If you knew how to say the letters you knew how to say the words. Words ended with spaces or sometimes with little black dots that didn't make a sound. Miss Young taught us that. Now when Mommy would read to me, I could put my finger under the words and follow along as she read. Pretty soon I figured out that when you came to one of the little black dots you pause just a teeny extra second before doing the next word. After awhile I could read all by myself, although for a long time I could only do it if I read out loud. It takes awhile to learn to hear words in your head without saying them out loud. The little black dots make a good place to breath.

Even after I had learned how to read I still had to go to school. That was because there were lots of important things you needed to know even after you learned how to read. Mommy said so. Bill said so, too. If you didn't go to school you didn't get to go to College. I didn't know where College was, but Corky had been there and both Bill and Bonnie were going to go there. So it must have been an important place to go to. But you didn't get to go there if you didn't go to school. Okay. If it was important enough for Corky and Bill and Bonnie to want to go there, I wanted to go there too some day.

Even though we had to go to first grade all day, there were a couple of times during the day when they would let us go outside and play for a little while. This was called recess time. We could go outside and slide on the slide or ride on the merry-go-round or just run around. Whatever we wanted to do. We had to come back in when the bell rang, though. In the first grade room there was a clock on the wall, and I got to where I could tell when it was almost recess time. But one day Miss Young told me I didn't get to go outside for recess that afternoon. I had to stay in the room that day. I don't know why. But she said I had to and we had to do what the teacher said. That was a Rule.

It was boring. She made me sit at a desk in the middle of the room and stay there. It wasn't even my desk. It didn't have my things in it. They left me all alone in the room while everybody else got to go outside and play. Even Miss Young got to go outside and play.

After awhile I opened the desk to see if there was anything inside it I could do something with. There wasn't much in there but I did find a crayon. That was promising. I looked around some more to see if there was some paper to draw on but there wasn't. The only paper thing in there was one of the little reading books and you couldn't draw in a book. You could only draw in coloring books, never real books. That was a Rule. Then I noticed something. The *top* of the desk was yellow and shiny and flat. It was a *perfect* place to draw. I got to work.

When the bell rang I could go back to my own desk so I put the crayon back where it was and sat down at my desk again. The other kids and Miss Young all came pouring back into the room and I got ready to pay attention again. That was one of Miss Young's rules. You had to pay attention. But then I

noticed something. One of the little girls – she was one of the ones I didn't know – sat down at the desk where Miss Young had made me sit. Uh-oh. It hadn't occurred to me that desk belonged to somebody else too. The girl saw my drawings on the desk top and she looked pretty upset. She didn't like it and that meant I needed to tell her I was sorry. But then she raised her hand urgently and Miss Young came over and looked at the desk top too. She turned around and looked straight at me. She was really, really mad.

Uh-oh. I realized right then that I'd done something naughty and it wasn't too tough to figure out what it was. It must be a Rule that you couldn't draw on desk tops. The ABC song Miss Young had taught us ended with

> Now I've said my ABCs
> Tell me what you think of me.

Miss Young didn't need to tell me what she thought of me. I could tell just by looking at her. Suddenly I felt just awful.

It got worse. She made me come up to the front of the room and stand there in front of everybody while she scolded me. The scolding went on and on and on and the longer it went on the worse I felt. I felt myself getting smaller and smaller, caving in like inside. It was *mortifying!* She kept asking me over and over why I'd done that but I felt so awful I couldn't say anything. All I could do was stare at my feet. I'd broken a Rule and you can never, ever break a Rule. There just wasn't anything to say and I couldn't have said anything even if there was. My voice wouldn't work anymore. Everything just got more and more awful. Finally Miss Young told me I had to stay after school and then made me go sit down again. I was so ashamed I couldn't look at anybody.

After school I had to wash all the drawing off the top of the desk. I scrubbed it and scrubbed it until it was all shiny again. Miss Young stood there and watched me while I scrubbed. I couldn't look at her. I couldn't talk to her. I didn't want her to look at me. I wanted to be invisible.

When Miss Young finally said I could go I had to run all the way home. I knew I was going to be late and that meant I was breaking another Rule. You had to come straight home from school right away every day. That was a Rule. I was late anyway but Mommy didn't seem to notice. So even though I broke that rule too, at least I wasn't being too naughty.

All the rest of first grade I stayed really, really quiet and kept out of Miss Young's way as much as possible because I knew she didn't like me anymore. I did everything she said we had to do. I never ever raised my hand. I only talked when she asked me a question and made me talk, and I talked real, real quiet. If we had to sing, I'd sing really, really softly. I just wanted first grade to be over.

I didn't want to do anything to make anybody mortify me ever, ever again. □

III. The Kennedy Years

1959 had turned into 1960 sometime during first grade and the new year brought new things with it. One of them was bowling night. Maquoketa had gotten two bowling alleys sometime near the end of the 1950s, the Hi Ho and the Town & Country Bowling Lanes, and something called 'bowling leagues' had been set up. Mom and Dad joined some of them – how many I was never sure – and the next thing I knew one night a week we had to go out to the Hi Ho for bowling night.

The Hi Ho was a big place and a little place all at the same time. In terms of sheer open size it was very big, or at least it looked that way to me. But most of the space was taken up by the bowling lanes. These were a long series of narrow hardwood lanes set side by side and separated by gutters with bowling pins at one end and pits where grownups sat at the other. People would take turns rolling huge black balls from the pit end. The idea was to knock down all the white pins at the other. I didn't know why the white things were called 'pins.' They didn't look like any pin I had ever seen. But since only the grownups got to bowl this was only a passing curiosity as far as I was concerned.

The place was small because there wasn't much room left after you took away the lanes. There was just a long half-hallway that ran between the wall and the lanes. I thought of it as a half-hallway because there was only one wall; the other side was bounded by racks of bowling balls and tables and little entry ways into the pits. Real hallways had two walls. With most of the grownups packed into the pits, the half-hallway was what was left for us kids to be in. Not that there were many kids there. Sometimes Melody and I were the only ones. Bowling was for grownups. After you wandered up and down that half-hallway a few times you'd seen pretty much all there was to see.

After watching what the grownups were doing for a little while, I strolled over to the racks where the extra bowling balls were kept to get a closer look at these things. They were black, smooth, and not as shiny as they looked from a distance. They all had the words 'Hi Ho' painted on them with numbers below. Different balls had different numbers. These things were way too big to hold like a baseball. Not even the grownups could get their fingers around these things. Instead they all had three holes drilled into them. I saw that the grownups would put their fingers into these holes – thumb in one of them and the two middle fingers into the others – so I tried that. The holes were far apart and I could barely get my fingertips into the holes all at once. The thing was *heavy*. I had to squeeze it with my fingers as hard as I could just to keep them from slipping out of the holes and then I had to lift with all my might just to pick the thing up. Actually swinging it underhanded like the grownups were doing was out of the question. I had to grip it so tight the ball actually hurt my fingers and I had to set it back down again. The prospects of having any fun with this thing looked pretty dim.

At one end of the Hi Ho was a big counter with a man standing behind it. After watching this for a little while I found out that this was where they kept special shoes. You had to put these shoes on or you weren't allowed to step onto the shiny hardwood floor down in the pits. This was also where the grownups paid the man for using the bowling lanes and where they picked up the huge score sheet paper. The grownups would write on these things every time somebody tried to knock down the pins and some kind of brightly lit, complicated gadget built into the scoring tables in each pit would project what was written onto big screens hanging over the pit so everybody could see what the scores were.

Bowling scores looked complicated and I spent a long while trying to figure out how that worked. If somebody knocked down all the pins on the first try, they'd get an 'X' in one of the little boxes. If it took them two tries, they'd get a number in one box and a '/' in the second. If they didn't get the rest of them on the second try, they'd get another number in the second box. It took awhile to figure out what the numbers in the boxes meant. My first guess was that it was the number of pins they'd knocked down on that try, but it was hard to make sure of this. I tried counting the number of bowling pins but this was tough to do. It was hard to see them all when they were all standing and they didn't stand there for long. A big thing would set them down all at once, so you couldn't count them one by one as they were being set up. Once they were set up, somebody would throw his ball at them and knock some of them down. If they didn't get them all on the first try it was still not easy to count how many were left. The big thing would come down again and there was a sweeper thing that swept the others away. Sometimes it was, though, but that wasn't the number on the score sheet. If they didn't get them all the second time either the sweeper thing would descend again and sweep them all back into a black hole at the end of the lane. It did it pretty fast and unless there were only a few left I couldn't count them fast enough before the thing took them all away.

After watching for a long time, I finally figured out that the pins were always set down in some kind of funny pattern. There were four rows with one pin in the front row and two pins in the second. It was hard to see how many were in the third row. But if the grownup didn't knock them all down on the first try, it was easy to see how many were left in the back row. Sometimes there was one, sometimes there were two. Sometimes the two would be left on one side. Sometimes they'd be on the other. Sometimes there would be one on each side; when that happened I noticed the other grownups would laugh and tease whoever threw the ball. Using my fingers to mark where the pins were left, I finally figured out there were only four in the back row. After that I found out that if I watched a *different* lane, so that I could see

in from the side, I could do the same trick to figure out how many there were in the third row. There were only three. Now I could count them using my fingers to keep track row by row. Fortunately, I didn't run out of fingers but it was a close call. There were ten bowling pins.

After that it was easy to figure out the numbers in the little boxes. Somebody would knock down some pins and I'd count how many were left, either before the big thing came down or after it set them down again. The big thing would come down and lift up all the remaining pins; then the sweeper thing would come down and brush away the ones that had been knocked down; then the big thing would set the others back down again. But as soon as this happened the grownup would throw another ball at them, so I had to count really fast. I found out the best way to do this was just to see how many were left in each row and then count these up. If there was only one or two in a row you could tell without actually counting, and then you could just count the patterns up with your fingers. So I'd count how many were left that way then look at the number in the box and count that number on top. It counted up to ten, so that was that. The numbers *were* the number of pins knocked down.

There was a third number they would write down in a big box below the little boxes, so I tried that one next. This one was strange. Sometimes they'd write it down right after the second throw. But sometimes they'd wait and not write it down until later. Sometimes they'd write it down in an earlier box after the first throw. Sometimes the number was more than ten. I couldn't see any pattern at all to that number so I had to give up. Sometimes grownups just do things and nobody understands why, and this was one of those things.

After figuring out the numbers in the little boxes, there wasn't much else to see. The only other thing that was interesting was the big thing that set down and picked up the bowling pins. The big balls rolling down the wood lanes would make a sound like thunder and when they hit the pins it would make a loud, strange *pow!* sound that seemed to echo. With all those grownups and all those lanes, the bowling alley was a very noisy place. As soon as the pins went *pow!* the big thing would come down to pick up the pins still standing up. Somehow it could hear them. The other interesting thing about it was when there were no pins left for it to pick up. When it couldn't find any pins to pick up, it would go back and get a whole new set of pins to put down. I didn't think it could actually see the pins because it didn't seem to know none were left when it first came down. So it must have been able to feel them. That was interesting. Clothes lines couldn't do that. I wanted to walk down there and get a closer look at the big thing, but I knew that was a bad idea. I didn't want grownups throwing those big bowling balls at *me* and, besides, it looked like the big thing was perfectly capable of squishing little boys if they got too close. On top of that, there was the sweeper thing; I didn't want it to sweep *me* back into the black hole in the back. I didn't know what went on back there, but with all those big bowling balls flying into it all the time I wasn't too keen on finding out. And since all those things could happen, I knew I'd get yelled at for even trying. So I gave up on the whole idea of going to look at the big thing up close.

I soon learned to bring along something from home to play with on bowling night. You could never count on there being other little kids at the bowling alley and even when there were there still really wasn't all that much to do there. Melody would be there, of course, but she had her own interests and we usually didn't stick together for very long once we got to the Hi Ho. The Hi Ho presented another special challenge to child's play, too. You couldn't really set up to play in the half-hallway. It was too often full of grownups moving in herds in one direction or the other. A little kid always had to watch out for getting run over.

Fortunately, there was a solution to that. The Hi Ho had a great big men's room that was almost always deserted while the grownups were bowling. Most of the room was a big open space with a long bench to sit on running around two sides in front of lockers that filled up the wall space. There were a few stalls with toilets in them, and a couple strange white things of unknown function, which I later learned were called 'urinals,' hanging on another wall next to the sink. The floor was tiled and always clean, and there were no herds of grownups to bother you. The back of the men's room was a perfect place to set up

my things and play.

That was where I first met Duane. He was a little boy who lived on a farm. He was even in my same grade at school, but we hadn't met there previously. One night I had my army men set up in the back of the men's room when the door opened and Duane walked in. I think he might have been as surprised to find me in there as I was to see him. Like I said, there usually weren't too many other little kids at the Hi Ho. Instinctively, we both knew we were in a territorial situation here. I thought of the men's room as my turf, which made this other little boy an intruder. Equally, Duane knew he had as much right to be there as anyone. The Hi Ho men's room was valuable territory and not to be conceded lightly. We were strangers to each other, so for the first few minutes we looked each other over like two stray dogs meeting in an alley.

"I'm Duane," he said after a minute or so.

"I'm Richard," I said. The silence returned as we continued to size each other up. I made the next move. "I bet I'm stronger than you," I said. That was obvious to me because my daddy was the strongest daddy in the world. Everybody could see that just from watching him bowl. When his ball reached the bowling pins there was always a tremendous *crash!* and pins exploded in all directions like a startled flock of birds. Since he was the world's strongest daddy, it stood to reason I was the world's strongest little boy.

Duane gave me the only possible answer one boy can give another. "No you're not," he said. The challenge had been thrown down and accepted and there was only one way to settle this: the manly art of wrestling. We were the same size but I knew I could take him easily.

Wrong. Duane was awfully strong, as is often the case when a boy lives on a farm. We gripped each other and strained, and maneuvered, each looking to take the other down. Duane got his arms around me and down I went. The contest continued on the floor for another few minutes and gradually, slowly, inexorably I felt him getting the upper hand. *Geez! he's strong!* I realized with a shock. Soon he had me on my back and I was pinned. It was a new and unsettling experience for me.

"Do you give?" he asked. I gave and he let me up at once. The question of who was the better boy having been settled quite decisively, we became pals from that night on. At school we would chum around a little during recess but not after school because Duane always had to ride the bus home. At school Duane, like me, tended to be one of the quiet boys. He never picked on anybody and you could always count on him. He was one of the good kids. We haven't been in touch for many, many years now, but I still like him and I still think about him sometimes. □

Bill finished his junior year of high school that spring and he had played on the varsity football team. 1960 was the year he taught me how to catch a football. There was always a gang of kids in the back yard at the Regenwether house and one Saturday Bill came out of the house with his football in his hands. He had lettered in football and the time had come to start his little brother following in his footsteps. It was one of those exciting little-boy-coming-of-age moments.

He had us line up in front of him and at the command, "Hut one! Hut two!" off we'd dash in all directions. He'd pick somebody and gently toss the ball to them.

Catching the football had always looked so easy at the high school games and on TV. I couldn't wait to do it for the first time. Off I went, running the pattern he had taught me then turning to catch the pass. My turn came and he threw me the ball. It got bigger and bigger in the sky, coming right at me and growing to gigantic proportions as it came. I closed my eyes. It bounced off my shoulder, knocking me down.

"Keep your eyes open!" Bill commanded.

Easier said than done. Especially when there's a hard, giant, growing oblong ball with pointy ends coming right at you. I closed my eyes a second time. Then a third. Then a fourth. The ball bounced off my

hands, my chest, the top of my head. Each time Bill repeated the command about keeping my eyes open. His patience wore a little thinner each time.

After the fifth time he gave me his Junior Father look. “Rick, stop being such a sissy,” he said sternly. “Keep your eyes open.”

Sissy? A sissy was the worst thing you could be! At school if one boy called another boy a sissy it always started a fight. I gritted my teeth. I wasn’t going to be any sissy. The sixth time I forced my eyes to stay open, even though they wanted to close by themselves. The giant spinning ball came right at me. I watched it all the way. I trapped it between my arms and my stomach and held on for dear life.

It *is* easier when you keep your eyes open. □

I don’t remember the TV set being on very much at our house in those days. There were cartoons on Saturday morning and every night we’d watch the News. Mom and Dad would, anyway. I’d stick around long enough to listen to the theme music but after that it didn’t hold much interest for me. If Dad wanted to let me sit in his lap while he gave me a back scratching that was one thing. I’d curl up and thoroughly enjoy that. Otherwise there were better things to do after supper than watch the dumb News.

But that year – I’m pretty sure it was that year – a new TV show came on after school. It was called The Three Stooges and I thought it was hilarious. I didn’t like Moe very much. He was bossy and mean and was always picking on people. He reminded me of some of the boys at school I didn’t like. But I liked Curly a lot. He was funny and nice, although he was awfully dumb and always getting into trouble. The other Stooge was Larry. He had weird hair. Him I could take or leave. Melody and I both became regular watchers of The Three Stooges.

One evening just after the show I was coming into the dining room for supper. Bill and Dad were in there and they were boxing. Bill used to challenge Dad to box a lot, although I couldn’t see much point in it. Dad would put those huge tree-trunk arms of his up and when he did there just wasn’t any way to touch him. You could barely even see him. A person might just as well try to box somebody who had one of those big shields the Romans had. He would just stand there crouched behind those arms grinning, sometimes chuckling, and every once in awhile throwing a short jab just to remind Bill it was there. He always was careful to pull his punches short.

Bill, on the other hand, was deadly serious about these matches. He’d bob and weave and advance and retreat and throw hard straight-ahead punches, just like Dad taught us, with everything he had. No pulling punches for him. They’d just bounce off Dad’s arms. Not a single one of his punches ever landed. I came walking up behind him, but he didn’t even notice me. His concentration was total.

Right beside and slightly behind him was a wooden stand on which was set a little bowl full of a bunch of different little knickknacks and things. Including one nice long sharp nail. I grinned. Here was an opportunity for some Three Stooges mischief. Instantly matching deed to thought, I picked up the nail and prodded Bill with it right on the bottom.

He gave a surprised yelp and jumped forward, arms thrown wide open just as Dad threw one of those little jabs. There was a *smack* and a *thump* and the next thing I knew there was Bill sitting on his bottom on the dining room floor. It was hilarious. He turned his head and looked at me, a small trickle of blood running from his nose and a surprised look on his face. Almost as surprised as the look on Dad’s face. “What did you stick me with?” he asked. Bashfully, I held it up. “I stuck you with this pin,” I said.

Bill just shook his head. “That’s a nail, Rick,” was all he said. Mom had a little more to say to me about it before we sat down to supper. Poking people in the bottom hurt them, she informed me. She also informed me that what the Three Stooges did on TV was faked, not real. They didn’t really hit each other or do any of those things. All those things were called ‘stunts’ and I mustn’t think anything I saw on TV shows was real. From now on there was a new Rule: No poking people in the bottom with anything.

Unfortunately, she forgot to tell Dr. Swift about this Rule. □

I don't think Bill had a lot of luck with his boxing. A lot of times he and I would box. When we did, he took Dad's role, protecting himself and just poking at me every once in awhile to remind me to keep my guard up. One day he was coming up the stairs just as I appeared at the top to go downstairs. Where he was standing we were just about the same height and face to face with each other. Right away he lifted his arms in the boxing position and we went at it. I was really letting my punches fly and he just blocked them, grinning and laughing at me. I started punching harder and faster.

Unfortunately for him, his arms weren't tree trunks and my little fists were small enough to fit in the gaps between them. One slipped through the crack before he could close up and caught him *whack!* right on the nose. Backwards down the stairs he went, all the way to the bottom.

I was horrified. I rushed down the stairs just as fast as I could go and got down there just as he sat up again. I was flooded with relief when I found out he was all right, except for another trickle of blood running from his nose.

"Nice punch," he said.

Bill was usually pretty tolerant and patient with me and willing to overlook the things I occasionally did to him. With Melody it was a different story. A really different story. She was always more than a little precocious and by the summer of 1960 my role of wiser older brother was, shall we say, not without its points of dispute. Most of the time we got along quite well. But Melody had and still has a very independent spirit and a mind of her own. And a temper. Patrick Henry never defended liberty with more fire and skill than Melody defended her prerogative to be her own person, wise counsel from me notwithstanding. From time to time we would, as the saying goes, fight like cats and dogs with one difference. Our fights were almost never physical. Almost. Even though I wasn't physically that much bigger than her, I was still bigger, stronger, and a boy besides. Melody was far too smart to play on my home field. When we fought, our fights were verbal.

It turned out this was Melody's home field. I might have been two years older and a graduate of first grade – whereas Melody hadn't started kindergarten yet in the summer of '60 – but in any war of wits I usually found myself heavily outgunned. It was bows and arrows versus armored tank brigades. It wasn't too hard for me to make Melody mad; I had a knack for doing that without even knowing I was doing it. But this was pretty much always a mistake. My skill level in verbal combat was typical for little boys: *Is so! Is not! Is so! You're a dummy!* Melody played at a whole different level, even a whole different league. She could get me so mixed up that pretty soon I wouldn't even know what I was talking about, which never prevented me from doing it at the top of my lungs. That was when she knew she had me. If she put her mind to it, she could get me to argue that day is dark and night is light. After one of these fights I usually wouldn't even know what had happened; I'd only know that I'd lost.

Around noon one otherwise bright, sunny, warm summer's day we were both in the upstairs front room which, since Sherri had moved out, had become a kind of playroom. We were having a doozy of a fight – I have no idea what about – and, as usual, I was coming out on the losing side of it. With the skill of a marksman, Melody delivered a verbal shot to a particularly tender spot on my ego and I completely lost my temper. She had this gigantic doll – the thing was almost as big as she was – and I grabbed it and threw it at her. Melody ducked.

The doll flew straight as could be right at the window overlooking the front sidewalk below. Ever have one of those nightmares where you couldn't move? Ever have one while you were wide awake? I did right then. I could only watch helplessly while the huge doll flew right into the window. It bounced off without breaking the glass. *Whew!* I started to breath again.

The window, wood frame and all, began to tilt slowly outward.

I let out a squawk and leaped forward, racing to catch that window before it fell out completely. Too late. Just as I got there it dropped free and I had to catch myself on what was left of the window sill to

keep from following it down. With stately, slow motion grace it dropped to the sidewalk below and shattered into a million pieces.

Ten feet in front of Dad.

He was just coming home for his noon dinner when this unlooked-for aerial bomb exploded at his feet. He looked at it dumbfounded for a second. Then he looked up to see his youngest son hanging half out the hole where the window had been, staring down at him wide-eyed and open-mouthed. Our eyes met for long seconds. Then Dad squared his shoulders and strode forward, looking straight ahead, and in through the front door he went. Melody lit out for California.

I turned around and faced the door, my back to where the window had been, in complete misery. Dad's footsteps – *thump, thump, thump* – sounded on the stairs. This was a total disaster. I knew there was going to be a spanking. How could there not be? *I had broken the house!* I sure didn't need anyone to tell me there was a Rule against breaking the house. That was obvious to anyone. *Thump, thump, thump*. There just couldn't possibly be anything naughtier than breaking the house. I began trembling and couldn't stop. *Thump, thump, thump*.

Dad appeared in the doorway. He was as big as a mountain. I hung my head all the way down to my chest. I just couldn't look at him. I heard him say in a voice like thunder, "What the hell's going on up here?"

In a small almost tearful voice, I told him the whole story of what had happened. I could barely force the words from my throat. I didn't leave Melody out, of course. But she hadn't broken the house. I had. Me. Nobody else. I felt my cheeks getting wet.

"Look at me," Dad said. Slowly I looked up. His face was stern and set. He stared at me for a long time. Then he said, "Don't ever throw things at your sister again." I whispered, "Okay." He looked at me some more. I squirmed. Forever passed. Then he said, "Now go downstairs to dinner."

That night Dad fixed the window. Nobody ever brought it up again. Not even Melody. I never broke the house again. I never threw anything at Melody again. Well, nothing hard anyway. □

The second grader (age 7)

That year President Eisenhower decided he didn't want to be President any more. I thought that was surprising but I didn't think it was strange. He had always been President and I figured maybe he was just tired of it, the way I'd gotten tired of first grade. Whatever the reason, he wasn't going to do it anymore and people were looking for somebody else willing to take the job. The grownups decided they were going to take a vote and then whoever was picked had to take the job and move to President Eisenhower's white house.

One night we went down to Aunt Hazel's and Uncle Wayne's house and the four of them started talking about who would make the best President. Aunt Hazel and Uncle Wayne wanted somebody named Nixon to be President. From what they said I figured out that Mr. Nixon was President Eisenhower's assistant president in charge of vice. It sounded important. But Mom and Dad thought somebody named Kennedy would make a better President. Apparently Mr. Kennedy moved around a lot because Dad said he'd get the whole country moving again. I hoped that didn't mean *we'd* have to move and I'd have to ride the bus to school.

"I'm voting for Mr. Nixon," I announced. Aunt Hazel and Uncle Wayne chuckled.

"You only say that because *his* name is Richard," Mom snorted. Mom didn't like Mr. Nixon. She didn't like him a whole bunch and she never ever did.

"It is?" I asked in surprised delight. Well, that settled it. □

Second grade started every day with the Pledge of Allegiance. The teacher would have us all stand up and put our right hands over our hearts and repeat after her: *I pledge allegiance . . . to the flag . . . of the United States of America . . . and to the republic . . . for which it stands . . . one nation . . . under God . . . indivisible . . . with liberty and justice for all.* After that we could sit down and learn things. Most things about the Pledge of Allegiance I understood. I understood we weren't really promising anything to the flag. The flag never seemed to need anything. It just flew up on top of the flag pole outside the school building, right above the Iowa flag, except when it rained. It said right in the Pledge the flag only *stood for* America. The teacher had explained that 'republic' meant when you elected people to represent you and run the government for you and that the government made all the laws for everybody. Electing people to run the government was called 'democracy.' I liked democracy. Democracy meant there would be liberty and justice for everybody and that was a good thing. The Germans hadn't had democracy before the war. They had Nazis. Nazis tried to conquer the world and take away everybody's liberty and justice. They were why Daddy had had to join the navy and fight the Japanese. That was what *allegiance* meant. If anybody tried to take away somebody's liberty and justice, *everybody* had to go fight them and make them stop. That was more than a Rule. That was a Duty.

The part I didn't understand was the 'under God' part. In Sunday School they taught us that *everybody* was under God. Not just us. We weren't the only nation under God. God loved *everybody*. Even the bad people. God was always forgiving bad people if they stopped being bad. I didn't see why they put God in the Pledge of Allegiance. It made it sound like God only loved us and that wasn't true. Didn't the people who wrote the Pledge of Allegiance know that? They must not have gone to Sunday School.

I kind of liked Sunday School, mostly, but I didn't like church very much. In the first place, they made you sit in the pews and not do anything all morning, except when they made you stand up and sing hymns or put money in the collection plate. It was boring and pointless. The minister would talk and talk and talk and talk and talk. And it was always about the same thing, about how everybody was a sinner and had better beg God to forgive them. Sinners were people who did bad things on purpose. Mommy and Daddy weren't sinners. I knew *I* wasn't a sinner. Melody wasn't a sinner. Most of the time anyway. Sherri and Bill weren't sinners. Grandma and Grandpa Teters weren't sinners. Aunt Sylvie wasn't a sinner. I didn't like it when the minister told everybody we were all sinners. It was a lie. Telling lies was a bad thing and he was doing it on purpose and that made *him* a sinner. He needed to go to Sunday School. And you didn't have to *beg* God for forgiveness. God was everybody's Father and children never had to beg their daddies to forgive them for being bad. Daddies always forgave their kids without being asked, so long as they stopped being bad. That was what daddies did. Ministers didn't know very much about God. They needed to listen to Aunt Sylvie. She could explain it to them. □

When November came we all went down to the voting place to choose who was going to be President after President Eisenhower retired. There were lots of people at the voting place and it was noisy and exciting. There were lots of lines everywhere but they weren't very straight. I stood in line next to Daddy and Melody stood next to Mommy. The lines led up to these tables where lots of people were sitting. I thought that when you got to the table you voted but it didn't work that way. Instead you had to tell them your name and where you lived and then they looked in a book to find your name. Daddy told the lady at the table his name and she looked in her book. She looked at me and I stood up straight and said, "I'm Richard!" She smiled and said something nice, but I don't remember what.

After talking to the nice lady we had to wait our turn again. There were lots of big booths with black curtains around all the walls. Daddy said these were the voting machines. But the voting machines didn't really vote. They just counted votes. Daddy and I went into an empty one and he moved a handle that made the black curtain close. The voting machine was made of lots and lots of little bitty levers next to a lot of names. I asked what they were for and Daddy said you pushed the levers beside the names of the people you wanted to vote for. Mr. Nixon's and Mr. Kennedy's names were there. There were lots of other names, too. It turned out there were lots of government jobs that needed someone, not just President. There were people who needed to go to Washington D.C. to be Congress. There were people

who needed to go all the way to Des Moines to be Legislature. Some people would get to stay in Maquoketa to run the county or the city. Counties are like the country only smaller. Maquoketa was the Seat of Jackson county. It was like the capital of the county. There were people who made boards for the school. I guess they worked for the PTA. It turned out we needed a lot of representing.

There was one lever you could use to vote for something called a 'straight ticket.' Daddy told me if you used that lever you voted for all Democrats or all Republicans. But we didn't use that lever. "You vote for the best man," Daddy said, "not the party." The Democrats and the Republicans were parties. Daddy showed me who we were voting for and I pressed the levers. He had to lift me up to reach the ones near the top. After we had chosen all the best men Daddy pulled on a bigger lever and the black curtain opened again. It was really neat. "Can we do it again?" I asked. Daddy laughed and said no. You only get to vote just one time. Then you have to leave the booth so the next person could vote. I was feeling pretty proud and excited. Voting for all the best men was part of Allegiance too. While we waited for Mommy and Melody to come out of their booth I said to a man standing next to us, *"I voted!"* He looked kind of startled for a second. "Who did you vote for?" he asked me.

I stood up very straight and tall on my tiptoes. "The best men!" I said. □

Thanksgiving came soon after the election and 1960 was a special Thanksgiving because we had a real turkey. Grandpa Teters had gotten a real live turkey from somewhere. His name was Tom and he was going to be dinner. Daddy and I walked next door to Grandpa's house to see him.

Tom was *enormous!* He was the biggest bird I had ever seen. The teacher had told us turkeys say, "Gobble gobble gobble" but Tom didn't say that. Instead he said, *"Obble-obble-obble!"* really fast and he forgot to say the "g." He kind of strutted when he walked like he was in a parade. He would look at us kind of stern like, as if he didn't like us.

Grandpa said we were going to eat him tomorrow, which explained why he didn't like us. Looking at him, I had my doubts about the whole idea. "Do we have to eat the feathers?" I asked. If we had to eat the feathers I didn't want any part of it. But Grandpa laughed and said no, you pull the feathers out first. Oh, no. Not me! I wasn't about to pull Tom's feathers out. He looked mean and I was sure he wouldn't stand still for that. Somebody else could pull his feathers out.

There was a tree stump in the yard and Grandpa's ax was sitting on it. Grandpa got hold of Tom and carried him over to the tree stump. He put this metal ring thing over Tom's neck and kind of nailed it to the stump with the dull side of the ax so Tom couldn't run away. When he did that I had a pretty good idea about what was coming next. Tom wouldn't let people pull his feathers out so first you had to chop off his head. That made sense. Also, if you're going to be cooked it's better if your head is chopped off first. I'd hate to be cooked while I was alive.

Grandpa raised the ax and brought it down hard. Tom's head flew off and blood started spurting from the neck. *But then the rest of him started running around in the yard!* He ran around and around in circles with no head and the blood spurting everywhere. I was horrified. This was like Halloween for real. It was *creepy!* Tom was alive with no head on. But then he fell down and stopped running around. The blood stopped spurting.

I just stood still there in Grandpa's yard with my eyes and mouth wide open. Grandpa looked at me and put his hand on my shoulder. "Don't worry," he said. "Sometimes turkeys do that after you chop off their heads. It's all right." I felt a little reassured, but it was still creepy. I wasn't too sure I'd be able to eat dinner on Thanksgiving. But the next day Tom didn't look like Tom anymore. All the feathers were gone and he was cooked and looked like a regular turkey. He was pretty tasty. But I never watched another turkey get his head chopped off. Never ever.

After Thanksgiving I told the other boys at school about it. Some of them thought that was really something, but a couple of the boys called me a liar. I kind of bristled up at that and we might have had a

fight start right there. But before it went that far a couple of the boys who lived on farms said I was right and that really happens. They said chickens do it too. Then all the boys believed me so it turned out there was no fight. It also turned out that girls thought the story was super creepy and they'd make funny noises when we told them about it. So we had a lot of fun for awhile telling girls all about it. Most of the time we could get them to run away. It was hilarious. But telling the farm girls wasn't any fun. They just said we were stupid and walked away with their noses in the air. □

There was one girl in second grade named Cindy. She was the prettiest girl in second grade and, rule or no rule, I wanted to be friends with her. The rule against being friends with girls was just a boys' rule, not a grownup rule, and it was stupid anyway. But making friends with Cindy was going to be hard because the girls and the boys never mixed during recess and I would only talk in class when the teacher made me. Cindy didn't live near our house so the only times I ever saw her were at school. I needed to get some way to talk to her.

Somebody had told me that if a boy liked a girl and wanted to be friends the way he showed it was to give her a ring. I knew that was true because Gary had given Sherri a ring. Two rings, in fact. So if I was going to make friends with Cindy I knew I'd have to give her a ring. I talked with Mom about it and she smiled and the next day brought a ring home from the store for me to give to Cindy. I couldn't wait for the next day. At morning recess the next morning I found Cindy on the play ground and walked over to her. A little bashfully I held out the ring and said, "This is for you." Cindy's face lit up with joy. She grabbed the ring from my hand and put it on her finger. She squealed and jumped up and down. She showed it to her other friends standing there. They squealed and jumped up and down too. Everybody was all excited and happy and jumping up and down.

Then they all ran away.

Well, that hadn't gone the way I'd hoped. Not at all. I just stood there feeling kind of bewildered and kind of hurt and wondering just exactly what had gone wrong. Cindy hadn't said one word to me, not even 'thank you,' which was *very* rude. She'd liked her present alright; that was obvious. But I might just as well have been a tree in the playground. The bell rang and we had to go back to class. Thankfully none of the boys had seen what had happened, and I kept my mouth shut about it. But, to make matters worse, somehow or other Uncle Chet and Grandpa Teters found out I'd given a ring to a girl and they both teased me about it without mercy. In view of how things had turned out – or, more precisely, how it had not turned out – I didn't dare say one word to them about what had happened and could only stand there and take it all in red-faced silence. It was embarrassing and humiliating enough without me handing them even more stuff to tease me about. Thank goodness Melody never found out. I never told a single soul what had happened. I never even tried to talk to Cindy again. It was a long, long time before I would talk to *any* girl at school after that. The boys had been right. You couldn't have a friend who was a girl. □

1961 came and Mr. Kennedy became President Kennedy. There was a big doings in Washington, D.C. We watched it on television. All the people were dressed up in very fancy suits and wore stove pipe hats. The news man said President Kennedy was the thirty-fifth President of the United States. By then I knew there really had been other Presidents before President Eisenhower. They had told us in school about George Washington, who had been the first President and Father of His Country. They had told us about Abraham Lincoln, who had been the sixteenth President and had saved the country during the Civil War. And I had heard the grownups talk about President Roosevelt who became President during the Great Depression and saved the country and then had saved the world from the Nazis during World War II. It turned out that America was really, really old and somehow thirty five Presidents didn't seem like very many Presidents to have in all that time.

President Kennedy was young, next to President Eisenhower, and very handsome even though he talked funny. I liked him and was glad he had been elected to take over being President. He put his hand on a Bible and promised to do his best and made an oath – which is like a promise only bigger – to 'preserve, protect, and defend the Constitution of the United States of America.' I asked Bill what the

Constitution was. He told me it was the Supreme Law of the Land. I knew what that meant. That meant it was the Law that gave liberty and justice to everybody.

President Kennedy made a speech. “Let the word go forth from this time and place, to friend and foe alike,” he said, “that the torch has been passed to a new generation of Americans born in this century.” I didn’t see any torches anywhere. *I* was born in this century but I didn’t have it. I didn’t know what he meant. I didn’t understand a lot of what he said, but then he said something I did understand. He said, *Ask not what your country can do for you; ask what you can do for your country*. I suddenly felt kind of chilly and tight inside when he said that, like there was something important inside me that was trying to get out. He was talking to *me*. “Okay,” I whispered to the television set. It was a Promise. It still is. □

That year there was an after school night where the mommies and daddies came to the school to talk to the teachers, and after that there was a Book Fair in the school building. There were lots and lots of books there of all different kinds. Unlike the school books, you could *buy* these books and take them home with you. I never knew there were so many different books about so many different things. It was exciting. If it had been up to me, I’d have taken every single one of them home. But there was one in particular that I especially wanted. It was a book about outer space. Ever since Sputnik I’d heard a lot about outer space and rockets and space exploration. Now here was a whole book about it. I begged Mommy to buy that book and I didn’t understand why she wouldn’t. A few years later I understood. It was an expensive book and we couldn’t afford it. Instead she bought a different, smaller book for me. It was about something I’d never heard of before: Dinosaurs.

We took that book home and I started reading it that very night. It was *fascinating*. It said that millions and millions of years ago there lived these giant reptiles. Many of them were bigger than a house and the ground used to tremble when they walked. Dinosaur meant ‘terrible lizard’ and the word came from a whole different language called Greek. All the dinosaurs died millions of years ago and we only knew about them because people had found and dug up their bones. The people who went out and found dinosaur bones and put them back together and figured them out were called ‘paleontologists.’

To read about dinosaurs I had to learn how to read real long words. That was hard at first, but Daddy had told me you spelled words like they sounded and I figured that meant words sounded like they were spelled. That turned out to be true, mostly, and pretty soon I could understand the names of all the different dinosaurs. There were big, huge, four-legged dinosaurs called ‘brontosaurus.’ That meant ‘thunder lizard.’ They were so huge they had to have two brains, one in their heads and one in their bottoms, the same way fire trucks had to have two drivers, one in front and one in back. There were funny looking two-legged dinosaurs that had bills like a duck. They were called duck-billed dinosaurs, which made sense. There were four-legged dinosaurs whose backs were covered with huge plates and who had big spikes on the ends of their tails that they used to fight dinosaurs who tried to eat them. They were called ‘stegosaurus,’ which meant ‘covered lizard.’ I suppose they called them that because they were covered with those big plates. There were four-legged dinosaurs who had three huge horns coming out of their heads. The horns weren’t curly like a bull’s; they came out straight ahead and were used to stab other dinosaurs that tried to eat them. These were called ‘triceratops,’ which meant, sensibly enough, ‘three horns in the head.’ There were two-legged dinosaurs who ate other dinosaurs and they were called ‘allosaurus,’ which meant ‘other lizard’; I thought that wasn’t a very good name for a dinosaur because it didn’t mean very much. There were four-legged dinosaurs who were covered in armor and had a big club for a tail. They were called ‘ankylosaurus,’ which seemed to mean ‘stiff lizard.’ With all that armor on, I could see why they were called that. There was one that looked like an ostrich and was called ‘struthiomimus.’ It was the silliest dinosaur. I didn’t know what that name meant; it probably meant ‘silly old thing.’ There was the meanest dinosaur of all, ‘tyrannosaurus rex,’ the King of the tyrant lizards.

I read every book about dinosaurs I could get my hands on. I pestered Mom about it so much that one Saturday she took me to the library and I got to have my own library card. The library had books about dinosaurs in it and I read every single one. You could only take library books home for two weeks and

then you had to take them back, so I tried to memorize everything that was in them and remember every single picture. It turned out that millions of years ago the world wasn't at all the same as now. Iowa was once under the sea and there were volcanoes and lava and even the plants were different. Life itself had begun in the sea and there were little undersea creatures called 'trilobites.' The books had spectacular pictures in them of what the earth had looked like all that time ago. Mom and Aunt Hazel began giving me dinosaurs instead of army men for presents. I became Maquoketa's greatest living expert on dinosaurs. For Show and Tell at school I always talked about dinosaurs. When I finished second grade my teacher told my third grade teacher that if she wanted to win my respect she'd have to know all about dinosaurs. So she learned all about dinosaurs too. When I started third grade I was amazed that the teacher knew all about dinosaurs. I thought she was the best teacher in Briggs Elementary. The other boys thought I'd gone nuts, but I didn't care. When we'd go to Aunt Sylvie's and Grandpa and my uncles were there, Grandpa would have me spell the dinosaur names from memory and then he'd tease Uncle Marvin and Uncle Chet because they couldn't even pronounce the dinosaur names, much less spell them. They'd listen to me and shake their heads and say it was amazing.

I wished, more than anything I ever wished for, that I could be a paleontologist when I grew up. But everybody knew that when little boys grew up they had to get a job and earn a living unless you were rich. I knew – it was obvious – that nobody would pay you to find dinosaur bones. Being a paleontologist was like being able to play and have fun your whole life, and nobody would ever pay you for that. I figured paleontologists were all rich guys who had all the money they needed and could spend all their time with dinosaurs. We weren't rich so I knew I'd never be able to be a paleontologist. It made me sad but that was just the way things were. I never even told anybody I wanted to be a paleontologist because I *knew* it couldn't possibly happen and nobody could do anything about it. □

That year the greatest thing in the world happened. A man rode a rocket into outer space and flew around the world. His name was Yuri Gagarin and he was a hero and he was a Russian. Everybody felt ashamed that a Russian and not an American had been the first to dare to fly into outer space. Everybody heard about what he had done but the grownups didn't talk about it very much because they were so ashamed. There was a poem I had read for some reason called *High Flight* and it went *Oh! I have slipped the surly bonds of Earth and danced the skies on laughter-silvered wings. . . And, while with silent lifting mind I've trod the highest untrespassed sanctity of space, put out my hand, and touched the face of God.* That was what Yuri Gagarin had done only he had danced above the sky on laughter-silvered wings. I wished I could have gone with him and touched the face of God too.

A few weeks later Alan Shepard, who was an American, rode a rocket into outer space too and everybody went wild and celebrated. The grownups hadn't talked very much about Yuri Gagarin but everybody was talking about Alan Shepard. Daddy said he was a Navy man and I felt happy that a Navy man had been the first American to go to outer space. Somebody wrote a song about him and they played it on the radio for awhile. I first heard it while I was at Aunt Hazel's house. It wasn't a very good song but the tune was happy and catchy and I'd go around singing it for awhile: *Count down to zero! There goes our hero! . . .*

It wasn't exactly *High Flight*.

We had astronauts – seven of them – and the Russians had cosmonauts. I was a little confused by that. Weren't they all going to the same place and doing the same things? I decided 'astronauts' and 'cosmonauts' must be kind of team names, like the Packers and the Bears. Walter Cronkite said we were in a 'space race' with the Russians and one of the boys at school said the Russians had bears, so it kind of fit. I wanted us to win the race because we were Americans and the Russians had Communists, who were against liberty and justice for everybody. Yuri Gagarin wasn't a Communist, though. He was a Soviet. I didn't know what being a 'Soviet' was exactly, but whatever it meant it had to be better than being a Communist. Anybody who is against liberty and justice for everybody is a bad guy and Yuri Gagarin was a hero. Bad guys can't be heroes. □

Somewhere right in here I suppose I should mention a little thing called the Bay of Pigs. I have read somewhere the Bay of Pigs is supposed to be one of the defining events of my generation. Sorry. Maybe it was for some folks, but it sure wasn't for me. I never even heard about it until years later. I never heard any grownup talk about it. No boys at school talked about it. Teachers didn't talk about it. I didn't see President Kennedy's television address about it. Unless the news was talking about the astronauts I didn't pay much attention to it; there were better things to do, like dinosaurs, than to watch the dumb news. The Bay of Pigs was absolutely zilch to me in 1961.

The Junior Fire Marshals, on the other hand, was a completely different matter altogether. One day a fireman came to our class and talked about what it was like to be a fireman. He was a real fireman and that was really neat! We all got little red fireman's hats to wear. They weren't real fireman's hats; they were made of very thin plastic and you had to be careful or you'd break your fireman's hat. He made all of us Junior Fire Marshals and we even had our own song, the Junior Fire Marshals' Song:

> Junior Fire Marshals are we.
> We're as watchful as can be.
> Our goal is fire prevention
> And firemen all agree
> If we learn to do our part
> A fire will never start.
> So as we parade
> With the fire brigade
> We're as proud as proud can be.
> Junior Fire Marshals are we.

I liked being a Junior Fire Marshal even though we never did get to march in a parade with the fire brigade. But one Saturday that spring the house suddenly began to fill with smoke. Mom made Melody and me run outside into the back yard. As we stood out there, smoke began pouring out from the windows and all the neighbors came running over. The house was on fire! I was horrified. And all my dinosaur books were inside! I tried to run back in to save them but Mom wouldn't let me go get them. Then the firemen came with their big red fire truck. I relaxed just a little. The firemen would put out the fire. They would save my dinosaur books. And that's just what they did. They were heroes. It turned out the chimney had clogged up and all the smoke from the furnace came backing up into the house. I heard the Fire Chief himself explaining this to Mom. I was glad it wasn't a real fire, although I was worried they might still kick me out of the Junior Fire Marshals. But I was lucky and they didn't. □

Near the end of the school year President Kennedy went over to where Congress was to tell them something. They put it on TV and I watched. This time I understood everything he said, mostly, although it was more like feeling the words than hearing them the way they rolled one into another. Years later I had to look up his speech and it was just the way I remember feeling it. He said, *Now it is time to take longer strides – time for this nation to take a clearly leading role in space achievements which, in many ways, may hold the key to our future on earth. . . Recognizing the head start obtained by the Soviets with their large rocket engines, which gave them many months of lead time, and recognizing the likelihood that they will exploit this lead for some time to come, in still more impressive ways, we nevertheless are required to make new efforts of our own. For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last. . . But this is not merely a race. Space is open to us now. And our eagerness to share its meaning is not governed by the efforts of others. We got into space because whatever mankind must undertake, free men must fully share. I therefore ask the Congress, above and beyond the increases I have earlier requested for space activity, to provide the funds which are needed to meet the following national goals: First, I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth.*

WE WERE GOING TO THE MOON!!!!

I felt stunned and elated and awed all at the same time, and so bursting with pride that tears came out of my eyes. *We were going to the moon!* We were Americans and we were going to the moon! All in one moment the universe had changed again forever and gotten bigger and somehow I just knew nothing would ever be just the same as it was ever again. We were going to the moon! □

The third grader (age 8)

For my birthday that year Bill gave me a model ship. He actually gave it to me a few weeks before my birthday because he was leaving for College, which I found out was in Iowa City at the State University of Iowa. He wouldn't be living at home again from now on.

It was the battleship U.S.S. Missouri. When I opened the box I was surprised and puzzled. Instead of what I was expecting, the box was full of millions of tiny little plastic pieces, a little tube of glue, and some instructions. It was the first time I'd ever seen a model ship. I looked at Bill and he must have seen how puzzled I was because he said, "You have to put it all together first."

I asked him to do it for me, but he shook his head and said no, *I* had to do it. He showed me the instructions and explained them to me a little bit but then he wouldn't do one more thing to help me. A bit tentatively, I got to work. The instructions turned out to be pretty easy to follow because there were pictures right along with the words showing you step by step what to do and what order to do it in. The glue was the hardest part. I had never used glue before – it wasn't like the paste we'd used to make things in school – and the instructions said not to put too much glue on and not to let the glue run outside the place where it was supposed to go. It was hard to figure out how much was enough but not too much. For the first little bit the glue kept oozing out from where it was supposed to stay. But I went and got a roll of toilet paper from the bathroom and that fixed that problem. The next thing that was hard was the drying part. The glue started out all wet and it took it a little while before it would hold the parts together. It got kind of boring holding the pieces together while the glue dried but I figured out I could sort of clamp the pieces in place by putting them in between the two parts of the box it had come in. Then while it was drying I could start figuring out what I was supposed to do next. It saved time.

The plastic pieces smelled different from anything else I knew about, but it was kind of a neat smell. The glue, on the other hand, was pretty stinky until it dried, and I found out that it tended to dry right in the spout so no more glue would come out. A pin from Mom's sewing machine basket fixed that. Mom had a lot of pins and I didn't figure she'd miss one of them too much. I put the waste excess glue in the cardboard box the ship had come in. I worked on it, right there in the middle of the living room floor, all day long and slowly, slowly a ship began to emerge from all those millions of pieces. When I came to the big guns the instructions said to glue the barrels into the turret and then glue the turret in place on the deck. The guns came in an assembly of three and I found out there was enough stick when you inserted them in the turret that you could elevate them up and down and they'd stay put by themselves without any glue. Then I found out the turrets, which fit into the deck using a little plastic dingus on the bottom of the turret, would stick in the hole well enough not to come out but still loosely enough you could turn the turrets. What was the use of turrets that couldn't turn or big guns that couldn't raise or lower? I decided not to glue these parts in. The little guns, though, were a different matter and I had to glue them in.

Melody came and watched me work for a little while, without talking or bothering me. After she'd watched for awhile she must have gotten bored because she left again. I figured she probably went off to play with her present. That was the way it was at our house. When either one of us had a birthday we *both* got a present. It was a good arrangement. At last all that was left were the decals. These were tricky, too. You had to moisten them with water and ever so very gently put them on the plastic. It turned out to be tough to do that without getting a lot of bubbles and bumps in the decal. My first few didn't look so good, but I eventually got the hang of it.

Finally it was done! I gently set the Missouri on her viewing stand and just sat there admiring her for the longest time. She was beautiful! I don't think Bill realized what he had started that day. From then until the time I started high school, I was a devoted model builder – when the dinosaurs could spare me that is. Over the years I built ships, rockets, airplanes, tanks, cars, the Mercury, Gemini, and Apollo space ships, the Lunar Excursion Module (as it was originally called), and even a great big Saturn V rocket that stood almost three feet tall. I even built a plastic man with transparent skin so you could see all the organs inside. You name it, I built it. I liked building them even more than playing with them. I loved the intricacies of the details, loved to see something taking form right there in front of me, loved seeing how all the little pieces fit together to make something that was somehow *more* than just all the parts added together. At the time I didn't have a clue how valuable this experience was going to be later. It was just something I loved to do. □

Melody started kindergarten that year and my teacher was Mrs. Lubbens. She was the one Mrs. Sutton had warned to learn about dinosaurs. All the kids said Mrs. Lubbens was mean so I was nervous about having her for a teacher. But the kids were wrong. Mrs. Lubbens turned out to be a great teacher. One of the things we learned about was how numbers worked and this was called 'arithmetic.' Mom told me to learn as much about it as I could because it was important. Arithmetic turned out to be a neat way to add things or take things away without using your fingers. There was a table called 'the addition table' you could use to look up the sum of two numbers. She showed us how to use it. We were supposed to learn the addition table by heart but there were an awful lot of numbers in it. It was impossible to remember them all. I was always forgetting them or getting them confused.

But I figured out you really didn't have to memorize the whole thing – you just had to memorize a little part of it – because there were patterns in it and if you could count backwards all you had to do was remember the pattern. I first noticed it with the nines. 9 + 9 was 8 with a carry. 9 + 8 was 7 with a carry. That was the way nines worked. If you added 9 to anything the answer was one less than that thing with a carry. Then I noticed eights had a similar pattern. 8 + 8 was 6 with a carry. 8 + 7 was 5 with a carry. Eights turned out to be like nines except the answer was two less with a carry until you got down to 1. 8 + 1 was 9. But that was just counting up from eight by one. Then I saw something like this happened again with sevens. 7 + 8 was 5 with a carry. 7 + 7 was 4 with a carry. With sevens you took away three from the second number. That worked until you got to 7 + 2, which was 9 without a carry. So not only were there patterns in the columns of the addition table; there was a pattern to the patterns. All you had to do was learn the rule for the pattern of the patterns and you didn't have to memorize anything except the ones that didn't have a carry. And those were just the ones where the pattern took away too much so you always knew it when you had one of those. That made things a lot easier and it was *neat*. It also turned out that the same pattern happened in the rows of the addition table. So you really only had to know less than half the things. If you couldn't remember 4 + 7 all you had to do was remember the pattern for 7 + 4 (1 with a carry). *That* was neat. Of all the numbers, six was the hardest because with six you had to take away four and that was starting to get hard again. But then it turned out that when you had a six all you had to do was use the seven pattern and then take away one from that. There was a pattern to the pattern of the patterns.

In the years to come, when arithmetic turned into math, it always turned out that there were patterns. There was always some new stuff you had to memorize, but I found out there were always patterns hiding in it somewhere. If you could find the patterns, it always turned out there was a pattern to the patterns. Math ended up being all about patterns. If you knew that then math was easy because you really didn't have to remember very much. All you had to do was learn how to use the patterns. It was neat *and* tidy.

It turned out there were patterns in spelling too, only they weren't tidy. Most of the time the rule that you spelled it like it sounded worked. But then there were exceptions like 'I before E except after C or when sounded like A as in neighbor and weigh.' And then there were exceptions to that, like 'weird.' That was why I was always irritated with spelling. You had to memorize a lot of little things and it wasn't neat and tidy like arithmetic. Compared to math, spelling was hard. □

Christmas eve that year a whole lot of people came to our house. There was Grandpa and Grandma Teters and Uncle Marvin and Uncle Chet and cousin Marilyn (she is Uncle Marvin's daughter) and Aunt Sylvie and Uncle Vern (her husband) and more cousins and I don't remember who all else. The house was stuffed with people like a turkey and it was all one big, noisy, happy, untidy Christmas Eve. Bill had come home from College for Christmas and that was great. It was always a great and happy thing when Bill came home. There were so many people everybody couldn't fit into one room. At supper time all the grownups ate at the table in the dining room and all the kids ate at card tables set up in the living room.

When it came time to open presents the grownups sat along all the walls and the older kids took charge of passing out Christmas presents. Wrapping paper flew everywhere and Aunt Sylvie made a brave attempt to gather it all together in one place, but that turned out to be pretty hopeless. Kids were running around in all directions and everybody was talking and the whole thing was, well, untidy. One of my presents was a little metal helicopter with a long wire attached to it that ran to a little box. I showed it to Uncle Chet and it turned out the thing *flew!* It actually, really *flew* just like it was a bird. I was agog. The helicopter instantly was a bit hit with the grownups, who flew it all over the place all night. It never came back into my hands all night long. I had lots of other presents, though, so it was okay with me if the grownups wanted to play with it, and I think every single one of them did. Between my other presents and cousin Marilyn, who was older than me and always liked me a lot even if she did tease me sometimes almost as bad as Uncle Chet did, I had plenty to keep busy with. I always had fun with cousin Marilyn even if I couldn't keep up with her all the time. I knew I'd get my turn with my helicopter on Christmas Day and every day after that. The grownups only had tonight to play with it.

The next day there were Christmas presents scattered around all over the place. All the company had gone home and it was just us in the house. Dad and Bill were watching TV and Mom was getting dinner ready. Melody was carefully collecting up all her presents and I was sitting in the middle of the living room on the floor playing with one of my presents, which had just happened to come to rest at that spot the night before and therefore was very conspicuous. Mom called in that dinner was ready and as Bill got up from his chair he accidentally put his foot down right on top of the little helicopter and crushed it. It made a terrible crunching noise as it died.

I was instantly shocked and heartbroken. There was *my* helicopter all crushed and mangled and I'd never even gotten to fly it. I ran over and gently picked it up and started to cry and took it to Daddy in tears. Bill felt just awful. I could see it in his face. I held the broken body of my helicopter out to Daddy and pleaded with him to fix it. I knew he could save it because Daddy could fix anything. He'd told me so himself. But he wouldn't even touch it. He just looked at it and said it was broken and couldn't be fixed. Now I felt even worse and I couldn't understand *why* he wouldn't even *try* to fix it. I *knew* he could if he tried. Then I had a mean thought. Maybe he just didn't *want* to fix it. That made things even worse still. I was inconsolable. My little helicopter was dead. It would never fly like a bird again. It would never fly for me. And nobody would help me.

I think Bill was inconsolable too, even though he didn't cry. He just looked really sad whenever he looked at me all the rest of that day. He was so sad he couldn't even tell me he was sorry. I understood. I knew he hadn't done it on purpose. I knew he was sorry. But Daddy just didn't seem to care.

And I couldn't understand why. It was the meanest thing he'd ever done. □

1961 turned into 1962. The space people, who were called NASA, had come up with a bigger rocket to use in Project Mercury. The first rockets, although they looked pretty big to me, were called Redstone rockets and this new rocket was much bigger. It was called the Atlas rocket. I found out it was named after a make-believe fairy tale guy who was so strong he could carry the whole world on his shoulders. Early that year the third astronaut, John Glenn, rode the Atlas rocket further into outer space than Alan Shepard and Gus Grissom had and became the first American to fly around the world. When you flew around the world it was called an 'orbit' and John Glenn flew three orbits around the world. Alan Shepard was a hero; Gus Grissom was a hero; now John Glenn was a hero too. Everybody was excited and happy

and proud, and everybody would go around telling everybody else about it even though everybody already knew about it.

Everybody already knew that Cape Canaveral in Florida was where the rockets took off. But now I began to hear more and more about the rocket scientists who built the rockets. It turned out the rocket scientists were very, very smart. I knew that because now whenever somebody did something stupid you could count on somebody else saying, "What did you expect? He's no rocket scientist." The smartest and most important rocket scientist was a man with a funny name, Dr. Wernher von Braun. I just knew Dr. Wernher von Braun was very, very, *very* smart if he was a doctor *and* a rocket scientist. It turned out that Dr. Wernher von Braun had a funny name because he originally came from Germany. That was where he had figured out how rockets work and after the war he became an American so he could build rockets for us so we could go to the moon. In his own way, Dr. Wernher von Braun was a hero too. Without him the astronauts couldn't be heroes. Without him America couldn't go to the moon. It wasn't easy to build rockets. Sometimes they blew up. I saw some blow up on television. It was awesome and terrible to see. Dr. Wernher von Braun wouldn't let astronauts ride any rocket until it stopped blowing up.

Whenever an astronaut was going to ride a rocket they would put it on television. The NASA would schedule the lift off for early in the morning so little kids could see it before they had to go to school. But something always seemed to go wrong and the rockets would never lift off when they were supposed to. I would make it a special point to get up early to see the lift off, and I began to really hate hearing the words, "T minus such-and-such and holding." When everything was okay they'd say, "T minus whatever and counting." But whenever anything went wrong they would say "and holding" and you always knew it wouldn't happen when it was supposed to. Whenever they would start holding some men had to figure out what was wrong and fix it. Walter Cronkite told us these men were called 'the engineers' and that they were very, very, very picky. Everything had to be just perfect or the engineers would make everybody wait. They almost always made everybody wait so long that little kids would have to leave for school before the rocket lifted off and then I'd have to watch reruns of it on the dumb news. □

Dad was in the implement business again and that spring there was a big doings of some kind at the Farm Bureau. Dad went to it and since the Farm Bureau Building wasn't too far from our house he took me with him. The inside of the Farm Bureau was full of grownups – all men I think – gathered for some kind of meeting or something. I had no idea what any of it was about and I didn't particularly care. It was boring so I went outside where all the kids were. There were a lot of kids out there. Not nearly as many as there were in school, of course, but a lot of them. They were pretty much all farm kids and I didn't know many of them. But farm kids are generally pretty friendly and in no time at all we were having a blast playing the running-around-in-circles game. This is the game where you form a big line and, as you might have guessed, run around in a big circle. Anybody can play it. The only rules are you have to stay in the circle and you have to follow whoever is in front of you. There isn't really even a leader when there are that many kids because pretty soon the line closes up in a circle and no one is in front and no one is behind. There isn't any winning or losing. It starts when it starts and it stopped when enough of us were too winded to keep running any longer. It's a great game.

The Farm Bureau had a great big front yard that was perfect for the running-around-in-circles game. It was all grass covered except for one bare patch of dirt at the west end of the yard. Because that was the only patch of dirt in the whole yard, it proved to be an irresistible magnet for the circle to pass over, and every time we came to the dirt patch we stomped on it with one foot like Mickey Mantle crossing home plate. We were all running and squealing and stomping and having a great old time.

I guess the hornets that lived under that dirt patch didn't like our game too much. Just as I was stomping on the dirt patch for the third time, out they came. All of them.

I went racing for the Farm Bureau Building screaming. Kids were scattering out of my way left and right, not so much from me as from the huge swarm of angry hornets buzzing all around me and stinging me over and over again. As I ran into the building men began waving their jackets and hitting me with

them trying to drive all those hornets away. Somehow the men made the hornets leave me alone and I ran on into the big hall, still screaming. I remember Daddy appearing in front of me and then I just dropped to my knees and fell over.

Dad took me straight to the hospital. I don't remember the drive at all or even whose car we rode in or anything that happened at the hospital. All I remember was being on fire from head to foot and moaning until I couldn't moan anymore. I don't remember being in the hospital, I don't remember coming home, I don't remember anything after I fell to my knees except the awful pain. I was a very sick little boy for quite a few days. My whole body was covered with ugly, red, throbbing stings. After that I never went near the Farm Bureau Building ever again. Ever. □

Summer came and now that Melody was old enough to go to school Mom decided we were both old enough that she could get a job. For awhile she worked at the Pastime Theater, which was neat because it meant we got to go to the movies for free. It was a perk that people who worked at the Pastime got. We hadn't gone to the movies very much before then, but we went a lot when Mom was working there. Then later she got a job as the bookkeeper working for Mr. Beatty at the Ben Franklin store. We pretty much stopped to going the movies again after that.

Because Mom was now working somebody had to keep Melody and me company during the days. This person is called a 'babysitter,' a term I was offended by because *I* wasn't a baby. But I put up with it stoically; life is full of lots of things you don't like and compared to hornets having a babysitter wasn't all that bad. Besides, our babysitters were lots of fun to be with.

We had two, although not at the same time, of course. The first was cousin Marilyn. I've already said how much I liked cousin Marilyn and how fun she was. For a Teters, cousin Marilyn was a bit on the serious side. That didn't mean she wasn't fun-loving and gregarious. There wasn't any such thing as a Teters who wasn't fun-loving and gregarious. Except for Uncle Bun. He was only fun-loving. He was too bashful to be gregarious. Uncle Vern, Aunt Sylvie's husband, wasn't fun-loving or gregarious; at least he never was any time I saw him. But he was a Said, not a Teters. So when I say cousin Marilyn was a bit serious for a Teters, what I mean is she wasn't as happy-go-lucky as the rest of them. But she was still fun and, like all the Teters, she really knew how to tease a person when she wanted to. She was the one who first started calling me 'little Ricky.' Now, in those days nobody ever called me anything but 'Richard' except for Bill, who called me 'Rick.' But Marilyn started calling me little Ricky. I didn't like being called Ricky, and I still don't, but Marilyn had a knack for doing it in a way that somehow I could not like it but not mind it all at the same time. Marilyn just had that kind of magic touch. I didn't like being teased – most of the time I hated it – but Marilyn could tease me in a way that not only I didn't mind but that was even kind of fun. She's the only person who could ever do that.

Melody, of course, picked up on this nickname right away and started using it all the time, except for when she wanted to let me know how dumb I was being, in which case I was 'Richard' again. Then Sherri picked it up, but she would usually only use it when she was teasing me or when she thought I was being childish. Of course, Sherri likes to tease me so she used it a lot. Neither of them had Marilyn's magic touch, so I didn't like it very much. But Melody had already taught me how futile it was to oppose a sister in anything so I resigned myself to it. Later on their kids, my nephews and niece, called me 'Uncle Ricky' and for some reason I never minded that at all. I even kind of liked it coming from them. To this day these are the only people who get to call me 'Ricky.' Nobody else gets to do it.

Our other babysitter was cousin Phyllis, who was Uncle Foryst's daughter. If Marilyn was an unusual Teters for being a bit serious, Phyllis was an unusual Wells for being extrovertedly happy and gregarious. Mostly the Wells', except for Phyllis and Sherri, tended to be pretty serious about everything. Certainly *I* was. So was Melody; so was Phyllis' sister, Dee; so was everybody else on that side of the family. With a Wells, nothing was ever so trivial and unimportant that it couldn't be inflated into a matter of the gravest concern.

But not cousin Phyllis. Joy and happiness followed her like sunshine. When she was sitting us there was always something fun to do, and if there wasn't she'd invent something. Phyllis had some fun records she would bring with her to play on the record player. My favorite was an album by a guy named Alan Sherman entitled "My Son, the Nut." For the younger folks out there who have never heard of him, Alan Sherman was kind of the Weird Al Yankovic of his day. He would take very popular songs and change the lyrics. He's probably best remembered for the Camp Granada song: *Hello Muddah. . . Hello Faddah. . . Here I am at . . . Camp Granada. . . Camp is very . . . entertaining . . . and they say we'll have some fun if it stops raining.* But my favorite was what he did to the classic song 'Fascination.' He turned this into 'Automation': *It was AUTOMA-TION I know . . . that was what was making . . . the fac-tor-y . . . go. . . I thought AUTOMA-TION was keen . . . 'til you were replaced by . . . a ten ton . . . machine, Dear.* Another one that was a big hit with me was "I See Bones" (kids, ask your grandparents what song this one was making fun of): *The doctor was looking at the x-ray . . . and I asked him . . . What do you see? And the doctor went on looking at the x-ray . . . as he replied in French to-ooh-ooh me . . . I see bones. . . I see gizzards and bones . . . and a few kidney stones . . . among the LOVE-LY bones.* Phyllis would play her funny records and we'd sing along until I started giggling so much I couldn't sing any more. Then Phyllis would start giggling too, then Melody, and soon we'd all be sitting there listening to the record and giggling like a flock of loons.

Music in general was changing, and for the better I thought. Those teeny-bopper songs of the 1950s were pretty much all gone now. A new kind of music, called folk songs, had taken their place. These weren't the old-time folk songs like they taught us in school. None of that *on the banks of the O-hi-o* kind of folk song. The new folk songs had messages and even when I didn't understand exactly what the message was, I'd still *feel* the message stirring around deep inside me. Sometimes they would make me feel melancholy because I just *felt* there was something I ought to be doing about things but there really wasn't very much a little boy *could* do about it. Sometimes they would make me feel uplifted, like my soul had grown wings. Whenever I heard a folk song playing, I'd stop doing whatever I was doing and pour all of myself into listening. Melody and I would sing the folk songs when we were riding in the back of the car. There were a lot of great folk singers, many of whose names I never learned, but absolutely the best were Peter, Paul and Mary.

I think each of us keeps a secret, tender place deep inside the heart and we protect it and very, very rarely let anyone reach in and touch it. Peter, Paul and Mary knew where my secret, tender place is, and they have always been able to reach in there and touch it whenever they wanted to. Nobody else has ever been able to do that. Other musicians, like Bob Dylan or Pete Seeger, might write the words to the songs, but Peter, Paul and Mary made those words *live*. When they would sing I knew what something that was right *felt like*, I knew what injustice *felt like*, I knew what duty *felt like*. To this very day, when I get a feeling like a feeling Peter, Paul and Mary gave me, I *know* what I have to do. They taught me that oftentimes the heart really does know better than the head. □

It was sometime in 1962 when I had to start wearing glasses. I don't remember exactly when that was; I think it was either late spring or sometime during the summer, but it was after the hornets. It was a surprise to me. The first hint that I had that something different was coming was one Sunday morning when Dad called me to come over by the living room window. He pointed out the window at a neighbor's house across the street and two doors down. "What letter is on their front door?" he asked me.

I looked and looked, and squinted, and looked some more. "I don't see any letter there," I said. I was puzzled. Why would Dad ask me about a letter that wasn't there? Dad didn't say anything, but he didn't look at all happy about it. Mom gave him her I-told-you-so look but didn't say anything. He didn't want me for anything else, so I went back to doing whatever I'd been doing and forgot about it.

Not long after that, Mom told me we were going to the eye doctor's to get me some glasses. This was another of those no-way-to-get-out-of-it situations, but I was secretly resolved that if the eye doctor tried to give me a shot in the eye he was going to get a shot in the nose first. I knew what glasses were, of

course. Mom wore them. Sherri wore them. Bill had worn them (now he wore something called 'contact lenses'). Even Dad wore them sometimes when he read, although most of the time he'd just hold things out as far as his arms would reach to read them. He pretty much never read anything except the newspaper anyway, so I almost never saw him with his glasses on. But I knew he had them.

I didn't have much in the way of enthusiasm for this whole glasses-and-eye-doctor business. As far as I was concerned, things were fine the way they were. In reality I was terribly near-sighted but I didn't know that. I thought this was just the way things looked. Oh, I had worn glasses once. One time I had found a spare pair of Mom's glasses lying around and I put them on to see what they were like. It was completely weird, like living inside a fun house. Everything was misshapen and tilted and so distorted it made me stagger and stumble when I tried to walk. After just a few minutes they started to make me sick to my stomach and I took them off again. I didn't see why Mom would insist on getting a pair of those crazy things for *me*. I knew *I* wasn't going to wear them.

We had to drive all the way to Davenport – some forty miles or so south of Maquoketa – to see the eye doctor. It wasn't what I expected. First – and best – there were no shots of any kind involved. The eye doctor had a dark room with a big machine you looked through at some letters projected on the wall. He would flip something that changed the way things looked and ask me to read the letters in the different rows. Sometimes they were very clear, sometimes I couldn't see them at all. We played this weird game for quite awhile and then that was that. Next Mom said we had to pick out frames for the glasses. She would ask me which ones I liked, and we looked at a lot of them. I thought they all looked pretty dorky but she said I had to choose one so I did. I thought once that was done they would put the glass in them, but that didn't happen. It turned out we had to wait a couple of weeks for the lenses to be made and then make another trip back down there to pick them up. When we did, they made me put them on and I was pleasantly surprised. They didn't at all make things look weird, the way Mom's glasses had that one time. In fact, they made everything look better. I was amazed at the difference. I'd take them off and look at something, then put them on and look at that thing again. It always looked better with glasses on. So it turned out this glasses thing was a pretty good deal after all. With my glasses on I was a better boy.

Dad didn't seem to think so. When we got home I was proudly wearing my new glasses and expecting him to say something nice about them. But he didn't. Instead he just looked at me kind of disapproving. "The boys are going to call you 'four eyes'," he warned me. I couldn't see why he'd say that. I didn't have four eyes and there just wasn't any reason for the boys to call me 'four eyes.' And if any of them did, I knew he wouldn't do it more than once. Nobody likes to be called 'black eyes' after all. But it turned out that nobody ever called me 'four eyes,' just like I figured. Not many boys at school wore glasses, it was true, but a few did and nobody ever picked on them because of it.

Wearing glasses did make a social difference, though, right from the start. The boys had already figured me for being a little bit nuts after the dinosaur thing. Now my new glasses seemed to make them think I was even more 'bookish' than before. Wearing glasses pretty much meant you got picked near the end when we were choosing up teams because boys who didn't wear glasses thought that boys who did were blind or something. Wearing glasses made them think you weren't as tough or weren't as skilled at running or throwing or catching. It took me awhile to understand that there *was* a new attitude towards me now. Nobody ever waved it in my face; it was a passive form of prejudice. I really hated and resented that once I figured out I was being treated differently now, but it never quite rose to the level where I felt justified in punching somebody over it. And I especially resented the fact that Dad seemed to share this attitude. But I just had to swallow it all and keep going. After awhile, though, something in me did change because of it. Now there was always a little bit of smoldering resentment going on inside. I think I became less friendly to people because of it. Not that I was ever a good-time-Charley before that; I've never felt comfortable among strangers. But now I wasn't just uncomfortable; I was a little bit hostile. From then on I was a little harder to get to know. Okay, I was *a lot* harder to get to know. I became very slow to warm up to people. First I had to be sure they were going to treat me as *me*, not as some dork with glasses. It wasn't a standard a lot of people could measure up to.

Some of the boys with glasses compensated in other ways. Some would never wear their glasses at all. Some became class clowns. Some became quick-tempered and got in a lot of fights. And some just changed who they were, at least on the outside, to fit in. I wouldn't do any of these things. I wouldn't change who I was because somebody thought I was somebody else. I wouldn't go around not able to see because somebody thought boys who wore glasses were dorks. My attitude became, *You don't like me? Well, screw you!* I didn't go around looking for trouble, and I'd avoid it if I could. But if it came after me anyway, all that smoldering anger inside me wouldn't let me back off one single step. *You don't like me? Well, screw you!* Picking on me became a really bad idea because I wouldn't get just a *little* bit mad.

I didn't analyze any of this, of course. After all, I wasn't even ten years old when all this started. It was all feelings, deep feelings. I couldn't have verbalized any of this even if someone had asked me to, and no one ever did. If I had known the F word, using it would have expressed my feelings perfectly. I didn't know the F word until many years later; Dad did use cuss words, but this one wasn't one of them. In retrospect, the very depth of these feelings combined with my lack of words for them probably prevented a lot of fights. The way boys usually started fights in those days began with a lot of posturing and name calling. From there it would go on to shoving, then to blows. There was a ritual to it everyone followed and nobody ever really got hurt beyond a few bruises and black eyes.

But I had that smoldering anger and it didn't take much to start turning it into rage, and the more angry I became the quieter I got. I'd just stand there glaring right into the other boy's eyes, not moving, not speaking, not retreating. Just waiting and all the while growing icier and icier inside. Well, that cut off the ritual right at the name-calling stage. I don't think other boys understood my reaction at all. But this didn't make them bolder or more aggressive. It unsettled them. I think they weren't sure what was going on, and I would see that uncertainty growing in their eyes. So it would end at the posturing stage and the other boy could back away pride intact and telling himself he'd won something. I didn't care if that's what he thought. To me it wasn't about who the alpha male was. It was about hurting him. Bad. Somewhere inside me was something ugly and frightening, and I was always glad afterward it hadn't developed into a fight. I was afraid of that icy rage I'd feel, and I was afraid of what I might do if I lost control of my temper. I knew what terrible, awful, horrible pain felt like; I didn't want to make anybody else suffer like the hornets had made me suffer. Not anybody. It would just be *evil.* That was why I was afraid of losing my temper. That was why I avoided trouble if I could. I was scared of *me*. □

But all this was still to come after the summer of 1962. Late in the summer Bill came home for a brief visit and, as always, that was a big event. By then I had learned that College wasn't just one place. I knew because on Saturdays in the fall there were college football games on TV and I had seen the Iowa Hawkeyes play against other college teams in a conference called the Big Ten. Bill was a Hawkeye now. I even knew there were more than ten colleges. Apparently every state had a college. Some had more than one. Somebody had given me a puzzle map of America where the individual states were the pieces and you had to put them all together to make America. Whenever I heard of a college from a different state, I would get my map puzzle out, put it together, and find the state where that college was. By the summer of '62 I was getting to know my U.S. geography pretty good, although the word 'geography' wasn't in my vocabulary yet.

Some of the states were interesting for things besides sports. Cape Canaveral was in a place called Florida and that turned out to be at the southeast corner of America next to the Atlantic Ocean. Space headquarters later came to be in a place called Houston and that turned out to be in the state of Texas next to a whole other country called Mexico. The other thing Texas had was a place called the Alamo where a small army of heroes had once fought for liberty and justice against a bad man who had a very big army. They lost and had all been killed, but then everybody else in Texas had gotten mad and came and defeated the bad man and his army and established liberty and justice for everybody in Texas.

The first night of his visit Bill up and announced that the next morning he and I were going to go uptown. I was thrilled. I had been uptown before, of course, but only with Mom to get groceries or with

Dad to go to the Pastime or with Mom to go to Sherri's and Gary's store. And, of course, I had seen uptown from the back seat of the car when we went someplace. But I had never really, truly *been* uptown. Now when morning came Bill and I were going to go explore uptown. We would be like Lewis and Clark. I couldn't wait for morning. I was so excited I had trouble getting to sleep that night.

The next morning I was up and raring to go long before Bill was awake. I knew it was still early, so I made myself wait for awhile so Bill could get a good night's sleep. I knew we didn't want to go uptown while it was still dark outside. But finally the sun came up and it was time. I went in to where Bill was sleeping and shook him on the shoulder. He almost jumped straight to the ceiling. I had to jump back to keep from getting knocked over. He looked at me kind of bleary-eyed and said, "What's the matter?"

"It's time to go uptown," I reminded him.

"What time is it?" he asked. "*Six-thirty*," I told him. I was starting to get impatient. He looked at me like he couldn't believe it. Then he said, "The stores don't open until eight, Rick." Well, he might have mentioned that the night before, I thought. So I had to wait some more. Bill went back to sleep and I prowled around the house trying to wish the clock into going faster. But instead it went slower. *Finally* Bill got up and we had breakfast and then we set off for uptown.

It was great. The morning was crisp and cool, the birds were singing, and it seemed like we had Maquoketa almost to ourselves. Uptown was a long walk away but not as far as I'd always thought it was. It turned out you didn't actually need the car to get there. We walked over to where the highway turned into Main Street and I was glad to see that the sidewalks were out already. I had heard Dad say on several occasions that at night they rolled up the sidewalks early in Maquoketa, although he didn't say why anybody would want to roll up the sidewalks. It didn't seem to me that anyone would want to steal them.

The sidewalks must not have been unrolled for very long because there weren't many people uptown yet. Some of the stores weren't even open. But that didn't stop us. We'd just go by the ones that weren't open yet, saving them for later. Bill showed me all over uptown and it turned out there were lots of neat places there. We stopped at one store where Bill bought me my very own Hawkeye sweat shirt. Now *I* was a Hawkeye too! That was great!

But the best was yet to come. We went to another store and to my astonished joy Bill bought me a *bicycle!* I'd never ridden on a bicycle except for that one time when Bill had given me a ride to Aunt Hazel's house. Now, all of a sudden, I had a bicycle of my own. It wasn't a very big bicycle as bicycles go, but next to me it was enormous. I wasn't sure how I was going to be able to climb all the way up there to the seat without the bicycle falling over. But later that day Bill started showing me how to ride a bicycle. It turned out that once you had it rolling it didn't want to fall down. That was amazing. Standing still, all a bicycle wanted to do was fall down. Once it was rolling it didn't want to fall down anymore. So the whole trick was in getting started and getting stopped without getting killed. It took awhile, but Bill showed me how to master this. He would hold the bicycle and me up until I finally got the hang of it, and then finally, after quite awhile, he said I was ready to solo. So I took my first solo bicycle ride. Mission Control, I am ready. What can I do for *you?*

It's easy to ride a bicycle, but it takes a lot of practice to really get *good* at it. The rest of the summer until school started again I practiced riding every day, gradually learning how to go faster and how to control the turns. I took a fall or two and got a little scratched up, but that was nothing. I was a bicycle astronaut now. Mounting and dismounting was kind of a trick with my short legs, but I got better and better at that, too. Mom took kind of a dim view of my bicycle riding – she didn't know how to ride a bicycle and didn't seem to have any interest in learning how – and she said I had to pass a test and get a bicycle license. So I learned about hand signals and traffic rules and stuff like that, and she took me to City Hall, which was uptown but off to the side, and I passed a test and got my bicycle license. Now I was a *licensed* bicycle astronaut. Best of all, Melody was jealous. She was still too short to ride a bike.

Being able to ride a bicycle brought a lot more of the world within my reach. Mom, of course, gave

me a lot of new rules I had to follow when riding my bicycle. Uptown I had to stay on the sidewalk. I always had to ride on the right hand side of the street and watch out for cars. She had a little mirror installed on the handle bars and I had to always look in that mirror before I turned or anything. And I couldn't ride it after dusk came. But this was all okay with me. Now I could more easily go over to my friends' houses whenever I wanted to. I could also go visit Grandma Wells now whenever I wanted. □

One of my friends was a little boy named Steve. His house was a few blocks away. We had met at school on the playground instead of in class because Steve was a year behind me in school. He was short for his age with fiery red hair and lots of freckles. Mom said that meant he had a fiery temperament and that was true. Like most boys, Steve didn't really know how to fight. When he got into a fight he'd throw haymakers. But he'd throw them hard and fast and when he got mad he'd just wade straight in and let fly like a whirling dervish. He was *tough* and even older boys didn't mess with him more than once. It's not the size of the dog in the fight; it's the size of the fight in the dog. You see, most boys that age didn't actually know how to fight, which means they didn't know how to defend themselves, and if your opponent doesn't know how to defend himself a haymaker is as good a punch as any. I never saw Steve lose a single fight. He and I were best pals and so we never fought each other.

Dad got to see Steve fight once. It was in the fall of that year, just after school began, and one Sunday afternoon he and I walked over to the playground. There were several boys there already and one of them was Steve. He was in some kind of argument with a bigger boy when we got there. I didn't know the bigger boy and I imagine that boy didn't know Steve. If he had he sure wouldn't have been picking on him. They were in the posturing and name-calling stage and Steve called him a something-or-other – I don't remember what exactly – and instead of shoving, the boy punched Steve in the mouth.

That was a mistake. Besides being a serious breach of the fight ritual, which meant it was dirty fighting, the punch *hurt*. Steve's face turned all bright red and his arms stiffened straight out to both sides and he started crying. Not because he was hurt but because he was *mad*. Steve charged straight in, both arms swinging, and *pow! pow! pow! pow!* Down went the other boy right on his bottom and Steve went for him some more. The bigger boy scrambled to his feet and ran away, Steve right behind him. But Steve's legs were kind of short, the other boy was quite a bit bigger, and he got away.

Later Dad wouldn't stop talking about it. I guess he was impressed. I wasn't all that impressed because I'd seen Steve in action before lots of times. But Dad kept talking about what a tough little guy he was and what a good fighter he was. Well, he had the tough part right. Everybody knew Steve was tough. But I didn't understand why he was telling *me* about it instead of telling Steve. It was Steve's fight. And I didn't understand why he was saying Steve was such a good fighter because Steve did all the things Dad and Bill had taught me *not* to do. That first punch, for instance. You could see it coming a long time before it landed. Steve didn't know how to block it and so it hit him right in the mouth. That kid would have never hit me because I knew what to do about it. I wouldn't have taken him out as fast as Steve had, true enough. I just wasn't as tough as Steve. But I wouldn't have had a puffy lip afterwards either. I had kind of a feeling Dad was trying to tell me something or compare me to Steve or something. I wasn't sure what he was driving at, but I didn't like the tone of the whole thing. □

I was in fourth grade now, in Mrs. Ellis' class, and the whole school thing was by now pretty routine. We were learning fractions and penmanship and division and stuff. Nothing too special. Fractions had patterns, too, so they were easy. Division was quotients and remainders and stuff. Nothing too tough there either. Later there would be something called 'long' division so I guess this must have been short division. It made sense they would teach short division first. The trick was to see that division and fractions were sort of related. In a way they were kind of like cousins. Penmanship was harder. They said you were supposed to move your arm and keep your wrist stiff, but when I tried that it just came out awful. So I used my fingers instead and nobody seemed to mind too much except Mom.

All things considered 1962 would have been a very good year except for a tragedy that came from out of nowhere. Uncle Chet died. He had a heart attack and he dropped right down dead on the spot. Uncle

Chet was Mom's youngest brother and he wasn't even forty years old when it happened.

It was the first time in my life someone I knew had died and I just didn't understand what had happened. Mom started to cry when they brought the news and that was new to me too. My feelings were a jumbled whirl that I can't even begin to describe. Words don't really cover it. All I know is I just couldn't take being there at home in the middle of all that sorrow. I ran out the door, got on my bicycle, and just rode as hard as I could for a long time. Nowhere in particular. I just rode.

The visitation – what many people call a wake – and the funeral were gloomy and unbearable. I saw Uncle Chet in his casket and I touched him. He was cold. After touching him I started to feel more awful than anything and I was very depressed for the next several days. Mom and Dad didn't make me go to funerals or visitations after that if I didn't want to, and I didn't want to. When Grandma Teters had a stroke and died I didn't go to her visitation or funeral. It was something I just couldn't stand. □

About a month or so before Thanksgiving there was some kind of trouble for awhile involving some place called Cuba. Apparently Cuba was somewhere out in the ocean south of Florida and there was something called a 'crisis' going on there. None of us boys knew what a 'crisis' was, although the word did sound like a bad word. None of the grownups were talking about it – at least not around us kids – and the teachers didn't bring it up either. One boy said he had heard the Navy had put a quarantine around this Cuba place so we figured there must be some kind of bad sickness there. But another boy said that wasn't right and the quarantine was to keep the Russians out of Cuba. So maybe the Russians were sick. Another boy said he'd heard Cuba was a prison, so maybe the Navy was keeping the Russians from helping all the crooks escape. That sounded like the kind of thing Communists would do because everybody knew crooks were against justice for everybody. But that didn't explain why the Navy would use a quarantine. Then another boy said his dad had told him that quarantine meant some kind of blockade so that made it sound like the Navy was blocking out the Russians. Everybody agreed that was what it was. Once we had it all figured out it didn't really sound all that important 'cause it was all going on in this whole other country way out in the ocean. That turned out to be right because the whole thing went away after a few days and nothing ever came of it. I didn't find out what had really happened until years later. □

Our house on Niagara Street

The *really big* event in 1962 was our new house. All our other houses hadn't really belonged to us. But *this* one was going to be *our* house and not anybody else's. It wasn't really a *new* house strictly speaking. Dad told me it had belonged to an old lady who had died. But it was new to *us*, you see, and that's what made it a new house. It was over on Niagara Street, which wasn't very far from the Regenwether house and was actually closer to the playground and Briggs Elementary School. It didn't have a name of its own. It was just *our* house.

Our house needed a lot of fixing before we could move in. Dad took Melody and me upstairs in it and told us to tear all the old wall paper off the walls. Now normally you don't get do something like that, but we had permission to do our worst and Melody and I set to it with gusto. It was great fun. But, like I said, it's not something you normally get to do.

There were all kinds of things that had to be done. We put a new hardwood floor in the living room. There were all these old closets to tear out and new ones to put in. It seemed like there was something that had to be done in every room, even in the basement although there wasn't as much to do down there. When we started our house was very noisy. It would make all kinds of weird noises all by itself. Dad tried

to tell me it was haunted and I rather frostily told him I was too big for him to be telling me fairy tales. Everybody knew there wasn't really any such thing as a ghost. Who did he think he was trying to kid? After we finished fixing up our house it wasn't so noisy anymore and Dad tried to tell me it was because the old lady's ghost had moved out because we'd changed it so much. I snorted in disgust.

Melody and I had the two upstairs rooms. She had the room on the west side facing Niagara Street and I had the room on the east side facing the back yard and the gravel alley that ran between our yard and the back neighbor's yard. There wasn't a hallway upstairs and there wasn't a door between Melody's room and mine. She had to come through my room to go down the stairs or to come up the stairs to her room. This presented some problems with privacy but we worked out a solution. We each had a closet and the opening between our rooms ran right between them. When we'd put the closets in Dad had rigged them so you could pull your clothes out on this sliding rod thing. It turned out this made a pretty good way to make a door. When either of us needed privacy, like when we were undressing, we'd just pull the closet rod out and the clothes would block off the hole. That way we knew when not to go into each other's room. Especially mine. I think that was Melody's idea first and it worked just fine.

Our two rooms were about the same size but mine was better. My room had the little door in the wall that led into the attic. The attic was this really neat place, although you couldn't stand up in it. There was a little light bulb in there and we kept tons of neat stuff stored in it. The only thing was you had to be careful and stay on the wood beams. Otherwise you might fall through the floor into Mom's and Dad's bedroom downstairs and a person would get in big trouble for that.

My room also had this big window in the east wall just above my bed. I could crawl out this window and get onto the back roof of the house. From there it was only about ten feet to the ground – just a little too far to jump. But I would leave the ladder up in the back yard so I could crawl out my window, walk across the back roof then climb down the ladder. This wasn't mischief, either. Mom said it was a way to escape if our house ever caught fire and Melody and I couldn't get down the stairs. But our house never caught fire so mostly I'd go out on the back roof on summer nights and watch the lightning bugs play in our back yard. I could also see quite a ways from there and at dusk there would be these pretty blue lights that would come on at one of the shops across from the ball field. I could sit out there and look at all the beautiful things and just *think* and *feel*. It was my special place. Nobody else's. □

Bill came home for a visit not too long after we moved into our house. He brought along something new just for me. It was a game called 'chess.' It had lots of different kinds of pieces and at first it was kind of complicated. He taught me the rules and how all the pieces moved and what you had to do to win. At first he let me win by pointing out my mistakes and letting me take them back. After awhile I sort of caught on to all the rules and then we played for real. I couldn't beat him when we played for real. But he said to me, "If you can beat me before you're twenty-one, I'll give you twenty dollars."

Twenty dollars! That was a fortune. That was more money than I'd ever seen. We shook hands on it.

Bill had no idea what he'd started. I practiced playing chess every single day, first taking one side and then taking the other for each move. It's hard to beat yourself because you know what you're thinking. But if you really change sides with each move and look at the board real hard, you learn to spot a lot of mistakes. The library also had a lot of books on chess including complete annotated games played by chess Grand Masters at world tournaments. They would tell you every move these guys made and why and explain why they hadn't made other moves that looked to me like they would have been just as good. But they weren't because the other guy had countermoves against them. The books explained all this in detail. After awhile I began to see there were patterns in chess, too. They weren't the same ones that were in arithmetic, but they were still patterns. It turned out the right way to play was never just one move. Every move was part of a whole pattern of moves and what you tried to do was force the other guy to have to move in a particular way so things would just get worse and worse for him. If you could get ahead by even one pawn, the worst that could happen was a draw unless you made a mistake. And if you could get ahead by even one knight, you were going to win unless you made a mistake. But you had to watch

out for traps. There were traps you could lay so the other guy thought he was going to win a piece. But he wouldn't. Not for long. When you sprung the trap you'd not only get even but capture another piece and get ahead. You had to watch out for traps *very* carefully. But there were trap patterns, too.

I poured as much energy into chess as I had with the dinosaurs two years earlier. I was always looking for someone to play chess with. It didn't matter who. Other kids, teachers, grownups, anybody. It turned out a lot of people knew how to play chess. The problem was getting them to keep playing after I beat them. They'd just give up after awhile. Sherri became kind of an ally after she gave up playing with me. She and Gary had opened a TV and Appliance business in 1960 so she met a lot of people in their store every day. You have to be very careful bragging about anything to Sherri. She loves nothing better than to embarrass anybody who brags. There was this one guy who sold insurance or was a lawyer or something like that. He was in the store one day bragging about what a good chess player he was. "My brother plays chess," Sherri said. I can imagine the devilish little smile she must have had on when she said it. I've seen that smile. You don't want to. It means something embarrassing is about to happen to you.

I was at home and the phone rang. It was Sherri. "There's a man here who'd like to play chess with you," she said. Say no more. I hopped on my bike and was at the store just a few minutes later.

The man was surprised that I was just a kid. He apparently thought it was beneath his dignity to beat a little kid so he tried to back out. "Oh, he won't mind," Sherri said as I set up the chess set. "And he's not bad." So the man reluctantly sat down with me kind of condescending like.

I beat him in nine moves.

Well, that kind of got his attention. He wanted to play again. This time he said he'd really concentrate.

I beat him in twelve moves.

One more game. Okay. He really, really concentrated this time. His breathing got to sounding kind of funny. He sweated.

I beat him in fifteen moves. Sherri laughed at him out loud. He didn't want to play anymore. "Thanks for the games, Mister," I said.

That was what was waiting for Bill the next time he came home to visit. And nobody warned him. I knew it wouldn't be polite to want to play him just as soon as he got home. So he settled in a bit then we all had supper. As soon as Mom had cleared off the dining room table, I set up the chess set. Bill smiled and we sat down and started to play.

Bill was a pretty good chess player. A lot better than the man at Sherri's store. He concentrated and I concentrated and we both made our moves carefully and deliberately. The game went on a long time. Then he made a mistake and I pounced on it. Checkmate.

I held out my hand, palm up. "You owe me twenty dollars," I reminded him. Bill grinned at me. "Let's play again," he said. "Double or nothing and I'll play without my queen." The queen is the most powerful piece. You're going to lose if you play without your queen.

I was tempted. But, "No," I said. "We'll play again for fun and you keep your queen. But you owe me twenty dollars."

Well, a bet is a bet and Bill knew he'd lost this one. He got his wallet out and gave me twenty dollars. Then we played again. It started out another tough game, but he made a mistake early. I'd set one of those traps I'd learned from the Grand Masters and he walked right into it and got slaughtered.

He looked up at Mom, who had just walked into the dining room. In kind of a shocked voice he said, "Geez! And I was going to play him without my queen." Mom just smiled. I laughed at him. □

Living in a new neighborhood meant meeting new people, and on Niagara Street the most important new person was Jim. Jim lived across the street in a very nice, very big house. He was in seventh grade,

which made him very grown up next to me and very wise. They had a great big front yard that was perfect for playing football in and also perfect for playing tennis ball in. Tennis ball was a form of baseball only you used a tennis ball instead of a baseball and thin, itty bitty wood bats instead of a regular baseball bat. Jim's yard was a gathering place and it was where I met most of the other kids in our new neighborhood. The most important of these was a boy pretty close to my own age and size named Dave. Dave had one older brother, Billy, and one younger brother, Ronnie, as well as a younger sister, Bonnie, who was about the same age as Melody. Billy was a couple of years older and he was very skinny and very smart. He didn't chum around with us too much, although when he did he was fun to be with. Jim had a friend his own age named Tom. Jim and Tom were close chums the way Dave and I became close chums. Jim and Tom let Dave and me hang out with them a lot and the four of us were always doing one thing or another, mostly sports. Dad started referring to the four of us as 'the gang' and in a way I suppose we were, although 'gang' didn't mean then what it means today. It just meant a group of boys who hung out together most of the time and did things together most of the time. Jim was the undisputed leader of our gang. Whatever he wanted to do, that's what we did and it was always fun.

I don't know where Dave and his family came from originally, although I was pretty sure it wasn't Maquoketa. The reason I thought so was because all of them used some funny words nobody else in town ever used. The one they used most often was 'yoose,' which meant the same thing as 'you' as in "yoose want to play some ball?" Dave didn't use this word so much, but Billy used it all the time. Another thing that was unusual was that their dad didn't live with them. That was very unusual for Maquoketa at that time, and I thought it was very curious. But they didn't talk about their dad so I didn't ask. I had a hunch that if I did it would hurt their feelings and they were my friends and I didn't want to do that.

Their house was across the alley behind Jim's house. I've already mentioned that fences were a rarity in Maquoketa at that time. You could walk from Jim's yard to Dave's yard in no time at all. For some reason she never explained, Mom didn't like Dave's mom. She never said why. She just instructed Melody and me that we weren't to go over to their house. As I got to know Dave more and more, this prohibition just didn't make any sense at all to me and eventually I started to ignore this rule. It's true I thought Dave's mom was a bit odd for a mom. She was always very, very sad looking and didn't talk much. There was a lot about her that reminded me of Grandma Teters. But she certainly wasn't ever mean to me. Dave and Billy were good boys, they were my friends, and I just decided I wasn't going to treat them any different from anybody else for no reason at all. Not ever going to their house was the first rule I ever decided to break on purpose. Besides, I'd never agreed to it. When Mom told me I wasn't to go over there I asked, "Why?" She said, "Because I said so." I never said, "Okay."

There was another place we weren't allowed to go and, as it turned out, none of the kids were allowed to go there and none of us wanted to. Living down at the corner just across the street from the playground was a very strange man I'll call C. He was the only grownup I never heard anyone refer to as "Mr. C." They all just called him C. Every single kid was scared of C. Usually you never saw him, but sometimes you would see him walking down the middle of the street mumbling and talking to people who weren't there. Sometimes he'd sort of growl and wave his fists in the air like he was beating off a flock of birds or something. Today people would say C was mentally ill. We kids had a different term: C was crazy. All of us, even Jim, would hide from him whenever we saw him. Mom never said why we weren't to go near C either, but she didn't have to. Every one of us kids could see that for ourselves.

It was Jim who introduced me to Dave. Unlike me, Dave didn't wear glasses. Unlike most other boys who didn't wear glasses, Dave never treated me any differently because I did. That was one of the main reasons why I warmed up to him pretty quickly. He was a *pal* and I learned really fast I could trust him. He and I had something in common, too. During 1963 both of us started putting on extra weight. This was something I never understood. I certainly wasn't any less physically active than I'd been before. Dave didn't exactly lie around in a hammock all day either. We ran, played football and baseball, played basketball in the winter, and generally were just as active as every other kid. Neither of us was obese. But, to use a term that became fashionable many years later, we were Bubbas and there just didn't seem to be

any reason for it. Many, many years later when I was learning about human physiology, I learned that chronic stress might be an underlying cause of excessive weight gain. I certainly was experiencing a lot of stress in those days, both from the glasses thing and because Dad didn't seem to like to have fun with me anymore, and I often wonder if that might not have had a lot to do with the weight gain. I don't know if Dave was experiencing a lot of stress, but I did learn something years later that makes me think he might very well have been. I'm not going to tell you what that was. But in 1963 the word 'stress' wasn't in anybody's vocabulary in Maquoketa, and people who were impolite enough to bring up my weight generally had a different, mean-spirited theory about it that wasn't true. My you-can-count-on-it reaction to this? *Screw you!* It was a very touchy issue with me. My *friends* never ever brought it up.

Something else Dave and I had in common was he was one of the few boys who *knew* how to fight. I don't know when he learned or who taught him. But he knew how to defend himself and he knew the right way to hit. I don't think very many people knew this about him. Dave never picked on anybody, except his little brother Ronnie every once and awhile, and I never knew of him ever looking for trouble. In fact, I only know for certain about one fight he was ever in. That one was with me and he didn't start it. Believe you me, he *knew* how to fight. I started it; he finished it. I'll tell you about it later. □

It was in 1963 that I began hearing about some trouble that was happening down in the South and it was over something called 'desegregation.' I'd never heard of that word before and I didn't know what it meant. All I knew was there was some kind of trouble happening between white people and colored people, who white people at the time called Negroes. Well, most white people I knew called them that. Some called them another name that started with an 'n' but Mom told me that was a very bad word and I should never use it.

Not only did I not know what 'desegregation' was; I hadn't even known there *were* any colored people except for Indians and, so I had heard, Japanese. There weren't any colored people in Maquoketa, not a single one. And I had my doubts there really was any such thing as a colored person. People said that Indians had red skin, but I'd seen Indians and they didn't look like they had red skin to me. They looked like they had a good tan. The only person I knew who ever had skin that really was red sometimes was me; I had a tendency to sunburn easily at the swimming pool. *That* was red skin. A lot of people, including Dad, said Japanese people had yellow skin. I didn't believe that at all. The *sun* was yellow. *Raincoats* were yellow. People weren't yellow. I'd seen pictures of Japanese people in Life Magazine. They weren't yellow. They were pretty much the same color as me. If I was 'white' then so were they.

But it turned out there really were people who were colored. They showed pictures of colored people from Alabama on television. They had dark skin, much darker than any suntan I'd ever seen. I asked my teacher why some people had skin that was so dark. She explained that skin has something called 'pigmentation' – which didn't sound like a very nice word to me – and different people had different amounts of it. White people had the least, Negroes had the most. She explained that if your ancestors came from a place where the sun was very hot most of the time they developed more of this pigmentation stuff as a protection from too much sunlight. I could appreciate that. I wished I could have more of it when I went to the swimming pool. It sounded like a good thing to me. She said that this pigmentation stuff was inherited by children from their parents and how much you had could only change very, very slowly and it took many, many generations for it to change. She said Negroes' ancestors were from the continent of Africa where the sun was very, very bright and not enough generations had passed for Negroes living in America to have much pigmentation change yet. She said it took thousands and thousands of years for this stuff to change. Okay. That explained that.

Desegregation was something harder to understand. I tried to look that word up in the dictionary at the library but it wasn't in there. But I knew that sometimes 'de' was what was called a prefix and when you used it you meant doing the opposite of whatever the rest of the word was. So I looked up the word 'segregation.' The dictionary said it meant 'setting apart from others or from the main mass or group; to isolate.' So something was being set apart from everything else and 'desegregation' meant putting a stop

to it. But that still didn't help because I didn't know what was being set apart.

It turned out to be people.

I asked around and you know what? It turned out that in Alabama they made white people and Negroes live apart from each other. In everything. They couldn't go to the same schools. They couldn't ride on the bus together. They couldn't even use the same drinking fountains or the same bathrooms. Just because white people and colored people had different amounts of this pigmentation stuff. I couldn't understand why anybody would care about that. It wasn't anybody's fault how much pigmentation they had. I didn't choose to not have enough of it. Negroes didn't choose to have so much of it. And what difference did it make? I couldn't see that it made any important difference at all. Desegregation meant putting a stop to this evil foolishness. Why would anybody possibly be against that?

But some people were. The TV showed a man named George Wallace standing in a doorway at a college. It was the University of Alabama. He didn't want to let some Negroes go to school there. The University of Alabama was supposed to be the best college in Alabama. He didn't want to let people go to school there just because they had a lot of this pigmentation stuff? That just wasn't fair.

It wasn't *right*.

It was against liberty and justice for everybody.

George Wallace was a bad man. He was breaking the Pledge of Allegiance.

That wasn't the worst of it. Dad seemed to think what George Wallace was doing was right. At least he said things that sounded like he thought George Wallace was right. I couldn't believe my own ears. I was sitting on the floor a few feet away from the TV, like I usually did, and he was sitting in his chair. I turned around and looked at him, and I think my face must have looked distressed because I *felt* distressed. I looked at him and I pointed my finger at the TV and I exclaimed, *"Dad, that's wrong!"*

He looked startled and then surprised then he looked at me for what seemed like a long time. He didn't look mad. He looked uncomfortable. Then he said I was too young to understand and that I'd understand it better when I was older.

I felt uncertain. I did know I was only a little boy and I did know Dad knew more things than I did. But I also did know, way down deep inside, *this is wrong!* I knew this feeling very, very, very well. It was the same as I felt when the boys treated me differently because of my glasses. I didn't have a name for this feeling, but I knew this deep, smoldering resentment. I *knew* what the man on TV was doing was wrong. I looked at Mom, and she didn't say a word or do a thing. I understood that, too. Mom and Dad *never* disagreed with each other in front of us kids. If I was wrong, she'd have said so. She didn't.

I *was* old enough to understand. And Dad knew it.

That year there were terrible things on the news. I saw firemen turn their fire hoses on a big group of colored people who weren't doing anything bad. The news man said they were 'demonstrators.' They weren't doing anything bad and the firemen turned their hoses on and knocked them down. *The firemen!* Firemen were supposed to be heroes; firemen were supposed to be good guys. How could *firemen* do this? How could *firemen* break the Pledge of Allegiance?

> Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

This was the very, very first thing it said in the Bill of Rights, and the Bill of Rights is part of the Constitution, and the Constitution is the Supreme Law of the Land. Congress cannot do these things; the state of Alabama cannot do these things; *nobody* can do these things. Anybody who does is taking liberty away from somebody. Anybody who does is taking justice away from somebody. Anybody who does is

breaking the Pledge of Allegiance. Anybody who does is hurting America, hurting *all* of us.

How could *firemen* do this? I was just sick about it. □

The fifth grader (age 10)

That fall I started fifth grade and Melody started second grade. In many ways fifth grade was the top of the mountain at Briggs Elementary School. There wasn't enough room for the sixth graders at Briggs and so they attended school up at the junior high school building even though sixth grade wasn't actually a part of junior high. My fifth grade teacher was Mrs. Tavenner and she was another really, really neat teacher. In a way I had two fifth grade teachers because I also had Mrs. Frank for chorus. Mrs. Frank was very talented and she could write songs. She wrote *Willy Claus,* one of our Christmas songs. Mrs. Tavenner could always explain things no matter how complicated they were.

And she could keep order on the playground, too. As I said, fifth graders were the oldest kids at Briggs and sometimes, to put it baldly, we threw our weight around. But not too much because Mrs. Tavenner was always there in the background somewhere seeing to it things didn't get out of hand.

One of the things we studied was history. I had always liked history before we had to take it in school. The library had a lot of good history books and my favorites were about World War II and about the American Revolution. These were books that told you what had happened and what it led to and what it meant. They weren't like the history books in school. I don't know who wrote those things but whoever it was they had *boring* down to a real art and *meaningless* down to a real craft. All the way through they were stuffed with things like, 'In 1932 Congress passed the Whatsisname-Whozamacallit Tariff Act. In 1933 Congress passed the Whodunnit-Whathehey Tariff Act. In 1934 . . .' So what? Who cares? What difference did any of this crap make to anybody? Even Mrs. Tavenner couldn't rescue this stuff. This was *dead* history, irrelevant history, meaningless history. Not like the history I'd read about in the library.

Nobody knew it, but we were about to get a big jolt of history that nobody saw coming and nobody wanted. One afternoon in November the Principal, Mr. Lord, came on over the loudspeaker. He used to do this a lot and when he did he always said the same thing: "May I have your attention, please? May I have your attention, please." The first one was always asked as a question, the second one was always an order. Then he'd say whatever it was he had to announce.

But this day was different. "ATTENTION!" he shouted. It made me almost jump out of my seat. Then there was a long pause and finally he said, "May I have your attention, please." Then he told us. President Kennedy had just been shot in some place called Dallas. He was dead.

For a moment nobody moved. Nobody said anything. Everybody just stared at the loudspeaker. It was only a moment, but it was a moment that went on forever. Then we began to look at each other. Still nobody said anything. All the kids' faces looked just the same, all white-colored with mouths open. Some of the girls had big tears starting to run down their faces, but nobody made a sound. For awhile even Mrs. Tavenner was like she had turned to stone. All the faces had the same look, and the look is called horror.

I was hollow. I mean there was *nothing* inside me. No air, no bones, no blood, no feelings. *Nothing*. I was hollow for a long time. Maybe five minutes, maybe ten, maybe more. I don't know how long. Then my insides started to come back, but my feelings didn't come back until later. It hurts to be hollow.

I think Mrs. Tavenner talked to us about it. I don't really know. I don't remember. I think they might have sent us home early. I don't really know. I don't remember that either. All I do remember is walking across the playground toward Niagara Street and our house and wondering who did it. I didn't wonder why. There isn't any why for something like this. There's just what happened and who did it. There isn't any why. There can't be. So I was just walking by myself and wondering who did it and thinking it had to

be the Russians and they couldn't be allowed to get away with it. And I still had no feelings. No feelings at all. Not any kind. And I walked some more and then my feelings started to come back. They were ice.

They were rage.

That weekend felt heavy. The television brought the pictures into our house. Before that Friday was even over, they brought the news that a man had been caught. They said he was Lee Harvey Oswald. They said he had killed a policeman. They said he had killed President Kennedy. Eventually I saw his face on the television and I looked at him and I hated him. The television showed the President's airplane bring him back to Washington, D.C. and the ice grew colder and sadness came with it. The television showed his casket in the rotunda of the Congress and more sadness came.

On Sunday the television brought the pictures of the police station where Lee Harvey Oswald was. The man said they were taking him to another jail. Then there he was, surrounded by policemen. One of them had a big hat that looked like a cowboy hat. Lee Harvey Oswald was smirking at us. Lee Harvey Oswald looked proud. Then a man ran up to him and there was a gunshot and I saw Lee Harvey Oswald's face change when the bullet went into him and I knew he was going to die and I wanted him to die. Later came the news he was dead and then the iciness began to go away and the sadness grew. But not for Lee Harvey Oswald. Never for Lee Harvey Oswald. None for Lee Harvey Oswald. I felt nothing for Lee Harvey Oswald. I was sad for President Kennedy and sad for Mrs. Kennedy and sad for his little girl and sad for his little boy and sad for all of us and sad for me. After it got dark I went to my special place and I sat out there for a long time all by myself in the cold. I sat out there and I didn't make a sound and I let the tears come and I stayed there like that until they were all gone and I never moved. I stayed there a long time. I never told anyone. It was something just between me and God. It was a prayer. And it was a Lifetime Promise. It was the same Promise I made to President Kennedy the day he became President. □

IV. The Johnson Years

1963 turned into 1964. I didn't have any great expectations for that year and, as it turned out, that was just as well. Project Mercury had ended in mid-1963 with Gordon Cooper's long orbital flight, and the way it turned out no Project Gemini astronauts would go into space for all of 1964. There was only one space launch that whole year and that one was just an unmanned test of the new rocket, the Titan II, they needed to launch the bigger Gemini space craft. By the time the astronauts started flying again I was in sixth grade and had to leave for school much earlier because the junior high school, where sixth grade went, was on the other side of town and it was a much longer walk. So I never got to try to see very many space launches again. Instead I had to see the replays on the news and a lot of times the news wouldn't even show them. The only news man who liked the space program was Walter Cronkite. He was the only one who knew what was important.

Vice President Johnson was now President Johnson. He had been in charge, sort of, of the space program. I thought it was good that we still had a President who liked the space program because there were a lot of big people who were saying they didn't like it. Mostly these were Republicans and some peculiar kind of Democrats people called 'the liberals.' I didn't know what was the matter with these people. How could anybody *not* want to go to the moon? I didn't like either of them because they didn't want to go to the moon and, even more, because they didn't like President Kennedy. I knew they didn't like President Kennedy because they wanted people to stop asking what they could do for their country. Instead they both wanted to tell everybody what to do and then make them do it.

They wanted me to break my Promise.

In math at school we were learning about the number line and what they called 'real' numbers. I thought that was a very strange thing to call them. What kind of number could possibly not be real? It looked to me like they were just more numbers. Somehow they weren't supposed to be the same as the regular numbers, which they were now calling 'the integers,' and they weren't supposed to be the same as fractions. Some of them were supposed to be just as good as fractions and these were called the 'rational'

numbers because a fraction could be thought of as a ratio of two regular numbers. We figured out rational numbers using something called 'long' division. When you did long division you still got a quotient but now instead of a remainder what you got was a whole string of numbers to the right of something called a 'decimal point.' Another strange name for something. You could use a decimal point to write money all as one number. Instead of saying, "two dollars and fifteen cents" you could just write $2.15 and everybody would know what you meant.

But there were more rational numbers than this. In fact, there wasn't any limit to how many there could be. There wasn't any rule that said 'there are just this many and no more.' So you couldn't count how many rational numbers there were. Of course, everybody knew you couldn't count how many regular numbers there were either because no matter how high you counted there was always another one. But with rational numbers you couldn't even try to count them because there wasn't any way you could use your fingers. With regular numbers you could always use your fingers if you had to so long as you were allowed to re-use your fingers. But there wasn't any way to do that with rational numbers. Instead you had to pretend you were dividing up the number line and the way you did this was long division.

I suppose they called it 'long' division because it took longer than quotients and remainders. For some rational numbers, like the one just as good as the fraction 2÷5 (which they said you wrote as 2:5 when you wanted it to be a ratio instead of a fraction), long division didn't take long. 2÷5 equaled 0.4 with as many zeroes after the 4 as you felt like writing down. Mrs. Tavenner showed us a procedure for how you converted a fraction into a rational number. But most rational numbers kept going without ever stopping. The only way you knew what it is was to spot its pattern. The pattern was that some sequence of numbers would start repeating over and over again and never stop. For 1÷3 you'd get 0.33333 · · · and the 3s would never end. So you couldn't even write down most rational numbers. All you could do was spot the pattern. Mrs. Tavenner said when you saw the numbers repeating you just put a bar across the top and that would mean the pattern just kept repeating. Okay. It was a little strange – why not just use a fraction? – but it wasn't hard so I didn't mind too much.

What I did mind was that all this didn't look like it was true. Not all the time anyway. You see, rational numbers were supposed to be just as good as fractions. The way you could tell they were just as good was to multiply them by the divisor (the number to the right in 1 ÷ 3) and see that you got the dividend (the number to the left in 1 ÷ 3). Mrs. Tavenner had taught us the procedure to multiply a real number and this procedure was also called 'multiplication' (although I thought it should have been called 'long' multiplication because it could get pretty long and it used regular multiplication inside it). Most of the time it worked and the rational number multiplied by the divisor did give you back the dividend.

But not always. When you applied this procedure to 0.33333 · · · you didn't get 1. Instead you got another endless number, 0.99999 · · ·. I might have only been a little boy, but even I knew 0.99999 · · · is not the same as 1. It looked to me like there was something basically wrong here and I didn't like it. So I asked Mrs. Tavenner about it. She pointed out that 0.99999 · · · was basically the same as 1 since the difference was tinier than anything and 1 – 0.99999 · · · = 0.00000 · · ·. Uh-huh. I had to admit Mrs. Tavenner was right about it not making any practical difference, but I wasn't completely sold. I decided this was something that was 'alright' but not 'okay.' It looked to me like if you just worked hard enough at it you could make any number equal any other number this way and that was obviously wrong. So I was very suspicious about this real number thing. But I figured maybe they'd explain it somehow in sixth grade. Every time you went up to the next grade they explained more stuff, so they'd probably explain this next year. (It turned out they didn't explain it next year. Or the year after that. Or the year after that. I had to wait all the way to college before anybody explained it and it turned out you really couldn't make any two old numbers equal each other. The moral of the story is: You never know enough math).

But rational numbers were a piece of cake compared to the other kind of real numbers, which were called 'irrational' numbers. The 'irrational' meant they couldn't be gotten by dividing out fractions. But the word 'irrational' also means 'nuts' and I thought that was a pretty good way to look at them. At least

rational numbers were practical even if 0.99999 · · · wasn't the same as 1. You could always figure them out good enough for practical purposes because they'd eventually either end or start repeating in a pattern. But irrational numbers, Mrs. Tavenner said, were numbers that never repeated in a pattern. If that was true, I couldn't see any way a person could figure them out and if you couldn't figure them out then they weren't practical. If they weren't practical I couldn't see how a person could know they really even existed. I asked Mrs. Tavenner about that, too, and she said the old Greeks had come up with a way to do it but first you had to learn something called 'geometry' to understand how to do it. Okay. I'd wait. Maybe this 'geometry' thing would straighten out the goofy stuff in the rational numbers too. □

One of the things every kid had to do once a year was take these big tests called the Iowa Tests of Educational Development. Nobody ever called them that. They called them the 'I-T-E-D' but the name of the test was written right across the top of the answer sheet so I knew what 'I-T-E-D' stood for. There would be an exam book and the answer sheet had multiple choice answers you selected by filling in a little circle with a number 2 pencil. They'd announce a few days ahead of time what day the ITED was going to be and on that day you'd come in and just spend most of the day taking it. Some time later your test results would come back, printed out on this piece of paper that sort of looked like a graph but had numbers printed on it too, and you were supposed to take this home and give it to your mom and dad. No big deal.

Nobody ever explained to me why we had to take these tests but I didn't particularly care. It was just another school thing we did. I didn't even care what my test scores were although, of course, I'd always do my best on the tests. The scores were kind of weird anyway. The highest score you could get was a 99. I asked one time why the highest score wasn't 100 since the scores were called 'percentiles' and 100%, not 99%, should have meant 'perfect score.' But the teacher told me there wasn't a 100th percentile and 99 was as high as it went. Okay, fine. Whatever. I would look to see what my scores were when the ITED result came back, but mainly only because the scoring system was so weird. I always did okay on it. Most of my scores were always in the middle 90s give or take a point or two. Once in awhile a score might drop down into the high 80s. I never got a 99. Nobody ever told me that wasn't good enough or what my mistakes were so I didn't waste any time thinking about it.

Every once in awhile another kid, usually a girl, might ask me how hard I studied for the ITED. I was always surprised by this question because I never studied for it at all. How could I? They never told us what it was going to be about. Besides, there just wasn't any need. All I had to do was pay attention in class and do whatever the teacher said and the ITED took care of itself. But I did get some funny looks, usually not very friendly, when I said I didn't study for it at all. I just shrugged that off. I didn't think the ITED was important and I didn't see why anybody should think it was.

One person did, though. Melody. Mom always saved our scores sheets for some reason and Melody discovered where she kept them. She started digging out my old scores from her grade and insisting on showing them to me right next to her scores. Melody got 99s straight across the top except in math, where she only got a 96 or something. Her main point was that her scores were better than mine straight across the board. She seemed to think that was important for some reason, although I couldn't see it other than to point out something I already knew: Melody was smarter than me. She'd do this every year. She'd haul out my old score and insist on showing it and hers to me. It was always the same. She'd get 99 straight across the top except in math where she'd get a 96 give or take a point or two. I think just one time I outscored her in math by maybe one point. I used the occasion to point out she wasn't perfect. Being teased about it by her rankled me a little bit, but it didn't bother me that her scores always beat mine. They were *supposed* to. You see, my little sister is a genius. I'd known that for a long time.

Which doesn't mean I ever told *her* I knew that. Oh, no. She already had me outgunned enough. □

That spring I wandered over to the Briggs playground one Sunday afternoon to see if anything was going on. Maybe run into a few of the boys and get a ballgame together or something. But there wasn't anybody over there. I was about to leave when I saw a couple of boys I didn't know coming on to the

playground from the south side. They both looked like they were my age but I'd never seen them before. They must not have gone to Briggs or I'd have at least recognized their faces. But I didn't. They were strangers.

They both saw me and came walking toward me so I waited for them. You can never tell. Sometimes you make new friends this way, sometimes you don't. They stopped when they got to me and we eyeballed each other for a few minutes. One of them was my height, the other was taller than me. He was a little taller, I was a little heavier. Okay, I was *more* than a little heavier; I was a Bubba after all. Of the two of them the taller boy was obviously the leader. He stood right in front of me and the other boy stood a little off to one side. That's how you tell who the leader is. I didn't say anything, so he spoke first. "You live around here?" he asked.

"Yeah," I said, pointing with my thumb back over my shoulder. "I live just down there. You live around here?"

"No," he said. He didn't say anything else, so we all just stood there for another minute or so looking each other over. It was clearly a territorial thing. Finally he said, "I bet I'm tougher than you."

Well, there was only one thing a boy could say to that. "I bet you're not," I replied.

"You better watch out, kid," his buddy said. "He's the toughest kid on his block."

I appreciated the warning but still there was only one thing I could say to that, too. "Well," I replied, "this isn't his block."

We were all caught in the ritual and just ran it like it was supposed to go. "Oh, yeah?" – "Yeah!" then he shoves me and I shove him back.

He was the challenger and so it was his call which way it went next. If he dived at me and tried to grapple, it was a wrestling match. If he took a punch at me it was a fight. You almost never knew which one it was going to be until after the shoving. If it was going to be wrestling, I had the weight. But it would depend on whether he had the speed and the strength.

He took a swing at me. It was a fight.

I blocked it and he took another swing with his other arm. It was just another haymaker and I blocked it, too. This kid didn't know how to fight. He just kept swinging and I just kept blocking. He was leaving himself wide open with every swing and it would have been the easiest thing in the world for me to just punch him out. But I didn't want to. I wasn't mad; this was territory, not honor. And it was sure clear he wasn't going to be able to hurt me, so I didn't want to hurt him. I let him keep swinging and I kept blocking every one of them. As it went on, I saw his face starting to change little by little. He wasn't landing any punches, and that unsettled him. But I wasn't hitting him back and that confused him. He didn't know what was going on now.

Finally he took a step back and dropped his arms to his sides. "Let's call it a draw?" he offered. "Okay," I said. I lowered my arms. "It's a draw."

He took a step forward and presented his left side to me. "Hit me," he said. I didn't want to hit him. "I hit you," he said earnestly, "so you've *got* to hit me!" Ah, honor! I understood. I gave him a punch on his arm, not so light it would insult him but not really hard enough to hurt him. An honor tap. He nodded and put out his hand. "Good fight," he said. We shook hands and they turned around and left. I never saw either one of them again. It was too bad. We would have been good pals.

There wasn't anything else going on at the playground, so I walked back to our house. Dad was in the living room reading the paper. Normally you don't bother to talk about a fight unless somebody actually got hurt, but Dad had liked it when Steve had had his fight over at the playground, so I thought I'd mention it. "I was just in a fight," I said.

"You?" he grunted. He didn't say anything else. It was like he thought I was just making it up.

That smoldering anger flooded all through me. I stood there for a second. Then I turned and walked away. □

I learned a new word that March. The word was cancer. Near the end of that month Grandpa Wells died of it. He had been sick for some time but I hadn't known that, so when he died it seemed very sudden to me. Something changed inside me that day when they told me he had died. I felt that hollowness inside start again and somehow I was able to reach inside and stop it from growing before it could take all of me away. I stood there with this one big hollow place inside and I put Grandpa into that place and I put walls around it and I squeezed it to make it smaller. With Grandpa safe inside the hollow place I could keep all the hurt away from the rest of me so I wouldn't have to cry. All I had to do was keep squeezing the hollow place in and I wouldn't hurt the way I had when Uncle Chet and President Kennedy died. In time the hollow place grows small again and the pain inside it stays inside it. The hollow place doesn't ever cease to exist. It's always in there somewhere and death always makes it grow and its gateway reopen and when it does I put the dead person in there with Grandpa and all the others I've known who have died. The hollow place is the grim but hallowed ground in my soul. It is the cemetery crypt of my heart and it is where I lay the people I love to rest. Over the many years since that day, in times of sorrow, some people have thought I had no feelings because they can't see them. They are wrong. Those feelings go with the person who has died into this sacred place and I carry the person and the feelings that belong to them in there where they are always with me and where my love never leaves them. □

Early that summer Dad said he wanted to go on vacation and visit his friend Carl Abbott and his family in Alabama. Mr. Abbott and Dad had served together on the destroyer U.S.S. Waller during the war and had become best friends. Dad had kept a diary during the war and I had read it. The entry for January 12, 1945, read:

> G.Q. at 6:00 a.m. and again all hell broke loose. We fired 40 rounds from gun 5 again and others fired more per gun than we did. We shot down one plane with 40 mm. Gun 5 had a powder jam and we were repairing that while the last of the firing was going on. That was the 2nd G.Q. this a.m. so far and I just got back from breakfast. The 40 mm.'s shot 12,000+ rounds this a.m. We just heard some scuttlebutt we are going to refuel and head back to Manus today. Left Lengayen at 6:00 p.m. with large convoy of transports for Manus. Also a large convoy of L.S.T.'s left at same time. G.Q. but no air attacks.
>
> Abbott wants to go home to Mildred. I want to go home too.

The four of us – Dad, Mom, Melody, and me – set off in the car for Alabama. Dad drove, Mom sat in front, and Melody and I sat in the backseat. The car was pretty crowded with all our suitcases. It was a long trip, and Mom always hated to take long trips with Dad because if anything went wrong or it looked like we'd taken a wrong turn someplace Dad would get mad and cuss. Mom disapproved of cussing. We drove south through Illinois then into the mountains through a piece of Kentucky and across Tennessee to get to Alabama. The mountains were very beautiful and they looked big, although many years later when I first saw the Rocky Mountains these mountains weren't so big in comparison. But this was the first time I'd seen mountains and I liked them very much.

Carl Abbott and his family lived in a little town far away from Birmingham and Mobile and the other cities that had been in the news. I think the town was bigger than Maquoketa but it was hard to tell. They welcomed us very warmly. They didn't have a very big house and it was very crowded with all of us there. Mr. Abbott had a son who was in high school and who insisted that Melody and I take his room to stay in while we were there. He slept on the floor in the living room, which I felt guilty about but he just wouldn't hear of doing it any other way. I had just started playing in Little League that summer and he would play catch with me in their back yard. I liked him a lot.

The Abbotts talked differently from us and this was called a 'southern accent.' They used a word I had heard used once in awhile on TV and in the movies, but had never heard a real person use before. The

word was "y'all." Contrary to what know-nothing TV and movie people seem to think, nobody in Iowa says 'y'all' but everybody we met in Alabama did. I asked Mrs. Abbott about that word and I think she might have thought at first that I was being critical. But she explained that they said 'y'all' to mean 'all of you; you all.' That made perfect sense to me so I started using it too. If it's okay to say 'can't' instead of 'can not' I didn't see any reason not to say 'y'all' instead of 'you all.' Melody teased me about it but I got even by calling her 'missy.'

Mr. Abbott owned a barber shop. He showed it to us and even gave me a haircut and wouldn't accept any money from Dad for it. He had invented this really neat thing. It was kind of like a vacuum cleaner hose that attached to the hair cutter and kept the hair from falling on the floor. You might think it would have been uncomfortable for the person getting his hair cut, but it wasn't at all. It was a little noisy but not too noisy and it didn't yank my hair the way I learned the vacuum cleaner did later. He had it just right.

In the town there were signs of segregation. I did see public toilet rooms with 'colored' and 'white' signs above the doorways. But there were no 'colored' and 'white' signs in Mr. Abbott's barber shop. Dad and Mr. Abbott talked a little bit about the trouble that had been going on in Birmingham and other places and Dad would listen to what Mr. Abbott had to say and didn't offer any opinions of his own. I think Mr. Abbott and his family did not dislike colored people – and they called them 'colored people' and not Negroes – but clearly they didn't like all the trouble that had been going on and they didn't like the way the news people were portraying all the white people in Alabama. I think they thought there were a lot of troublemakers on both sides. Still, I also thought that while they didn't dislike colored people they didn't particularly like them either. They seemed to look at them pretty much the same way I looked at strangers – not overly friendly and kind of cautious. There were, Mr. Abbott said, good colored people and bad colored people just like there were good white people and bad white people.

He took Dad and me on a drive to see the town and on part of this drive we saw what Mr. Abbott said was a 'colored neighborhood.' I had heard the TV talking about 'poverty' but I'd never seen what it was until that day. The houses were all small and they weren't painted and they looked very run down, like a lot of the houses in Fulton only much worse. I didn't see any people in that neighborhood when we drove through it. It looked like everybody was gone somewhere. Probably they were at work somewhere, I figured. There weren't even any kids around. There was one house that had a new-looking car parked in front of it. It had been washed and polished and was very shiny. I bet its owner was very proud of it. I would have been. It was the only nice thing I saw in that neighborhood and I was glad that person had at least one nice thing because all the rest of what I saw didn't look nice at all. Our family wasn't rich and our house wasn't the nicest house in Maquoketa by a long ways, but it was a million times nicer than this neighborhood. I was glad we didn't live in poverty and I felt sorry for these people who did. I thought to myself, *'If it is segregation that makes it so people have to live like this, then segregation must never, never be allowed.'*

I don't know how Mr. Abbott or his family felt about segregation. I didn't hear them say anything in favor of it, I didn't hear them say anything against it. I didn't hear them use the word at all. I wanted to ask Mr. Abbott about it, but we were his guests and that wouldn't have been polite. Mom always said when you were company or when you had company the two things you could never discuss were politics and religion. Religion is a private thing; it's between you and God. Politics is a democracy thing; it is how you make America work. We didn't come to Mr. Abbott's house to make America work. We came to Mr. Abbott's house to make new friends – except for Dad who was already Mr. Abbott's friend.

I enjoyed our visit with the Abbotts and I liked them a lot. In no time visiting time was up and it was time to leave. But before we went back to Iowa there was one more thing Mom and Dad wanted to do. Florida wasn't very far away, relatively speaking, and they wanted Melody and me to see the ocean. It was really the Gulf of Mexico but it looked like an ocean to me. We drove to Florida and went to a beach. The weather turned out not to be very nice; it was cloudy and windy and cold. But we did see the ocean and Dad let me wade out into it a little ways. I only made it out about waist deep because the waves

coming in kept knocking me down. The water was very salty and not at all like a lake or a river. When I stood out in it I could feel it pulling the sand away from my feet. But despite the fact that it was kind of cold and the weather was pretty disappointing, we had fun and Melody and I did collect some sea shells. There were little animals still in them, so Mom wasn't too thrilled about that.

I played Little League on the team sponsored by Cassidy Sporting Goods. The neatest thing about playing on the Cassidy team was our uniforms. Being a sporting goods store, Mr. Cassidy didn't skimp at all on outfitting us. Our uniforms looked just like the big leaguers' only smaller. They were probably the best thing about our team because the New York Yankees we weren't. We'd win some games, lose some games, and generally just have fun. I didn't like losing, of course, but I did like the sportsmanship at the end of every game. The boys on the other team were your mortal enemies during the game, but right after the game everybody would line up in two lines, we'd slap hands (this didn't come to be called a 'high five' until many years later) and the winners would say, "Good game, good game," and we'd all be friends again – at least if we were friends to begin with. In those days people would say, "It's not whether you win or lose, it's how you play the game," and they really meant it. It was a *sport*.

How I played the game – well, let's just say I had my highlights and my lowlights. My particular highlight was fielding. Generally if I could touch the ball I'd catch it or scoop up the grounder or pull in the throw. My throwing arm was only fair, which sometimes was kind of a disadvantage because I usually played either left field or center field, although occasionally the coach would put me in at second base. If a fly ball really went deep – back near the fence – my throw to the cutoff man might or might not come somewhere close to him depending on how much adrenalin was pumping through me. If I'd been the coach, I would have put me at first base because I really could catch the ball. The coach tended to put the tallest boy on the team at first base, and the way our infielders threw I guess I could see why.

I could run the bases pretty good. The problem was getting on base in the first place. I was the absolutely worst batter who ever played Little League. That ball comes at you awfully fast and by the time I figured out whether or not it was going to be in the strike zone it was generally too late. If I got wood on it at all, it was usually on its way straight to the other team's first baseman. I was a little better at bunting, but not a whole lot better. The plain fact was my best chance to get on base was to get hit by a pitch. It didn't take long for everybody in Little League to know that, either. Once in awhile, in a clutch game-on-the-line situation where I was coming up to bat, my teammates would yell encouragement. *"Okay, Rick!"* they'd yell, *"Tough batter! Get hit!"* Not 'get a hit'; 'get hit.' The umpire would usually give me a funny look when they yelled that. I'd crowd the plate and try my best, but pitchers hardly ever threw inside to me. They never worried I might take them downtown on an outside pitch. I could have been the poster boy for the designated hitter rule if there'd been one in those days.

It was always frustrating for me that I couldn't figure out how to be a better batter, but I still loved to play baseball. Games were played starting in the evening and there were usually two games a night. The teams playing the second game played under the lights and some boys never did quite get the hang of that. The lights didn't bother me so far as fielding went – and nothing could have possibly hurt my batting; there wasn't anything there to hurt. But some boys couldn't quite adjust to playing under the lights. One night I was in left field and an easy fly ball was hit to right field. The boy playing right field took a couple of steps, got under it, pounded his glove, got in perfect catching position, and *splat!* took it right in the face. That was the first and only time I've ever seen an outfielder do that. Fortunately, he wasn't hurt too bad; no broken nose, no broken cheek bone, no missing teeth. *Really* nice black eye. He had to come out of the game but he didn't leave the field and sat out the rest of the game in our dugout. I cheerfully reminded him when we came in to bat that getting hit by the ball was *my* job.

Another night we were up to bat and our guy hit a line drive right back at the pitcher. It really wasn't a very hard line drive and there was plenty of time to either catch it or get out of the way. But I guess the pitcher had trouble seeing it because he just stood there and *whump!* it hit him right in the jewels. We didn't wear cups in Little League and down he went in a heap. His mom came tearing out onto the field

and got to the mound even before the umpire could. Right there in front of the whole world she pulled down his pants to see if he was okay. All the parts were still there and still where they should have been. Boy, oh boy, was he ever mad at his mom for that. In our dugout we were screaming with laughter. For the next couple of months some of the boys, instead of saying 'hi' or 'hello' when they saw him, would yell, *Ding dong! Avon calling!* That always started a fight.

A lot of parents would come to watch the games, although they generally did more visiting with each other than actual watching of the game. If somebody did something really good, like make a great catch or get a good hit, they'd clap and give a nice, polite cheer. Otherwise they just let us play. I don't remember anybody ever yelling at the umpire from the stands, although it wasn't unknown for one of us to yell at the umpire. They didn't harass the coaches, and they didn't ever get down on any of the players. Baseball was a game, it's only purpose was to have fun, and the parents all knew that. Dad came to a few of my games my first year of Little League but he stopped coming after that. I was never able to quite figure out if I was mad or glad about that. I suppose I was both. □

The atmosphere at home started changing in 1964 and I didn't like it one bit. It started very abruptly one night after supper when Mom announced to Melody and me that from now on we were going to do the dishes after supper. Where did *that* come from? You see, always before when Mom would tell me I had to do something she always explained why first and even though I might sometimes whine about it a little, she was always able to get an "okay" from me. I felt like I had a say in it despite the fact that whatever it was I'd always end up doing it. This wasn't that way. It felt like a punishment for something. *What did we do wrong? We didn't do anything wrong!* I didn't think either of us, Melody or me, had done anything to make Mom punish us.

We handled it with all the calm dignity you can expect from a ten-year-old and an eight-year-old. We bickered and fought with each other in the kitchen from first plate to last fork. Every night. We couldn't take it out on Mom or Dad, so we took it out on each other. Model inmates of Sing Sing we were not. There was another consequence as well, and I don't think this one was part of the plan. Until then, the whole family would always gather in the living room together to watch TV and, not infrequently, do a little cuddling. No more. At least not for me. Melody might still have done this after the dishes, but I didn't. I was angry and resentful and I'd usually retreat to my room afterwards and do something I could do by myself. Build a model, read a book, practice chess. It was my way of telling the world to go to the infernal region and screw itself.

From there our domestic chores increased. Melody generally was relegated to cleaning duties. I got the lawn mowing detail and some other things I no longer remember. Again, it wasn't something open to discussion although it was accompanied by the bribe of a fifty cents per week allowance. I think maybe Mom and Dad thought that was an incentive, but I saw it as something you gave the hired help, something that said I wasn't part of the family anymore. I don't know if Melody felt like the maid or not, but I felt like the gardener and not the son. I also was the sullen recipient of some lectures on how a boy had to 'learn responsibility.' Maybe if those speeches had come first I'd have felt differently – and then again maybe not – but the fact was I didn't feel like I was or had ever been 'irresponsible.' I also was treated, usually once a week or so, to Dad's lecture on how a boy needed to 'learn the value of a dollar.' I already knew the value of a dollar. It was twenty packs of chewing gum. It was ten bottles of soda pop. In the history books at the library about the American revolution I had read about how people would be brought to the colonies as indentured servants. That's what all this made me feel like. I was an indentured servant for five bottles of pop a week plus room and board. And there was nothing I could do about it.

Now I didn't know this at the time, but it was sometime right in here – probably a bit before – that Mom had had what apparently looked like a mild heart attack. It had scared Dad, and probably her too, right down to the core. I never found out about it until years later; this was just the sort of thing Mom and Dad would always keep from us kids. After I did I understood better what was happening right at this time. But, you see, *at the time* I didn't know anything about it. All I knew was that suddenly the universe

had changed again from out of nowhere, and in this new universe it looked like Mommy and Daddy didn't like their little boy very much anymore. I felt very, very alone.

Dad delivered the final *coup de main* late one afternoon around the middle of the summer. I happened to be standing in the dining room when he came home and when he saw me a look I'd never seen before spread across his face. He pointed his finger right at me and in an angry voice he said, "You're ten years old! It's time you got a job and that's what you're going to do!" Then he stomped off into the living room.

He left me standing there with my mouth open. *What did I do wrong?* I always knew I had to get a job when I was old enough for high school. Bill had. I had expected I would, too. Why was Daddy mad at me? *I didn't do anything wrong!* The way he had looked at me and the way he had yelled and the way he'd stomped away from me suddenly became a magnet for every other hurtful memory – the way he felt about my glasses, the contempt in his voice I heard in that *"You?"* when I told him about the fight, every hurt I had felt going all the way back to that long-ago Christmas when my helicopter died. It all came crushing in on me in a single ugly mass and suddenly exploded in fury. I felt baffled, betrayed, icy cold, and so enraged I couldn't breath or speak or think. *I couldn't be here!* I had to get away from *him*, get away from *his* house, get away from everybody. I ran out the door in a red-rimmed fog, turned north to the ball field, and ran across it. I climbed over the levee, slid down its other side to the banks of the Maquoketa River. Then I just stood right there at the river's edge. I felt like a stone, blind and cold, until the sound of the chuckling water gradually brought me back. I found I could roll all the hurt and pain into a little ball and tie my rage like a cord around it and push it all into a deep hole in my chest. When I could make it stay there, not until then, I went back to the house. But I was different now. I was a grimmer, colder boy who had lost his Daddy. I came back as a stranger living in a stranger's house and it would be a long, long time before this new boy would or could let the father have the son back again.

I think he tried to take some of it back the next day. He sat down with me in the living room and told me stories about when he was a boy in his dad's bakery. He told me how when he was three years old he had to stand on a box at the sink and wash the bakery bowls and pans, and how he'd no sooner get through with them than they came back dirty and had to be washed again. He said how he wanted to play and would run out the back door and his dad would come get him and carry him back inside and set him on the box again. It was too late. He didn't know how wide the rift had opened between us the day before. I listened to the story in silence and thought, *You think I should have been working when I was three, just like you?* I was ready to understand everything he said in the meanest possible way. We were strangers now, but he didn't know it. He didn't know this was now *his* house and I was just the serf boy. I carried that ball of hurt and rage inside me from then on until it became just another part of me.

But he did mean it about the job. He handed me a catalog from a company that made lawn mowers and said I could make a lot of money going door to door selling lawn mowers. He didn't actually *say* I had to go sell lawn mowers. But he wouldn't have given me that blasted catalog if that wasn't what he wanted me to do. So that Saturday I went out with that blasted catalog under my arm and I tried to sell lawn mowers door to door. I didn't sell a single one. The last house I tried was where Steve lived. I talked to Steve's dad and he explained something to me. "These machines have Briggs & Stratton engines in them," he said. "I only buy machines that have Clinton engines in them." The Clinton Engines factory was Maquoketa's largest employer. 1200 people – one for every five people in town – worked at Clinton Engines. Gary had worked there before he and Sherri opened their store. Briggs & Stratton were the enemy for people whose paychecks depended on Clinton Engines. I might have only been ten years old, but that was plenty old enough to understand this situation. And once I did understand, I didn't *want* to sell those Briggs & Stratton machines. I wouldn't have *given* them away. I told Steve's dad I hadn't known what kind of engines these were, and I thanked him for telling me. I threw that blasted catalog in a trash can as hard as I could after I left.

That still left me having to find some kind of job. One of my friends had a paper route delivering the

Telegraph Herald newspaper, and he told me the manager was looking for a boy to take the delivery route that started at the west edge of town and ran outside the city limits past the Hi Ho Bowling Lanes. It turned out they were always having to find somebody to take that route because it ran way out of town, didn't have too many customers, and in the winter you had to walk or ride your bike in the dark on the highway on the way back into town. But it was a job and I didn't need a work permit to do it. I was ten years old. I knew they weren't about to give a ten-year-old a work permit. I talked to the manager, he showed me the route, and the following Monday I was a paperboy for the *Telegraph Herald*. I made $1.35 per week. Three cents a customer. That plus my serfdom as gardener meant I was now valued at eighteen and one-half comic books a week. My favorites were *The Fantastic Four, Superman,* and *Classics Illustrated.* What I didn't spend on comic books and soda pop went to the five-and-dime store across the street from Beatty's Ben Franklin for models. Oh, yes. I knew the value of a dollar. Mom thought it would be a good idea for me to put my vast wealth in a savings account at the bank, so pretty soon I also owned a bank book. That made me cut back by two bottles of pop per week. The bank manager never did come running over when I'd go in to make my weekly twenty-five cents deposit.

The *Telegraph Herald* was an afternoon paper and I did enjoy biking out in the countryside on nice afternoons. Also, one of my edge-of-town customers was the house where Rocky, a school chum of mine, lived and every once in awhile the paper delivery ran a little late because of that. What I didn't enjoy so much was biking on the gravel shoulder at the edge of the highway. It was a harder push, especially when it was muddy. But I didn't dare ride on the highway itself. Cars would come zipping over the hills at seventy miles an hour and I didn't want to become somebody's hood ornament. Melody was now riding a bicycle too, and one afternoon she wanted to come with me on the route. We were out on the highway part of the route and I'd told her to ride on the shoulder instead of the pavement. She took that advice the same way she usually took my advice, which was not at all. I kept looking back over my shoulder because I was very nervous about her being on the pavement, even though she was right at the edge next to the gravel. We were maybe fifty yards or so past the crest of a hill when what I was afraid would happen did happen. A car came zooming over the hill full speed. I grabbed Melody's bike in my left hand and jerked her, bike and all, off the highway. The car missed her by inches and never slowed down. She fell off her seat onto the frame when I pulled her off the road and got a little banged up. Boy, she really let me have it for hurting her. Car? What car? I was a jerk. I wouldn't take her with me again after that.

Another less-than-my-favorite-part of that route was this black little psycho terrier one of my rural customers owned. Every day when I showed up with the paper this vicious little mutt would come charging at me, mouth open and fangs bared. I'd raise my hand like I had a rock in it and was going to throw it and he'd veer off in a big circle then take another run at me. But the rock trick always worked. Except once. Usually I'd just go to within throwing distance of their porch and let fly the paper. But once a week I had to go to the house to collect. One collecting day I showed up and there was no dog in sight. I looked all over the place very carefully, but I couldn't see him anywhere. I walked up to their porch, which was in blackness because the sun was setting right behind their house and back lighting everything. I couldn't see the black dog waiting for me in the black shadows of the porch. He let me get within about five feet and out he darted. He snapped his teeth into my leg but, fortunately for me, I was wearing fairly loose-fitting pants and he missed my skin. So here we were, me standing there with this snarling little psycho mutt ripping and tearing at my pant leg. I brained him with my collection bag, which was full of quarters, dimes, and nickels, and got the heck out of there fast.

Around late fall I was finding myself not very keen on doing that route in the winter. It would be a heck of a long walk once the snow came and almost all of it would be in pitch darkness. I heard about an opening with *The Des Moines Register* that was entirely in town and was a morning route, which meant that only most of it would be during the dark. I talked to that manager and next thing I knew I was working for *The Des Moines Register* making a whole $1.85 per week. Now my net value was up to twenty-three and a half bottles of pop a week, almost a whole case. But, after all, I was eleven now. I'd start my route at six, finish by seven-thirty, bolt down a couple spoonfuls of Cheerios and head off for the

junior high school, which was about a half-hour walk from Dad's house. □

The November elections were coming up fast but there was never any doubt about who I thought the best man was. President Johnson was talking about a Great Society program. He had already gotten Congress to pass the Civil Rights Act that outlawed job discrimination and segregation, and that was something that was just plain *right*. He had announced a War on Poverty program too, but I was a little less sure about this one. Not about the goal. If there was a way to eliminate poverty I was all for it. Nobody should have to live in places like the one I'd seen in Alabama. I just wasn't too sure what he planned to do about it.

The Republicans, on the other hand, were backing a guy named Senator Barry Goldwater. I didn't like him and I didn't like the tone of what he said he'd do as President. He said he would undo all that President Kennedy had done. He didn't care about desegregation. And his backers all seemed to be the kind of Bible-thumping scolds who know *nothing* about God but are all raring to fire-and-brimstone the sinners like me into their place and make us all live the way *they* thought we should. And that way of living was a life without liberty or justice or morality or honor. I already had enough wardens of my own; I didn't want any more, especially these jerks. So when President Johnson was elected in a landslide I was jubilant – and it had been awhile since the last time I was.

Of course, I didn't get to vote in this one. Oh, I already knew I hadn't really voted in 1960 but at least I'd been there and I'd gotten to see the inside of the voting booth. But not this time. This time there was no going down to the polls with Mom and Dad on election day. Dad and I rarely went anywhere together anymore unless he told me I was coming along. And he hadn't told me that this time. There was no part for me to play at all this time. Unless delivering papers counted, there was nothing I could do for my country right now. I was fresh out of Briggs & Stratton catalogs to trash. □

The sixth grader (1965, age 11)

As 1964 faded into 1965 I was getting used to sixth grade. At Briggs we spent the day in one classroom with one teacher. In sixth grade we started having different rooms and different teachers for different subjects. That took a little getting used to. But I was learning to take whatever came my way with a fair degree of stoicism. Mostly, anyway. If I have given the impression that I'd become just a tad testy, well, yeah. I was. I was still attentive to my school work – that had just become part of my routine by now – but I had become even quieter and more reserved and a lot more independent in how I looked at things and what I thought about them. And I didn't give much of a hoot about what anybody thought of me or what *they* thought I should be doing. What *I* thought of these was what mattered to me.

I'd never been the most talkative kid in school, but now I was becoming pretty unapproachable. Oddly enough, at the same time and for reasons completely unknown to me, I was starting to become an object of attention from other kids. Maybe this had something to do with the fact that having different classrooms meant you also spent more time in hallways encountering more kids. The entire sixth grade was confined to the first floor of the junior high building, while the seventh through ninth grades occupied the upper two floors. Hallways aren't as big as playgrounds and we were thrown together in much closer contact than ever before. And for some reason I was getting noticed.

My first awareness of this came when I was accosted in the hallway by a boy named Randy. I'd known him – which is to say I knew who he was – ever since kindergarten but we had never been pals or even spoken very much to each other. The fact was I didn't like him, never had liked him, never was going to like him. He was a pretty good sized kid – he'd already been a Bubba in kindergarten – and I

considered him to be nothing more than a fat, obnoxious, stupid bully. I had never had any personal run-ins with him but I'd been watching him pick on smaller kids for years.

Now, for the first time since we'd been five years old, he confronted me in the hallway and demanded to know, "Do you get straight-A's?" Whatever that meant, I was sure it was none of his business. In point of fact, I really didn't know what he was asking. He meant grades of all A's, of course, but I honestly had no idea what my grades were. They would give us a report card to take home to have our parents sign, they'd sign it, I'd bring it back. I never even looked at it. I was just the mule. Nobody had ever said anything to me about grades so I never paid any attention to them. "What are straight-A's?" I replied.

Well, it won't surprise you when I say he acted pretty insulted by that answer. I'm sure he thought I was being a wise guy with him or something. I'm fairly sure anybody as dumb as this kid had probably found out what grades were somewhere around the second or third day of kindergarten. He treated me to a couple of words I'd never heard before – although whatever they meant I knew it wasn't a compliment – and repeated his demand for knowledge. "It's none of your business," I replied coldly. "Excuse me." I walked away and continued on to my next class.

That was a mistake. Not the 'none of your business' part but the 'excuse me' part. He thought I was afraid of him, politeness not being part of his universe. The next day he had a charming new name for me. I was 'Professor Inkenschlein.' I was fairly sure the dumbbell meant 'Einstein,' and he mispronounced 'professor,' but I got the drift anyway. That cold, smoldering anger started building up in me, but I just ignored him. Still, I was pretty sure he wasn't smart enough to leave well enough alone and we were going to have to settle a thing or two one day soon.

'Soon' turned out to be about five weeks. In the interim I'd been getting the 'Professor Inkenschlein' treatment on a fairly regular basis, and every time I would get a little angrier and a little angrier. But I always managed to keep my temper under control. About five weeks from the start of the whole thing the weather had warmed up enough for us to be outside for PE, running fifty yard dashes and doing other track things. I never was the fastest kid in school but I wasn't the slowest by a long shot. That distinction went to a fat puffing walrus who didn't know how to pronounce either 'professor' or 'Einstein.'

We had just finished and started back up the hill that ran from the track to the junior high. As I was walking I heard Randy and a couple of his coat holders behind me. He was making witty remarks – what passed as witty for him anyway – about 'Professor Inkenschlein' up there. My jaw started to clench but I ignored him and kept walking. Then I felt one of his fingers being poked up between my legs.

I whirled around to face him and just barely managed to stop myself from hitting him. *"Don't ever do that again!"* I warned him. Then I made myself turn around and start walking again. Behind me came a chorus of giggles and "ooh!"s.

He was too dumb to heed a warning. The second time he did it I whirled around and punched him just as hard as I could right in the belly. If my arm had been a sword I'd have run him through. As it was, my fist disappeared past the wrist in the folds of his fat that closed over it. It was only in there a fair fraction of a second before his body acted like a spring and ejected my hand, which conveniently re-cocked my fist for a second overhand punch to the face. It was on its way when I managed to catch it and stop it.

His face was ashen, his mouth was a wide, gaping hole, and he couldn't breath. Both hands were over his stomach and he was completely helpless. Even though I was so furious I was seeing the world through a red haze, my mind screamed *stop right now!* I lowered my hands, both fists still clenched so tightly my fingernails were cutting into my palms, turned my back on him and walked away again.

I'd gone about thirty feet before he came back *again*. He'd found some more air and was trying to talk tough but I heard fear in his voice. "Are you ever going to hit me again?" he was saying. "Eh?" He punched me on the left arm. It was just an honor tap. I kept walking and didn't – couldn't – say anything.

I never had any problems with him ever again. □

After Randy and I had reached our little understanding I didn't get any guff from any other kids in sixth grade either. However, I was involved in one more fight that year and this one, strangely enough, was with my best pal Dave. Stranger still, although I threw the first punch, the kid indirectly responsible for it was my other best pal, Jim.

Jim, Tom, Dave, and I were all over at Tom's house one Saturday goofing around. I don't remember any more exactly what we were doing, just some kind of normal kid stuff. Dave and I were just getting to that age when boys tend to get a little lippy. Me more so than Dave in this case. Jim and Tom, being the older boys, were at that stage where they knew they didn't have to take any lip from smaller boys. There was always an easy solution they could use. It involved the use of certain wrestling holds accompanied by a healthy dose of harmless but humiliating torment applied by the bigger boy to the smaller.

This particular day I supplied the lip and Tom supplied the rest. Jim joined in the fun in a secondary way and I lost my temper. Normally these things end with some closing ceremony squabbling and then you patch things up and go on to something else. Sometimes, though, the bigger boy will overdo it a bit and that's what happened on this particular day. I was pretty mad at Tom and not inclined to leave Jim out of it either. The squabbling part of the ceremony ended with tempers heating up all around and I stormed out of the house after inviting both of them to go visit the infernal region. Dave was the innocent bystander in all of this.

Jim either figured Tom and he had overdone it or that I was overreacting or, most likely, both. Whatever the case might have been, he sent Dave after me to bring me back so all of us could patch things up. Dave happily obeyed and went trotting after me. He caught up with me less than a block from the house. Unfortunately, what neither he nor Jim could possibly know was just how much I *was* overreacting. As I've mentioned before, I was chronically in a pretty bad mood all the time in those days and right then I was really steaming. In an hour or two I almost certainly would have cooled off and come back to patch things up on my own. But I wasn't in the mood for it right at that moment. My buddy Dave couldn't know that.

I'd heard him calling my name from behind, telling me to wait up, but I wasn't paying any attention to that. So he did what anyone would do; he caught up to me and grabbed my left shoulder to make me stop and listen to him.

I turned around and punched him in the mouth.

Have you ever seen surprise, pain, then anger pass across someone's face all in about half a second? I have. Right there and then. On Dave's face. He punched back and just like that we were really going at each other. I mentioned earlier that Dave was one boy who really knew how to fight. The only reason I'd landed that first punch was because I'd taken him completely by surprise. I didn't land any more. His defense was up now. Of course, mine was too so for a few minutes neither one of us were landing any shots. Then Dave managed to get an upper cut under my arm and connect it right to the breadbasket. It was a really good punch and knocked the wind right out of me. He followed it up with four more, two from each hand, right to the same place all in the space of less than two seconds. It deflated me like a balloon and my knees buckled. Fight over. I was down and he turned around and stormed away sort of howling a little bit from anger and the sting of that first punch he'd taken in the mouth.

The next day Jim the Peacemaker patched things up between us. He talked to me alone using good natured kidding to overcome my bad mood. "Did you know Dave had a bloody lip?" he asked me. Jim was so good at this sort of thing he had me almost half believing I'd been the victor the day before. Total nonsense, of course. I hadn't been the one left standing at the end. My guess is that Jim also talked to Dave by himself, either earlier or not long after he talked to me. I'd really like to know what story he told Dave to calm him down. I bet it was a honey. Then Jim put Dave and me back together, acting the moderator all the while, and it ended up with Dave and me reluctantly shaking hands, then grinning at each other, then being best chums again. I'd swear Jim could negotiate peace in the Middle East. □

In March of ’65 I watched as the television brought pictures of policemen in Selma, Alabama, attacking people with clubs and tear gas. Like those first pictures I’d seen from Birmingham, the people being attacked weren’t doing anything wrong. The news man explained that these people were marching for the right to vote. They didn’t have the right to vote? *Everybody* had the right to vote! Well, everybody who wasn’t a kid, anyway. I’d already figured out kids didn’t have any rights. But excepting kids, everybody *had* to have the right to vote or liberty and justice for everybody would be impossible. Yet here were policemen – the very men whose job it was to see to it liberty and justice were upheld – attacking people to prevent them from having the right to vote. I began to understand there was a lot more wrong going on than just segregation. I didn’t know which I was most upset about: finding out there were Americans who weren’t being allowed to vote or finding out that sometimes the police are the criminals. I knew where *I* stood on the matter. To me the issue was, if you’ll pardon the expression, black and white. I tried and tried to figure out what *I* could do about it. But no matter how much I thought about it, I couldn’t think of *anything* one boy in Iowa, who didn’t have any rights himself, could do about it. All I could do was hope there was something President Johnson could do about it.

It turned out there was. Later that year, in August, something called the Voting Rights Act was passed. Nobody ever explained to me exactly what the Voting Rights Act did, but Walter Cronkite said it made what happened in Selma illegal. That didn’t tell me much. As far as I was concerned, what happened in Selma was illegal when it happened. But apparently it hadn’t been. I was very confused about the whole thing. Wasn’t something that was injustice automatically illegal? Unless it involved a kid?

I was even more confused a few days later when the TV starting bringing the pictures of what was going on in some place called Watts. I learned another new word, ‘riot.’ For six days there was a huge riot in Watts. What they were rioting about, I had no idea. Even more confusing, the people who were rioting looked to me like they were just hurting themselves. I mean, they were setting fire to the place where *they* lived and beating up the people who were *their own* neighbors. It was all very senseless, except for one thing. I knew to a certainty that what the rioters in Watts were doing was *wrong*. I was not on their side.

One thing I did find out during sixth grade that year was that I wasn’t the only kid who was watching these things and feeling the same way about what was being done to liberty and justice. Almost all the teachers I ever had – and all of them up to this point – were good teachers but I learned there could be bad teachers, too. In sixth grade we had one. He was the man who taught social studies and he didn’t like Indians. One day in class we were learning about something – I don’t remember exactly what except that it involved Indians – and the teacher said that Indians were stupid. Not *this* Indian or *that* Indian. I wouldn’t have had a problem with *this* Indian or *that* Indian being stupid. There *were* stupid people. Randy, for instance. But he was saying *all* Indians were stupid.

I was shocked to hear a teacher say that. But before I could say anything, one of the girls began yelling at him. Then another girl. Then a boy. Then *everybody*. Another new first. I’d *never* seen anybody yell at a teacher before; it just wasn’t done, ever. But here we had the whole class yelling at the teacher. It was definitely a protest. We weren’t marching, but it was still a protest. My first. He couldn’t get us to settle down either. Luckily for him, he was saved by the bell. We didn’t talk about Indians any more in sixth grade social studies after that.

Grownups were starting to talk more and more about the troubles too. Mostly it was talk about something called the ‘Black Muslims’ and somebody named Malcolm X. They said this Malcolm X guy had been the leader of the Black Muslims and that he hated all white people and said we were devils. Others said the Black Muslims were against police brutality – another new phrase. I was against police brutality, too. I had seen police in Selma being brutal on TV. But if the Black Muslims hated all white people then they were just as bad as George Wallace and the bad firemen in Birmingham and the bad policemen in Selma. So I decided these Black Muslim guys were bad guys, too. The troubles were getting worse and worse.

I started hearing another new word more and more in 1965, and this word was a place: Vietnam.

Vietnam was a country; I knew that. And they said it was in southeast Asia. That seemed pretty vague. And the grownups were talking about it because the Marines had gone there to fight somebody called the Viet Cong. I didn't know who the heck the Viet Cong were. The Congo was in Africa, not Asia. They said the Viet Cong were Communist guerillas, and that really had me confused because I thought they were saying they were Communist gorillas. A gorilla was an ape. It couldn't be a Communist. It couldn't be anything but a gorilla. Unless they meant these Viet Cong guys were just really big guys who were Communists. I knew that really big guys got called gorillas sometimes. So the Marines were fighting really big Communist guys? It had to be something like that. But then people were saying the Marines were there for a 'police action.' That didn't make sense either. Marines weren't policemen. They're supposed to get used when you have a war. And we didn't have a war. Congress has to declare a war before there can be a war. It says that right in the Constitution. And Congress hadn't declared war on anybody. I was *sure* I'd have heard about it if they did. If nothing else the boys would be talking about it and they weren't. None of it made sense. I decided the grownups didn't know what the heck was going on in this Vietnam place, wherever it was. □

That summer Dad told me we were going to some place called Red Lake on a fishing trip for vacation. It was going to be him, me, Gary, and Gary's dad, Darrel. Dad had taken me fishing a few times when I was little – back before I was serf – and I'd liked it a lot. But that was when I was his little boy. Why he'd want the serf to come with them now I didn't know. But it didn't sound like he was asking me if I wanted to go so I knew I was going whether I wanted to or not. It didn't seem to bother him that paperboys don't get vacations. I knew I was going to have to talk to the manager to see if he could arrange a substitute to take my route while I was gone. Hopefully I'd be able to get it back when we came back from Dad's vacation. But I knew all this was *my* problem and I was the one who had to handle it.

Fortunately, I happened to mention my problem to Dave and he immediately said he'd take my route for me while I was gone. I was really glad he'd do that for me. I hadn't been looking forward to talking to the manager about it because there was a good chance he'd see it as being the same as quitting. If that was how he looked at it, I'd lose my route. But with Dave substituting for me there wouldn't be any problem with the manager. After all, it said right on *The Des Moines Register's* advertisement blurbs that 'paper carriers' (some paperboys were girls) were 'independent businessmen.' That made it a good deal for *The Register*. First, subscribers liked boys better than big companies that live in Des Moines. Second, *The Register* got its money in full every week no matter what. The paperboy had to pay them for each paper no matter what. If a customer stiffed the paperboy, the paperboy still had to pay *The Register* in full for that paper. That meant the paperboy was the one who ended up eating the cost of a deadbeat customer. It took away his money from a bunch of other customers plus the deadbeat to pay the cost of one deadbeat. That's why when you stiff your paperboy you all of a sudden don't get a paper anymore. If he can, he finds a new customer and delivers your paper to him instead. Otherwise he tells the manager you canceled so he doesn't lose all his money the next week too. And he loses money if he has to cancel you.

The week before the fishing trip I took Dave with me on the route every morning so he'd know where all my customers were. I took him with me on collection day to introduce him to the customers, so they wouldn't be surprised when he showed up to collect instead of me. I split my money fifty-fifty with him since it wouldn't have been fair to ask him work the route for free that week. The money would all be his while I was gone. With Dave's help, I'd fixed my business problem Dad's vacation had caused.

Red Lake turned out to be in Canada, which is this whole other country. At first I'd thought it was in Minnesota, which has signs everywhere telling you it is the Land of Ten Thousand Lakes. That's a lot of lakes. I thought Minnesota was awfully flat looking, especially compared to Iowa which is very hilly. But I knew Minnesota had gotten squashed flat by glaciers during what was called the Ice Age. I figured the Ice Age was where all their lakes had come from and Red Lake would be one of them. But we drove all the way through Minnesota and that's how I found out Red Lake was in a foreign place. I was both excited and nervous when I learned that. Excited because of the idea that we weren't just leaving Iowa but the whole country. Nervous because I didn't have a passport so I wasn't sure they'd let me back in later.

Even after we got to Canada and they let us in there, it was still a *long* drive to Red Lake. I knew already that Canada was a big place, but Red Lake must have been at least 300 miles north of the border. All the way there I mostly kept looking out the windows and not saying much. Dad and Gary and Darrel were doing plenty of talking as it was and I wasn't keen to be noticed any sooner than necessary. I pretty much figured I was along so Dad could keep making a man out of me by picking on me. No sense doing anything to get that started before it absolutely had to. There was already enough talk in the car about how this was 'a man's vacation' and how great it was to 'get away from the women' for awhile and just do manly things and all that. They weren't looking at me yet while all this talk was going on, but I knew they'd get around to me eventually. It was going to be three against one when they did and I knew once three grownups started ganging up on me I didn't stand any chance at all. So I kept quiet.

Red Lake turned out to be *huge*. It was the biggest lake I'd ever seen. Not as big as the ocean had been, of course. You could see across Red Lake to the other side where the trees started again. You could look across the ocean and not see anything but the ocean. Here I knew I was seeing the trees on the other side, even though I couldn't really see the individual trees, because it was green over there. Red Lake was so huge we had to use a boat to go fishing. That was going to be a new experience. I'd never even been in a boat before, much less fished from one. And we had to wear life jackets because the lake was so deep. I knew how to swim, but I knew I couldn't swim even half way across Red Lake, so it was reassuring to know the life jacket wouldn't let me drown if I fell in the water no matter how long it took the others to come back with the boat and let me back in.

They gave us a cabin to use while we were there, and I was relieved about that because we hadn't brought a tent or sleeping bags with us. I was glad I wouldn't have to sleep on the ground at night while the bugs ate me. That wouldn't have been any fun at all. Red Lake was way inside this *huge* forest made of pine trees. I'd never seen a pine tree before and I was really surprised to find out how different the woods smelled out here. The air smelled *good*. Gary said that was because it was fresh and clean.

The whole place – the lake, the woods – was just beautiful. I'd never seen any place that was so beautiful and where the beauty went on and on without ending. I would have really loved to go exploring those woods, but I knew I didn't dare because I'd get lost and then the bugs would eat me alive. Darrel said this was God's country. I knew he was wrong about that because everywhere is God's country. But I thought maybe this place was God's special place. It was peaceful and quiet and just very, very good and there was no evil anywhere around. I hadn't known Paradise was in Canada.

The first night there I found out Canada wasn't just a special place. It was a strange place. It was a place where the sun didn't set when it was supposed to. It hung in the sky for hours and hours and hours. Bill had given me a watch for my birthday the year before and the sun was still up at 11:00 at night. That was weird. I'd heard people say there was a Land of the Midnight Sun but I'd figured that was just another story they told to fool little kids. Now I wasn't so sure. Maybe there really was a Land of the Midnight Sun. Whether there was or wasn't, Red Lake came mighty close and I was just thrilled. It was just so *neat* to have daytime at night even if nighttime daytime was really more like nighttime dusk time. The boys would never believe me if I told them about this. They'd call me a liar for sure.

We had to get up very early the next morning to start the fishing. All through breakfast I started to get ready for the inevitable. I figured the picking on me would start as soon as we started baiting the hooks. Ever since those awful mutant worms in the tree at the Regenwether house, worms had always just disgusted me and I hated to even touch one of the dirty, slimy things. The picking on me was going to start just as soon they made me shish kabob the first worm onto my hook.

We carried all the poles and fishing tackle boxes and bait cans down to the boat. Instead of baiting the hooks, though, we just put everything in the boat, started the outboard motor and headed out toward the middle of the lake. Oh, great. The picking on me was going to happen out in the middle of the lake where I couldn't get away. Suddenly having daytime all night long wasn't so neat. It was going to be a *really* long day. And there wasn't a single thing I could do about it.

To my surprise, when it finally was time to bait the hooks I found out we didn't have any worms. Not one single filthy, slimy, disgusting worm. "Where are the worms?" I asked Gary. He explained the fish in Red Lake were so big you couldn't use worms. The lake was full of 'walleyes' – what a weird name for a fish that is – and northern pikes. Apparently these kinds of fish didn't like worms. More Canadian magic. This really *did* have to be God's special place.

Instead we had a can full of minnows and, even better, the tackle boxes were full of all kinds of plastic or wooden fake fish. Dad told me these were 'fishing lures.' I took a chance and asked if I could use one of these fishing lures. I didn't mind shish kabobbing a minnow but it seemed mean even if the minnow was going to be eaten by a fish as soon as it got thrown in the water. Besides, the fishing lures were really neat. They had hooks all over them – so you had to be careful handling them – and some of them were made of two pieces with a screw holding them together so they could wiggle their tails. How neat was that! I expected Dad would make me shish kabob a minnow so they could start picking on me right away – and I wasn't about to give them the pleasure by letting them see I felt sorry for the minnow. But to my surprise Dad didn't seem to mind at all if I used a lure instead. He didn't even look disappointed that they'd have to wait awhile longer before they could start picking on me. I chose the neatest lure in the tackle box, one of the tail wigglers. Darrel said I'd picked a good lure. So far so good.

Even though I'd been fishing before when I was little, I'd never learned how to cast. The grownups would cast their lines and they'd go *way* out far away from the boat. I tried to do what they did, but it didn't work so good. My line only went a few feet before it splashed in the water. There was some kind of knack to it and I didn't know what it was. "Here," Dad said, "I'll show you how to do it." *Here it comes,* I thought. But to my surprise he explained it very carefully and didn't seem impatient when I didn't get it right away. He would just show me what I'd done wrong and how to do it right, and in no time at all I was starting to get the hang of it. I still couldn't cast as far as the men were doing, but, after all, I was just a boy. Boys couldn't throw a ball as far as men could, and so a boy couldn't be expected to cast a fishing line as far as a man could. Men were just so much bigger than boys. "Now you're getting it," Dad said approvingly. That took me by surprise, too. I was used to only hearing approval from teachers. I hadn't expected to hear any from these guys. They couldn't get their kicks by approving of me.

Gary got the first bite. He really had to work at reeling it in, too. Whatever was out there on the other end of the line *really* didn't want to be caught. Of course, catfish don't like to get caught either, but they're pretty little and there isn't much they can do about it. But whatever was out there, it looked like there was plenty it could do about it. Dad and Darrel reeled their lines in, and Dad told me to reel mine in, too, because we had to help Gary land his fish. When he finally got it reeled in close to the boat and it began flopping in and out of the water my eyes almost jumped out of my head. This thing wasn't a fish. *It was a sea monster!* It *looked* kind of like a fish, but it was *enormous* and its mouth was full of huge sharp teeth. Fish didn't have teeth, except for sharks and sharks lived in the ocean. And it was so *big!* "He's hooked a northern," said Darrel. "I wish we'd brought a grappling hook," said Dad. He readied a fish net with a long pole and started trying to net the sea monster to pull it into the boat.

When Gary and Dad finally got that thing into the boat it started thrashing and flopping around like crazy all over the place. Its business end, with all those millions of wicked sharp teeth, was pointed right at me. I started scrambling backwards in a big hurry before it could start eating me. I tripped and almost fell out of the boat. All of a sudden I realized there might be lots of sea monsters in Red Lake. And this one looked like it really *liked* to eat boys. I imagined myself in the water, being held afloat by my life jacket while sea monsters chewed me to pieces. Alive.

But Darrel reached down casually and put two fingers right over the sea monster's eyeballs and started squeezing. I watched in nauseated fascination – I could almost feel *my* eyeballs being squeezed into my head like Darrel was doing to the sea monster. The sea monster stopped thrashing around and was still.

"Is it dead?" I asked. I didn't mean for my voice to sound so squeaky and timid. That was just the sort of thing they could pick on me for. But Darrel didn't notice how timid I sounded. "No," he said. "This

just stuns them." He skewered the sea monster onto the fishing stringer, so it couldn't get away, and tied the stringer off to one of the stays in the boat and dropped the thing over the side into the water.

I cleared my throat carefully and made sure my voice was strong and steady. Nobody had noticed how I'd sounded before, and I wasn't going to let them hear *that* voice again. No sir! "What is that?" I asked.

"It's a northern," Dad said. A northern pike. It really was a fish. "I never saw a fish with teeth before," I said. They all three chuckled, but I didn't feel like they were laughing at me. "These do," said Gary. "You don't want one of these to take a bite out of you." No kidding. By now I was fully in control of myself again, and feeling pretty lucky that so far I'd dodged being picked on. But I just had to look over the side at that northern again. I was very, very impressed by it. It was awesome. These northerns were really quite the fish. There sure wasn't anything like them in the Maquoketa River. Or even in the Mississippi River and the Mississippi River was the biggest river there was. I was quite sure about *that*. I'd have heard about it if there were sea monsters in the Mississippi.

We caught a bunch more northerns that day, although none as big as the one Gary had caught. I even caught a couple and I landed them all by myself, except for the netting at the very end, and I didn't need any help from anybody. Boy, they really did fight. Even the little ones like mine. When I caught my first one and we got it in the boat they all kind of cheered and everybody was all smiles, and Gary gave me a big thumping pat on the back. "Now you're a *real* fisherman," he said happily. Fisher*man.* I liked the sound of that. They didn't even try to make me squeeze the sea monster's eyeballs in, which I was silently grateful for. Even though these things tried to eat you, squeezing something's eyeballs in was just too creepy. Darrel showed me how to put my fish on the stringer and I started feeling kind of proud of myself. I was holding my own against three grownups out here in the middle of the lake surrounded by sea monsters.

Dad kept saying northerns were too bony and we needed to catch some walleyes or blue gills because they were better eating. But no matter what we did all we caught were northerns. We even tried something called 'trolling' and that didn't work either. When we finally called it a day and went back to the cabin we had a lot of fish but they were all northerns. At the dock Dad had me stand there holding up *my* fish while they took my picture. I really was feeling very proud of myself and I stood up straight and tall while they took the picture of me and *my* fish. I'd been a fisherman all day and hadn't been picked on once.

Gary said he'd take the first turn at cleaning the fish. I kind of blinked twice when he said that. The fish didn't look dirty to me. But it had been a *good day* and I wasn't going to chance spoiling it by asking any dumb questions at that point. Back at the cabin I watched him take the first fish and a big sharp knife and slice it open. All of a sudden I was horrified. *The inside of the fish was full of slimy, wormy things!* He scooped them out with his bare hand and tossed them into a pail. I felt sick to my stomach and had to run outside to keep from throwing up. Now I could see what 'cleaning the fish' meant. They were filthy and disgusting on the *inside*. I stood out there taking deep breaths of the clean Canada air until I didn't feel sick anymore. When I felt better I clenched my teeth together in absolute resolution. No way was *I* going to reach in there and scoop out all that disgusting wormy filth and get it all over *my* hand. No sir. I just wasn't going to do it. When they said it was my turn to clean the fish I'd tell them all where to go. I didn't care how much they picked on me. I didn't care if they took me out in the lake and held me over the side of the boat in the water and let the sea monsters eat my legs off. I wasn't going to do it and they couldn't make me do it no matter how much it hurt. I'd show *them* a thing or two.

It turned out they never even tried to make me clean the fish so I didn't have to have my legs eaten off.

Northerns *are* really bony, but I thought they were mighty tasty just the same. Dad kept telling me to be really careful not to swallow a bone, so I was. I hadn't thought anybody could eat all those fish, but it wasn't any problem. The more fish the better. They were *mighty* tasty. As the days went by we did catch some kinds of fish that weren't northerns, and they tasted pretty good too. But the northerns were my

favorite. They had teeth and they were *manly* fish. The ones without teeth were sissy fish. Melody could have caught them. I didn't want to catch anything but northerns. We'd fish most of the day and at night there was that beautiful, strange nighttime sun, and I was just living in *Paradise*.

I used my special wiggler lure every day. Then something terribly, terribly disappointing happened. It was the second to the last day and we were out on the lake and something really, really big took my line. It bent my rod so far I thought it would break, but it didn't. "He's got a big one! He's got a big one!" Dad exclaimed. He was really, really excited. Gary kept yelling to me, "Hang on tight! Don't let go!" They all reeled in and started moving the boat to help me bring it in. Nobody tried to take my pole away. They let me fight that fish all on my own. I was excited and scared and thrilled all at the same time.

It took a real long time to even get the thing anywhere close to the boat. I'd reel it in then it would run and the line would go screaming back out again. I fought it and I fought it. Dad kept saying, "That's the way! You're doing good, son! That's the way!" They were all encouraging me and telling me to keep it up, and that's what I did. It was man against fish.

When I finally got the thing up to the boat my eyes got bigger than baseballs. "Jesus!" Dad said. Darrel and Gary both whistled in amazement. It was a northern alright – we'd all figured on that early on – but it was the King of the sea monsters, a Tyranno-northern Rex. I mean, it was *gigantic!* "It's bigger than he is," Gary said softly. I got it up to the boat and Dad tried to net it. But as soon as it saw the net it turned and the line went screaming back out again. I fought it some more and some more while they all kept telling me to hang in there. Still nobody tried to take *my* fish away from me. I got it up to the boat again, but the same thing happened again. I fought and fought and finally got it back up to the boat again. Dad reached out for it with the net again. The King tossed its head.

Suddenly the line went slack and I fell over backwards off the seat into the bottom of the boat. Dad was holding my special wiggler lure and looking at it with an amazed look. He showed it to the rest of us. Only half of it was left. The whole bottom half was gone. The King of the sea monsters had pulled my special lure in two. "I've never seen that happen before," said Darrel.

I felt just heartbroken. I'd fought *so hard* and I'd done everything I could do and still I'd failed. Dad must have seen the heartbreak on my face because he put his arm around my shoulders. "That wasn't your fault, son," he said gently. "If we'd had a grappling hook you'd have caught him. It wasn't your fault." I tightened all my face muscles and squeezed myself on the inside real hard, and took a deep breath, and nodded. I hurt on the inside and my eyes felt a little wet, but I didn't cry. Everybody kept patting me on the back and saying it was bad luck and nobody could have done better than I did and sometimes they just got away and finally I felt alright again. Not good. But alright. I'd done my best. On the last day I picked a one piece lure and really, really hoped I'd get another chance at him. But the King of the sea monsters didn't come back. I caught three fish, but they were little ones.

When we got home it all felt different. Our house felt like it was *our* house again. I still felt like the gardener, but I also felt like this was my house again, too. I felt calmer inside than I had felt in a long, long, long time. I *had* had fun on vacation, despite losing to the King. Nobody had picked on me. Not at all. Nobody had lectured me or scolded me or hinted that I wasn't good enough. Nobody had treated me like I was different, except for cleaning the fish and that part was okay with me big time. Dad had talked to me like a *person* and like a *son* and I had even talked to him some. After we got home, I even cautiously started to rejoin the rest of us in the living room at night. Up there in Canada, up there in God's special place, a truce had happened. □

Fall of '65 brought my twelfth birthday and the start of junior high. Being a seventh grader started off a lot like being a sixth grader at first except for the fact that now we went to classes on the upper two floors of the building and we had to put up with eighth and ninth graders again. But after not too long a time a couple of differences became clear. Classes were different from the way they were in elementary school. There was less work done in the actual classroom and more to read. But they also had something

called ‘study hall’ and I found out I could get my work done there just as well as I had when we did it in class. The only difference was it took an extra day to find out what things I’d gotten wrong.

The other difference was football. We could go out for football in junior high. I’d been waiting my whole life for this.

In a way junior high football wasn’t full blown football. We weren’t in a conference and the only people we played were each other. It was kind of like training camp for real football, high school football. But we wore the pads and the helmets, started learning blocking and tackling, defense – all the good stuff. The junior high football team was just seventh and eighth graders. Ninth graders, even though they weren’t actually in high school yet, got to play on the high school junior varsity team. But junior high football was still a lot of fun and I loved it no matter what position I was playing. At first they had each of us play each position for awhile to give us a chance to find out what we were good at. Except quarterback, that is. The quarterbacks were always eighth graders. After awhile our positions stabilized quite a bit and I found myself playing lineman. Of the two ways to play lineman, it didn’t take me long to figure out I liked playing defense better than offense. It really is better to give than to receive. Especially when it involves hitting versus being hit. Of all the lineman positions, I decided the best one of all was linebacker. I not only got to hit but sometimes I would pick off a pass and then I was a runner. Maybe not the fastest runner on the field, but still a runner. Linebacker was the best of all possible worlds. Rookie linebacker Dick Butkus of the Chicago Bears soon became my hero. □

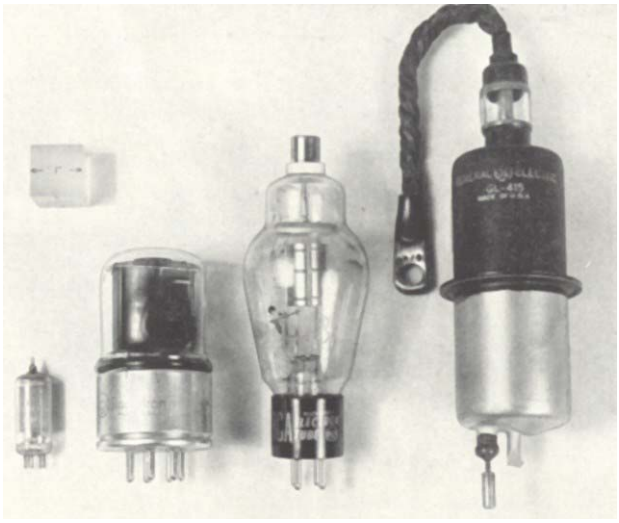
I was still lugging papers around for *The Register* and that fall the manager called all of us in for a meeting. They were having a big sales drive to sign up more subscribers and there were some nice prizes being put up for the guys who could sign up the most new customers. My own route was already pretty well covered, subscriber wise, but there was no rule that said I had to stay in my own territory. I went all over town door to door selling subscriptions and I ended up bringing back somewhere around seventy new subscriptions when we met again the next week. The next highest guy only got about twenty.

The manager was impressed. “Did you really sign all these up?” he asked me, not quite believing it. I was indignant. Did he think I’d lie? He was so happy about it he gave me the Sunday corner.

The Sunday corner was the best and most sought after route there was because it wasn’t actually a route. It was just what the name said. Instead of lugging papers all over town every day, you set up at the corner of Main and Platt streets from 6:30 to noon on Sunday and sold the Sunday paper to everybody who went by. After noon if you had any papers left you put them in a paper stand, people could put their quarters in the slot, and the papers basically sold themselves. No more getting up so early every single day, no more lugging a big bag full of papers around all over the place in all weather, no more going around one afternoon a week collecting. And on a normal Sunday I could clear six bucks, more than three times what I made on my route. Suddenly I was on top of the paperboy mountain.

Of course, I *did* have to sell them. From the second the truck dropped them off, those were *my* papers and *The Register* always wanted its money each week. I accosted everybody in sight every Sunday to sell them a paper. People walking by, people walking across the street, people waiting in their cars at the stop light. Everybody. Of course there were my regular customers, people who always bought their Sunday paper at my corner. But there were a lot of people, too, for whom buying a paper was the last thing on their minds. I saw to it that it became the first thing on their minds. I almost never had any left over papers on a Sunday. I didn’t keep one for us either. I had plenty of time to read the funnies or the headline stories if they were interesting. I’d look the front page stories over anyway so I could pitch the news to the non-regulars who went by. But take a paper home? Not if I could help it. Business is business. If Dad wanted to read the Sunday paper, he paid a quarter just like everybody else. □

One day early that fall I happened to stop by the store Sherri and Gary owned. I liked to do that once in awhile because I thought the back room shop where Gary fixed radios and televisions was pretty neat. I liked to watch him working on them every once in awhile, trying to understand what he was doing.



What vacuum tubes used to look like.

That particular day Gary asked me if I would be interested in making a little extra money. He had a job that needed doing and he didn't have time to get to it himself. Since the dime store wasn't in the habit of giving away its model kits and my taste in models was getting more expensive as time went by, I said sure, what did he have in mind?

In those days almost all TV sets were still made of nifty little gizmos called 'vacuum tubes.' Just a few years later vacuum tubes would become museum pieces as they were replaced by an even niftier gizmo called the 'transistor,' but in 1965 the vacuum tube was still the dying king of the TV world. One way to describe them is to say that they looked like light bulbs from Mars. When operating, they would get hot enough to glow and, like regular light bulbs, every once in awhile one of them would burn out. When it did, the TV would stop working and if you lived in Maquoketa your TV would soon find its way to Gary's workshop.

One difference, though, between light bulbs and vacuum tubes is that when a vacuum tube burned out it didn't necessarily stop glowing, and that meant it usually wasn't obvious which one was the bad one. Because Gary had so many TVs to fix, the fastest way to find out if a tube was bad was to just pull it out and replace it with a new tube. If the TV started working again, he'd found the bad tube. If not, that wasn't it and he'd try another one. A lot of times he wouldn't bother to put the old working tube back in because that took more time and people were more interested in getting their TVs back than in paying an extra couple of dollars for a new tube they didn't really need. Basically, faster service costs more.

As a result of this practice, over time Gary had built up an inventory of a lot of tubes from old TV sets. His problem was that they were all mixed up and he didn't know which ones were still good and which ones were really bad. They had this small little room – basically a glorified walk-in closet – where he had box after box filled with vacuum tubes. He needed to have them sorted into good ones and bad ones, and that was the job he had in mind. He had an electronic gadget called a 'tube tester.' All I had to do was put the tubes, one at a time, into this tube tester and it would say if the tube was 'good' or 'marginal' or 'bad.' Then I would sort the 'good' tubes into one group and the 'marginal' and 'bad' tubes into another. We settled on a fee of fifty cents per hour for the job and the next Saturday I came in and got to work.

The job took pretty much all day. Gary had *a lot* of tubes that needed testing and even though it only took about fifteen or twenty seconds to test one of them, when there are hundreds and hundreds of tubes even that small amount of time per tube adds up. Finally, though, near the end of the afternoon I'd gotten through them all. On one side of the room was a huge pile of boxes full of 'bad' and 'marginal' tubes, and on the other side was a much smaller pile of 'good' tube boxes. I guess that meant Gary got it right the first time a lot more often than not when he was fixing TVs.

While I was doing the job, I started noticing how really exotic looking and even pretty most of these tubes were. They came in all different kinds of shapes and sizes and most of them were made from nice clear glass on the outside that the glass blowing process had given all kinds of interesting tips and curves. Better still, you could see the tiny little wires inside, which also came in a variety of neat looking patterns. That had given me an idea so after I'd finished I asked Gary, "What are you going to do with all those bad tubes?"

"Throw them away," he said. There was a note of deliberate patience in his voice, like he was thinking, *Geez, Richard, what did you think I was going to do with them?* I grinned because that was exactly what I'd thought he was going to do with them. "Can I have some of them?" I asked.

He looked kind of surprised at this question for a second but, after all, why not? He told me I could take as many as I wanted. I loaded up a box with as many of the prettiest and most exotic looking ones I could find and carted it home with me. For the next couple of weeks I'd take a couple shoe boxes of these tubes to the most public places I could find where there were a lot of kids around, and I'd play with these tubes out in plain sight for all the world to see. Sure enough, it attracted attention and lots of kids would come over and look at my tubes and ask me what those were. "They're spaceships!" I said. The kids would 'ooh!' and 'ah!' and generally think these were pretty neat spaceships. In no time word got around through the kids' grapevine.

I sold every single one of them I had for a nickel apiece. □

There was a small building called 'the annex' near the junior high where we'd go for assemblies and to eat lunch. That year they started something new called 'the hot lunch program.' It was one of the things that was coming out of President Johnson's Great Society program. The hot lunch program turned out to be very, very popular with the kids and most of them quickly started eating 'hot lunch' for lunch. I didn't much like the kinds of food they had, though, so I continued to bring a sack lunch to school. Besides, you had to pay for hot lunch and a sack lunch from home didn't cost me anything. Because I didn't have to stand in a long line waiting to get food, I'd finish my lunch earlier than most other kids and that left a little time for goofing around before class started again. I couldn't leave the grounds of the annex until everyone else did, and one day the junior high Principal came over to talk to me.

He had a big warm smile on his face, knew my name, and was very friendly. I wasn't quite as warm, not because I didn't like him but because he was the Principal, I didn't know him very well, and so he was about half-stranger as far as I was concerned. But this didn't seem to bother him and he told me he had a question he wanted to ask me. "Which takes longer? To run from first base to second, or from second base to third?"

I had to think about that one. I'd been playing baseball for a long time now, but this question had never entered my mind before. I thought very carefully. The question was a little ambiguous, it seemed to me, because it would depend on what the field situation was. I'd never hit a triple in my life, so I decided what the situation called for was a standing start from first base and trying to get to third on the next guy's hit. Because you were standing still at first base but already running when you got to second, the answer was obvious. "It takes longer to run from first to second," I answered.

His smile got even wider. "No," he said, "it takes longer to run from second to third."

I thought about that very carefully. I couldn't find anything wrong with my reasoning, so I asked him, "Why?"

"Because there's a shortstop in between," he answered, his smile even wider still.

Well, if that wasn't the dumbest thing I'd ever heard. *"What does that have to do with it?"* I almost shouted it at him.

The expression on his face became disappointed when I said that, and he said in a voice that was kind of sad and kind of full of pity, "You take life pretty seriously, don't you?" It took me three days before I realized he had been telling me a joke. □

The school had a small library located in the annex and when I found out about it I just had to go and explore it. They didn't have a whole lot of books, but I ran across one that immediately caught my attention. It was entitled *The War of the Worlds* and it was even written by a Wells, H.G. Wells in fact. Huh, I said to myself. I hadn't heard of this one. I checked it out and started reading it at home that night. This war, it said, had happened right at the end of the nineteenth century, which put it after the Civil War and before World War I. The other history books I'd read had never mentioned this war. Very odd.

It turned out I hadn't even begun to see odd yet. The book said that once the earth had been invaded by Martians. Not men from Mars, either; strange, weird octopus-like creatures the size of a bear. They had

giant machines that ran on three legs and used heat ray weapons and poisonous gas. They had conquered all of mankind and we'd only won because they caught a fatal disease from germs that their immune system just wasn't able to deal with.

Wait a minute.

Of course I knew that there were two kinds of books. One kind was make-believe, like comic books and little kid books. The other kind were books about things that were true. The Bible, naturally, was in a class by itself. It was a book of mostly make-believe, all kinds of ridiculous mistakes about God, and a lot of moral lessons about right and wrong that were good lessons even though the stories were made up. But *this* book, *The War of the Worlds*, had me buffaloed. It was in a *school* library, so it couldn't be a little kid book and therefore what was in it had to be true. But, on the other hand, it sure *sounded* like make-believe and I was sure that if mankind had ever been conquered by Martians I'd have heard about it a whole lot sooner and it would have been in *a lot* of history books. So had this ever really happened or not?

I didn't know what to do. I didn't dare ask *anyone* whether this stuff was true or not. If it wasn't true, I'd look like a total retard just for asking and it would be *very* mortifying. If it was true, I'd look like a total retard for not believing a school book and *that* would be just as mortifying. Either way, nobody would ever let me live it down. I was stumped. I had to know the truth about it, one way or the other, but it was just impossible to ask anyone for help. This was a problem I didn't know how to solve.

I had to think for a long time about how to find out the answer without making myself look like a complete retard to everybody in the process. Finally it occurred to me that the Maquoketa Library had a big collection of books called an *Encyclopedia*. The whole point of the *Encyclopedia* was to tell you the facts about anything you wanted to know about. I'd only looked up a few things every now and again in the *Encyclopedia* but I figured it was my best shot.

Things didn't start out too good. I tried to look up 'war of the worlds' but it wasn't in there. But in the book everything that was going on went on in England, so I looked up 'England.' There was some stuff about England in there, but it still didn't say anything about any Martians. I tried 'Martians' and while there was a little bit about Mars in there, there wasn't anything about Martians. Things weren't looking too bright and I was running out of ideas. Then I remembered that the *Encyclopedia* also has facts about famous people in it. I didn't know if H.G. Wells was a famous person, but it was fourth and ten, so to speak, and there wasn't anything to lose. I looked him up. Bingo! He *was* famous. He was a famous writer who wrote *novels*. I had to look that one up in the dictionary. Novels are story books of make-believe. Mr. Wells wrote novels of science *fiction*.

Science fiction. Huh. I knew what science was. I knew what fiction was. I never knew you could put the two of them together. Science is about finding out things that are true. Fiction is make-believe. Who would have ever thought you could put the two of them together? What did it even *mean* to put the two of them together? I tried looking that one up too, but I guess the *Encyclopedia* didn't know because it wasn't in there. It wasn't in the library's big dictionary either.

But 'What is science fiction?' *was* a question I could ask someone. It isn't dumb or retarded if a kid didn't know what 'science fiction' meant. Since she was at the desk right over there, I asked the Librarian and she explained it to me. It was when you make up one thing or maybe a few things science thinks probably isn't true or doesn't know if it could be true or not, and then you write a story in which everything else *could* happen if the things you'd made up *were* true. She also told me there was such a thing as 'science fantasy' in which you pretend one thing or a few things science knows are *completely* wrong and then you do the same thing as in science fiction. *Well how 'bout that!* I thought.

Since I was standing right there anyway, and since she didn't look too busy, and since I wasn't really all that clear on how the make-believe in novels was different from the make-believe in comic books and little kid books and the Bible, I asked her if she could tell me exactly what a novel is. She took me over to the sections of the library where the novels were and explained a lot about them. One thing I learned was

that some kinds of novels were far superior to other kinds because the stories they told had lessons in them that were important. They taught everybody important lessons about Courage or Duty or Overcoming Adversity and lots more important stuff like that. Their lessons, she said, were *ageless*, which means they never get old. These kinds of books, she told me, were called *Great Literature*. She showed me some of them. They were written by people with names like Dickens and Mark Twain and even guys who lived a super long time ago like Homer (who I knew about because I read *Classics Illustrated* comic books; I just hadn't known he wasn't a comic book writer) and Plato, who she said was a Great Philosopher. I didn't know what a Philosopher was, but my head was getting very full with all this neat new stuff she was telling me and I figured finding out what a Philosopher was could wait for another day.

When I finally left the library, I was thinking, *Wow!* There sure was a lot of important stuff I didn't know about yet. It was kind of intimidating to think about how much more I had to learn if I was going to do a good job of keeping my Promise. How can you ask what you can do for your country if you don't know what the important things are? Like poverty. How can you know what to do about poverty if you don't know what will work and what has been tried and didn't work and why it didn't work? I knew it wasn't enough to just want poverty to go away. You have to know what you can *do* to get rid of it. You have to be *practical*.

I never knew I was going to find out so much important stuff just from wanting to know if the War of the Worlds had ever really happened. And, in a way, that was the most surprising thing of all. □

That visit to the library was the catalyst one day when an encyclopedia salesman came to our house. He was selling *Colliers Encyclopedia* and I bugged Mom without mercy to buy a set. Melody joined in with the bugging – why I never found out, but I really wasn't surprised by it – and eventually we wore her down. The encyclopedia set was very expensive and Mom wouldn't have bought one all by herself. After it came and I started using it, I decided it wasn't as good as the one at the Maquoketa Library, but it was plenty adequate for most things. For the rest there was always the one in the Library. □

My work on the Sunday corner tended to alternate between times that were so hectic I could barely catch everybody to times that were completely dead and there wouldn't be a soul to be found except me. Just before the different church services started and just after they ended tended to be hectic, the time when the church services were in full swing tended to be dead. There was a Snow White Pharmacy right across the street from where my paper stand was set up, and I would normally pop over there at some point and pick up a comic book to have something to do when things were dead. They also had a paperback book stand there, but I hadn't paid much of any attention to it before. After my library expedition, though, I noticed that some of their paperbacks were science fiction stories. Some were little novels, some were collections of short stories. They cost about fifty cents, which was a bit pricey, but I started buying some every once and awhile to help pass the time when no customers were around. (Any person I saw was a customer; not all of them knew it, and a few didn't believe it, but they were). This was how I came to know names like Isaac Asimov, Robert Heinlein, and many others. I got to be pretty good at being able to tell which parts of the stories had to do with real science – computers, for instance – and which parts had to do with science make-believe – electronic brains and positronic brains, for instance.

That was why something Walter Cronkite said one day came as such a profound shock. It was during his coverage of one of the Gemini missions and they had been talking about the computers that controlled so much of the rocket and space capsule flights. Right in the middle of this, he referred to one of the computers as 'the electronic brain.'

Computers were electronic brains? Computers *were* electronic brains?!?

Wait a minute. How could that be? How could a *machine* think? That's what a brain did. If computers *were* electronic brains, didn't that mean they could think too? Walter Cronkite was always very careful to let you know when he wasn't sure about something. That was another reason he was the best. I knew I could always trust Walter Cronkite because he never, never lied and he never, never got anything wrong.

If he said computers were electronic brains, then by golly that's what they were. And if they were brains, they could think.

Then I heard Chet Huntley and David Brinkley, two other pretty good news guys, say the same thing. Huntley and Brinkley weren't as good and reliable as Walter Cronkite, of course. Nobody was better than Walter Cronkite. But if all three of them were saying that, well that clinched it.

I knew how important computers were to the space program, and to the Navy, and to the Air Force, and to the government. But I had no idea they were so important that they had to be able to think. I had thought they were just a kind of big calculator, like the mechanical calculator Mom had only faster and more powerful. And I knew that people were always trying to make them better and better – which could only mean they weren't smart *enough* yet. I also had seen, in the science fiction stories, some of what might be possible some day if electronic brains could just be made smart enough. If they could only be made smart enough, there just wasn't *any* problem they couldn't help us solve. Ending poverty, preventing wars, going to other planets – there just wasn't anything they couldn't help us do if only they could become smart enough. All of a sudden I knew what I could do to keep my Promise. I could learn how computers could be brains and then help figure out how to make them as smart as they could be. It was one of those oh-so-rare moments that changed my life forever.

I knew this wasn't going to be easy. I wasn't that naive. The space program had the smartest people in the country working for it – dumb people or even ordinary people couldn't get us to the moon – and I knew even *they* hadn't gotten it all figured out yet. So I knew it was going to be hard. It turned out that I had no idea just *how hard* it was going to be. Today, more than forty years later, I'm still working on it. But I'm still working on it for the very same reason I had when I was twelve. Walter Cronkite never knew what he'd started that day.

My resolution grew even stronger later that school year when a bunch of us seventh graders piled on a bus and headed for Chicago on a field trip to visit the Museum of Science and Industry. I was eager to see Chicago because I'd never actually been *in* a really big city before. I'd been to the quad cities – Davenport, Bettendorf, Rock Island, and Moline – and I'd seen the Twin Cities from a distance, but I'd never actually, in person, been in a really big city. Chicago is a really big city. Chicago was impressive and I thought it was really neat, but it was also in a strange way a little bit disappointing. It was kind of gray and even though so many people lived there it lacked something. There was something God's special place at Red Lake had that Chicago was missing. But even so, I was happy to see Chicago.

The Museum of Science and Industry was awesome. First, I never knew that any building could look so much bigger on the inside than it looked on the outside. Second, it was packed to the gills with all kinds of amazing things I'd never even imagined before. I had no idea that so many things were not only possible but also *practical*. It was very overwhelming; one day just isn't anywhere near enough to spend in the Museum of Science and Industry. One thing I did especially notice there was a little display about Robert Millikan. Millikan was a famous scientist who won the Nobel Prize in physics. A lot of people know that. What a lot of people don't know is that he grew up in Maquoketa and graduated from Maquoketa High School. *He* was one of *us*.

And then there was the tic-tac-toe machine. They actually had a machine there that could play tic-tac-toe. The sign said the machine had been built with 'artificial intelligence.' So here, right in front of me, *was* an electronic brain. They really *were* real. We were allowed to play the machine, so I did. I found out that I couldn't beat it. We played draw after draw. Then I tried deliberately making mistakes to see if it would spot them. It did. Whenever I made a mistake on purpose, it beat me. It knew its tic-tac-toe. I could tell, though, that it really wasn't *very* smart because it couldn't do anything *but* play tic-tac-toe. Yep, we still had a long way to go in making computers be as smart as possible. I didn't think they'd get it all done before I was old enough to help. □

1966 was shaping up to be a very busy year. The Gemini space missions continued to come one after

the other and with every flight it seemed the moon was getting closer and closer. The troubles continued and accelerated as well and for a time more rioting seemed to be becoming a disturbingly normal occurrence. Less was heard about the Black Muslims and more was heard about Black Power, the Black Panther Party, and somebody named Stokely Carmichael. Negroes started to be called Afro-Americans instead. What made it hard to figure out what was going on and what all this meant was it often wasn't clear, at least to me, whether the Black Panthers were just opposing the bad people where they lived or if they hated all white people. Sometimes it seemed one way, sometimes the other.

One thing that *was* clear was that the Vietnam thing was now 'the war in Vietnam.' There still hadn't been any declaration of war – which meant we shouldn't *be* at war – and no reason for the war was clear. America was at war in Vietnam to 'oppose the Communists.' What did that mean exactly? Nobody was explaining that. It bothered me that nobody even seemed to *want* to understand why we were at war.

Even President Johnson's Great Society was starting to be criticized by a lot of people. They weren't being critical that it wouldn't work; if it wasn't working *I'd* have been critical of it because when you do something you have to be able to make it work. But the grownups I heard criticizing it didn't seem to want the problems it was trying to fix to *be* fixed. And that was wrong. The people who didn't like it were starting to call it 'welfare' and seemed to think 'welfare' was a bad thing just *because* it was 'welfare.' I didn't understand how they could think that.

> We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

There it was, the very first thing it said in the Constitution. Promoting the general welfare was what the government was *supposed* to do. 1966 was a bad year for domestic tranquility and promoting the general welfare. Justice didn't seem to be doing too good either.

Bill had graduated from college in 1965; we all went to Iowa City to watch his graduation. When he graduated he had been commissioned as a 2nd Lieutenant in the Army and was now stationed at Fort Rucker in Alabama. Dad didn't talk about it, but I got the idea he was worried Bill might have to go fight in Vietnam. I heard him say a few times that America had no business being in Vietnam and we should mind our own business. Dad had fought in World War II. He knew what war really was. And he didn't like it at all. Because he knew all about it, what he thought about this war carried a lot of weight with me.

So, there were a lot of bad things going on in 1966. But there still wasn't anything *I* could do about any of them. So I went to school, did athletics, sold my papers, built my models, read a lot, and started trying to teach myself how computers worked. That last one was turning out to be very hard to do. There was a lot you had to learn before you could even *start* to try to understand computers. They were made of transistors, and I didn't know how those worked; I only found out that they operated as a 'switch' of some kind and computers worked using a different kind of arithmetic called 'binary arithmetic.' At least the binary arithmetic stuff wasn't too tough. Computers were made of 'logic circuits' which, in turn, were made out of transistors. The encyclopedia could have done a better job explaining about these logic circuit things. I wished there was a computer I could go look at up close, but that wasn't possible. Computers were pretty rare and very, very expensive in 1966. There wasn't a single one anywhere in Maquoketa, although the Jackson State Bank was talking about maybe getting one. I was finding it pretty slow going. I would have liked to have had some help and a teacher for it, but there just wasn't anybody in Maquoketa who could do that. □

One day the phone rang and it was Sherri. She told me there was some woman who was giving away kittens and did Melody and I want one? Mom was at work so Melody and I made a family decision. The vote was 2-0 in favor of a kitten and I headed for Sherri's store. I came back with a little yellow-striped kitten and we named him Cinnamon Bun. Bun was still a very little kitty and he was pretty scared about being taken away from his mom and brought to this strange place. As soon as I set him down in the

dining room he took off running and hid. I figured he needed to get used to our house and I had something else to do, so I left him on his own and went off for an hour or so. When I came back, Bun came running and wanted to be held. I guess he found this big, strange new place kind of scary and he got kind of lonely while I was gone. When I came back, he was so happy to not be alone that he became my kitty right then and there. I gave him some milk and petted him until he started to purr. In return, Bun gave me soothing and calming of my soul. He was a furry little ball of peace in a mean world.

When Mom came home from work she wasn't too thrilled about 'the kitty Sherri gave us.' It seemed kind of wise to not make the explanation any more complicated than it absolutely had to be, hence Bun was 'the kitty Sherri gave us.' But aside from making it very clear to me who was going to be responsible for cleaning up any cat poop, she didn't object too much. It turned out Bun wasn't that hard to housebreak anyway and I didn't have too many cleanup duties to do. Mom was even less thrilled when a week later *Dad* brought a kitten home. One of his farmer customers had given the kitten to Dad, and Dad thought it best to accept the gift rather than risk offending the farmer. This kitten was a little older than Bun and quite a bit bigger. He was a black and gray striped kitten and we named him Tommy.

The first meeting between Bun and Tommy was hilarious. Dad had left Tommy out in the closed-in front porch of our house and I brought Bun out there so they could meet each other. Bun, of course, regarded our house as *his* house and Tommy as an unwelcome intruder. Even though he was only half Tommy's size, Bun put on a great display with arched back, hairs all standing up, growling – the whole works. Tommy just watched him with a completely unconcerned attitude, like he was saying, "Oh, come on kid. Gimme a break." Bun stood way up on the toes of three of his feet, his fourth paw raised and poised menacingly to strike. He danced on his toes all the way across the porch hissing and spitting. Tommy just stood there calmly, waited for Bun to get in range, then *swish! swish! swish!* raked him three times across the nose. Confrontation over. Tommy was top cat from that day on.

People say you can't train a cat but that isn't true. I trained Bun and Tommy to come when I whistled. Our cats spent most of their time outside. When it was time to feed them, I'd put the cat food in their dishes and give a special little whistle that sort of went *tweet, tweet, tweet!* They learned very quickly that meant 'soup's on' and would come running. After a week they'd come when I whistled whether there was any food for them or not and they did that all their lives.

You couldn't really say Mom ever warmed up to Tommy and Bun, but I noticed she did thaw a bit after our mouse problem started to go away. We had been having some problems with mice in the house and if there were two things Mom disliked more than cats it was rats and mice. If a mouse showed up anywhere in the house Tommy would be on him, well, like a cat on a mouse. He was a great little mouser. I loved to hold Tommy and Bun in my lap and pet them until they purred like buzz saws. □

Although I no longer had to wash dishes, I still had gardener duty, the only difference being that I was no longer being paid for it. One day in the summer I had just finished up when a stranger boy came walking up the gravel alley behind our yard. He was coming up from the ball field and when he saw me he turned and casually walked right into our back yard. He was my age, slender, a couple inches taller than me, and he looked like he could handle himself in a fight. Who the heck is this kid? I wondered. I walked forward to confront the intruder.

But he just strolled up to me fresh as paint with a big easy grin on his face. "Hi, I'm Lyle," he said and put out his hand. "Who are you?"

More than a little surprised, I told him my name was Rick and I took his hand. He gave me a good, firm, friendly shake and just started talking like we'd known each other for years. Was this my house, what grade was I in, he was in that grade too; no, he lived on the other side of town a block down from the swimming pool, etc. He was about the friendliest kid I'd ever met. He had a nice, warm, equal-to-equal kind of friendliness about him that just evaporated that curtain of reserve I always put up around a stranger. To my bewilderment I found myself liking him instantly. We chatted about this and that for a

little while then he said, “Well, I gotta get going. See you around.” With that and a friendly wave he strolled off as easily as he had strolled in. I didn’t know it yet, but I’d just met the boy who would be my best friend and brother all the way through high school. Lyle was a charmer. A lot of people thought of him as a best friend. □

In August I suddenly developed some kind of strange ailment, and to this day no one knows what it was or what caused it. Every once in awhile I started having these strange spells where I would break out in a cold sweat, my heart would race a little, and my hands would start to tremble. It would last a few minutes and then stop as quickly as it started. The first time it happened it had me worried, but after the next few times I didn’t think too much of it. I never even bothered to tell anyone about it. I wasn’t trying to hide it; it just didn’t seem important. But one day Mom saw me having one and straight to the doctor’s office we went.

This guy wasn’t Dr. Swift. Dr. Swift had left town and this was our new doctor. I never even bothered to learn his name. He was just ‘the doctor.’ The doctor examined me, listened to my heart, gave me some more tests. I don’t think he had the faintest idea what was wrong with me but doctors almost never own up to that. He told Mom I had an ‘irregular heartbeat.’ Given the history of heart problems on Mom’s side of the family – including her own – that was probably the worst thing, for me, he could have said. He couldn’t figure out what it was, much less cure it, but there was one thing he could do. He could refuse to sign the form the school required before they’d let you play football. And he did refuse. I could do athletics with my friends on the playground, play baseball, bike all over town up and down the hills; I could do everything I’d always done except for one thing. I couldn’t participate in school sports. Mind you, I could still do PE right along with everybody else. But I wasn’t allowed to participate in organized team sports. Well, that was just a load of crap. I *loved* being on the football team and I pleaded with Mom and Dad trying to somehow get somebody to take another look at me and sign that blasted medical form. But no dice. Mom and Dad both sided with that idiot doctor and suddenly I was an athlete no longer. I took it pretty hard. □

The teenager (1966-67, age 13).

Eighth grade without sports seemed like it was going to be a year of letdowns. It started off that way at least. I couldn’t go down to the boys’ locker room for PE without always being reminded that I wasn’t in that locker room for football practice. I hadn’t told anyone about the doctor thing and some of my ex-teammates were a little unfriendly toward me because I wasn’t playing any more. There were some occasional exchanges of words and some shoving that resulted but none of it ever went all the way to a fight. In a locker room when two guys get to shoving each other around the other guys jump in and separate them before any punches can get thrown. A locker room is kind of a cathedral, despite what the movies like to depict them as, and fighting isn’t tolerated there as a general rule. Oh, there are some pranks and high jinks, of course; any place full of towels and naked boys taking showers has its temptations for the occasional towel snap to the hind end. But on the whole it is a very well-behaved place. Something about being mostly undressed most of the time you’re in there seems to promote that. There isn’t much of any ‘meet me after school and we’ll settle this’ stuff either, again despite what Hollywood likes to portray. The fact was that junior high boys got into fewer fights than elementary school boys did, and high school boys got into fewer ones than junior high boys did. It’s a case of more posturing and less punching. After all, we’d been going to school together for eight years – most of our lives – and any questions about the social hierarchy had long ago been settled. It was only the new boys who got tested in that regard. □

At its peak the Clinton Engines plant in Maquoketa employed two thousand people, one for every three people in Maquoketa. In October of ’66 a bombshell fell: The Clinton Engines plant closed and went in receivership. It came without any warning at all. The day the plant closed was a Friday, payday,

they hadn't been able to meet their payroll, and they locked the doors. Just like that, the town's biggest employer was gone and a whole lot of people were out of work. I'd never seen anything scare a whole town. But it happened. Later some new management took it over and temporarily people were able to go back to work there. But it was only temporary and the new owners gradually laid people off until only about 400 were left. Selling all my papers got a lot harder. Tough times had come to Maquoketa. □

My voice was starting to change and that led me to drop out of the little choir Mom's church group had formed for special occasions like caroling and Christmas events. I'd already stopped participating in the school chorus in seventh grade because of the music teacher, Mrs. Jetter. I didn't like her very much. She was a good music teacher but she was also energetically extroverted and basically a wisegal. Because I was still the Great Silent One at school, she seemed to think extra doses of teasing administered to me was just what the doctor ordered. My reaction was just the opposite of what she was probably looking for. One day during music class she had pestered me and my 'lovely soprano voice' to join the chorus and that clinched it. Sopranos were girls and I was a football player. The second she said that to me in front of all the guys, school chorus was out of the question for good.

Well, I started eighth grade without 'my lovely soprano voice.' I couldn't hit the same range as I'd always been able to and when I tried my voice would crack and sound just awful. It was embarrassing and so I dropped out of the church choir group too. Mrs. Jetter could probably have taught me how to make the transition to tenor, but music was optional for eighth graders and I wasn't having anything to do with 'Jitterbug Jetter,' as I called her.

I had long stopped going to church unless Mom made me. Every now and again she'd get it into her head for some reason that I should be made to go, but they were still preaching the same mistaken nonsense about God. My Sunday corner gave me a good excuse for not going. But Mom and Aunt Sylvie apparently figured I needed some saving so they had kind of pushed me into taking part in a church youth group with the unlikely name of 'the Zioneers.' That name seemed to me to be nine parts crap and one part water. We weren't Jewish, we weren't of middle east extraction, and we sure weren't the lost tribe of Israel. The Teters family was of German extract and the Wells family was of Norman – which is to say Viking – extract. But I kept my opinions to myself for the sake of peace and harmony. At least there wasn't much preachy stuff that went on in the Zioneers and occasionally what we did was sort of fun. I thought it was interesting that the Zioneers boys came closer to being juvenile delinquents than any other group of boys I knew. But mostly those Thursday night get-togethers were just another thing I had to do at somebody else's choosing so I tolerated it one night a week and forgot about it the rest of the time.

There was one kid, whose name is Bob, I was just starting to get to know. Bob's family was Catholic and one day he brought up some religion thing – I don't remember what exactly – and I remarked that I 'didn't believe in all that stuff.' What I meant was I didn't believe in all that Biblical make-believe stuff but Bob thought I meant I didn't believe in God. So he started calling me 'the atheist.' Interestingly, he seemed to think that was more exciting than censorious. Maybe I should have installed some Viking horns on my baseball cap or worn goat skin pants and gone shirtless. Whatever, I was a tolerated infidel and I did like Bob. He was smaller than a lot of the boys and very, very skinny. He called me 'the atheist' and I called him 'Bones' (short for 'Skeleton Bones') and we were pals. □

Eighth grade itself was mostly more of the same except for a couple of things. One of our classes was world geography where we had to learn about other countries and memorize stuff like where it was, what its capital was, how many people lived there, and what its main national product was. Where it was and what the name of its capital was I found interesting enough, but left to myself I couldn't have cared less about how many people lived there or whether they produced bananas or diamonds. However, the teacher had a pretty cool way of motivating us. She invented a game called 'geography baseball.' We'd choose up two teams and every time you got a question right you'd advance one base. If you missed the first question you were out. It started off with the easy questions and they got harder as you went. It was the only 'baseball team' I was ever on where I got picked first and 'batted cleanup.' Usually whatever team I

was on, Cindy was on the other team 'batting cleanup' for them. She was still the prettiest girl in eighth grade and I still wasn't talking to her. I was still very sweet on her; basically I didn't have eyes for any other girl. But we weren't about to have any repetition of the infamous ring incident in any form. No sir.

The other thing that stood out was science class or, more precisely, Mr. Bittner. Mr. Bittner was young, for a grownup, and he was just a terrific science teacher. I hadn't cared much for seventh grade science class. It was taught by Mr. Zirkelbach, who I thought was alright but nothing special. It had been about biology and botany and had involved a lot of worm dissecting – which I found disgusting, not because it was dissection but because it was worms – and looking at tiny paramecium in water drops under the microscope, which I thought was very cool. Botany I had no special interest in. One day he handed us a bunch of little booklets that were supposed to be good for classifying trees. Basically it was kind of a 'twenty questions' book – yes or no answers like a computer would use – and depending on how you answered one question it would direct you to another. At the end you were supposed to have correctly identified what kind of tree it was – genus and species and phylum and all that. He sent us out to classify the Dutch elm trees in the school yard and I positively identified mine as a type of tree found only in the Congo. So much for my career as a botanist. As it turned out, the Dutch elm disease was in the process of wiping out Maquoketa's Dutch elm population at this time anyway and within about a year there weren't really any Dutch elms left in 'the Timber City' (as Maquoketa was often called).

Mr. Bittner's science class was a whole different matter altogether. It was a general science class and dealt with chemistry, physics, the atom, you name it. He had a real gift for explaining science in a way any kid could understand. Any kid but Randy that is. Never try to teach a pig to sing; it wastes your time and annoys the pig. Mr. Bittner made science fascinating and fun for me, and he'd let me come back after school and show me how to do a wide variety of chemistry experiments. He would explain and then step back and let me do the whole thing. Sometimes we'd stay until five o'clock doing science experiments. Then I'd have to really run for home, about a mile away, so I wouldn't get chewed out too badly for being late for supper. 'Irregular heartbeat' my hind end!

Talk about the Sorcerer's Apprentice! Did you know that if you burn a piece of steel wool pad in pure oxygen it reforms into a hollow little ball of metal and becomes very, very fragile? It does. You can check it out. Be sure to have somebody show you how to do it safely unless you happen to like the idea of setting your hair on fire with a blowtorch. Don't have any pure oxygen? No problem. Get a beaker of water, a couple test tubes, some glass tubing, a pair of wires and a good battery. You'll have some pure oxygen in no time at all. You'll have some pure hydrogen, too. If you take it in mind to set fire to the hydrogen, do it from a long ways back with a long-handled stick and make sure you don't point the test tube at yourself. Unless you happen to be a Vietnamese Buddhist monk who wants to set himself on fire, that is. Some of them did that you know. The right mix of chemicals, a test tube with a rubber stopper stuck in the end, and a Bunsen burner turns out to make a pretty good cannon, too. The rubber stopper part wasn't sanctioned by Mr. Bittner, though, and I had to promise I wouldn't do that again.

Chain reactions were super cool. We didn't have any uranium in the chemical closet, but I thought of an experiment I could do that would be just as cool. I planned on doing this one at home on our dining room table. In retrospect, it might have been a good idea to run this one by Mr. Bittner first. I looked around for a good-sized piece of wood I could drill some holes in but we didn't have a suitable one lying around the house anywhere. What we did have was a big block of paraffin wax Mom kept under the sink for reasons known only to Mom. Perfect! I drilled a hundred little holes in the wax on one inch square centers. For fuel I used wooden safety matches. I applied a lit match to just one of the matches in the corner of the paraffin block and the chain reaction was underway.

What I had expected was the heat from the first match would ignite the two matches nearest to it, they would ignite the ones nearest to them and so on. I was looking forward to seeing the ignitions ripple across the block from one end to the other in a lovely, stately progression. Turned out that wasn't exactly the way it went. I lit off the corner match and *whoosh!* in the blink of an eye every one of those hundred

matches was ablaze like a forest fire. Wax began running all over the table.

Mom started to take kind of a dim view of my science experiments after that.

Mr. Bittner was just a great, great, great teacher. If every school in America had a teacher like him, our country wouldn't be the scientifically illiterate place it is. □

When fall passed into winter PE moved from outdoor activities – mainly touch football and cross country – to the three indoor activities: basketball, wrestling, and boxing. Basketball was a sport I wasn't genuinely keen on. It was okay enough but paled in comparison to football. I was one of the shorter kids, my shooting percentage both from the line and from the field was at best so-so, and, as more than one coach observed at one time or another, I played basketball like a football player. Still, basketball was the sport of sports compared to wrestling.

Iowa is a big wrestling state. Wrestling is to Iowa what football is to Nebraska or Texas. Ninth graders, who could play on the high school squad, would go through incredible feats of starvation just to lose that one or two pounds that would put them in the next lower weight class. I wasn't a terrible wrestler but there were just a *lot* of boys who were just flat-out better. In PE I was rarely pinned but I never did figure out either how to do or prevent the Houdini-like escape moves the really good wrestlers had mastered. As a consequence, I spent of lot of time being the one being ridden rather than the one doing the riding. It didn't take too long for me to get tired of having my face pushed around on the mat like a human mop. For me it was a kind of moral victory to lose on points rather than by being pinned.

Boxing, on the other hand, I liked just fine. We didn't get anything that resembled training or coaching for boxing; it wasn't a conference sport. We didn't even have a ring. Just a mat and the boys would sit forming a big square around the outside. These boys were the 'ropes.' Their job was to prevent either of the boxers from falling off the mat onto the wood floor. If one or the other boxers careened into them, they would catch him.

The two boxers would put on boxing gloves and a football helmet complete with face guard. The helmet was to prevent injuries. I was used to the helmet and there was something about the odor of real boxing gloves that I liked a lot. The way PE boxing worked was we'd get paired off, either by choice or by arbitrary assignment, and each match would consist of one three-minute round. Except for me, that is. For some reason the coach *always* left me in there more than just three minutes. I know. I checked the clock hanging on the wall. The shortest round he ever gave me was five minutes, the longest was eight. I never knew if that was because he didn't like me or because he didn't like the other kid, or because he just liked to watch me box. Since we got zero instruction on how to defend, how to punch, or how to anything in the ring, most of the boys boxed the same way they fought on the playground. Or they'd try to imitate the professional boxers they'd seen on TV. Either way, it was usually pathetic. The ones who tried to imitate pro boxers didn't know how to use the jab to set up the other guy for the real punch. They didn't know how to throw punches in sequence or move around from head to body and back with their punch sequences. They didn't know how to protect themselves by blocking punches or using counterpunches.

Unless my opponent actually knew what he was doing, I'd generally take it easy on him. Oh, he'd know we'd been in the 'ring' together. You can't really hurt somebody who's wearing a football helmet so I didn't pull my punches to the face. But I generally did pull them a little on body shots. This was exercise, not ego. I wasn't trying to knock anybody down, much less out. But I did once.

One of the boys in my class was a gentle giant named Stan. No nicer kid ever drew a breath. But Stan was big. Very big. Enormously big. He was tall, he was broad, he was overweight, he had huge arms, legs, and hands. And the most gentle disposition you've ever seen. He was very smart, not especially extroverted (although next to me he looked like the life of the party himself), and I'm pretty sure he just hated boxing. I never knew or heard of one single time when Stan had been in a schoolyard fight. He'd never start one and he was so big that even the most aggressive boys didn't want any part of a fight with Stan. In PE when it was Stan's turn to box the match was usually pretty boring. Stan's opponent typically

tried to hit him without standing within a mile of him. Those big arms of Stan's had a *long* reach.

Well, one day the coach decided to pair Stan up with me. I had no intention of hurting him, but I wasn't going to embarrass myself by not boxing with him. And, yeah, I thought I'd have a little harmless fun with him. Coach blew the whistle and our endless round began.

Stan was slow. I'd dart in, throw two punches – *bop! bop!* – into the face mask of his helmet, then dart back out of range of Stan's haymaker. *Whoosh!* it would fly by harmlessly in front of me, then I'd dart back in and we'd do it all over again. After a minute of this it actually started to get boring. Stan couldn't throw anything but haymakers – slow ones at that – and, feeling a bit cocky, I decided there was no reason not to go toe to toe with him and fire away. I knew I could block those slow motion haymakers.

Wrong. Big mistake. I stepped in and started firing off jabs into his face – one, two, three, four – and then it was time to block that haymaker.

Stan might have been slow, but there was plenty of power in that big arm of his. I put up my left for the block and Stan's arm drove right through mine. I actually hit myself in the face when my left arm collapsed. Stan's arm kept coming and hit the side of my head like a baseball bat. Everything went black. Later one of the other boys said my arms just dropped straight down to my sides. Somehow, though, my balance was still working and I didn't topple over. I just stood there like a statue. But I was out cold on my feet.

Why in heck the coach didn't stop it right there I don't know, but he didn't. The first thing I became aware of, even before my vision came back, was a sensation of my head bobbing gently back and forth, back and forth. As my vision started to come back I could see Stan through kind of a fog. He was standing right in front of me with a concerned look on his face and giving me these gentle little jabs to the face. About one every second. Bop . . . bop . . . bop. That was why my head was bobbing back and forth.

Sheer instinct took over. I went to duck under his next jab and my legs just buckled. I actually had to put my right glove on the mat to keep from falling over. Then at the next moment my legs were driving me straight up and that right glove came off the floor and up in a really vicious uppercut. It caught Stan on the chin, knocked his head all the way back, and drove him all the way up on his tiptoes. In slow motion he toppled over like a giant tree. The boys who were supposed to catch him scattered in all directions and he went down hard on the floor. I hadn't meant to do that; it was all pure reflex because my brain wasn't really working too good.

I pulled off my helmet and staggered over to him. I was starting to be able to think – not too fast or too clearly but at least my head was starting to work again – and I half knelt and half fell down to see if he was okay. Fortunately he was and I helped him get up as best I could. I don't remember ever hearing coach actually blow his whistle to stop the match. But it was over.

Thank goodness Stan was so gentle. I had been out cold on my feet and an aggressive kid might have killed me. The boys thought I'd won that match but they were wrong. Stan won. All the way. □

I kept having those strange cold-sweat spells off and on again and again. There was never any reason, no kind of trigger for them. One minute I'd feel fine and the next I wouldn't. They'd last a few minutes and then be over until the next time. I wouldn't tell anyone about them, but once in awhile one would happen when Mom was around to see it. Each time Mom found out, off to see the doctor we'd go again. Each time he was just as useless. I was annoyed about it, but I think Mom was getting more and more worried. I wasn't sure how Dad felt. I wouldn't talk about it, he wouldn't talk about it. There was a truce between us as far as I was concerned, but I did have a suspicion he felt the same way about these spells as he'd felt about my having to wear glasses. However he felt, he and I still didn't talk with each other all that much. I didn't have much to say to him and I guess he didn't have much to say to me. It was a truce, not a peace. □

One day when I came to school my homeroom teacher told me they had a test I had to take. "Okay," I

said. “What kind of test?” She told me it was an I.Q. test but I didn’t need to be worried about it. I wasn’t worried. I did know what ‘I.Q.’ stood for. We boys used it every once in awhile as a put down for insulting each other. I had to go down to a little room where a psychologist, a Mr. Something-or-other, had set up shop.

It was the dumbest test I’d ever taken. Can you put these different shaped things into the right holes? Well, duh. There just wasn’t anything hard, challenging, or interesting about any of it. I couldn’t see what the point of the whole thing was. After it was over I asked him, “Well, what’s my I.Q.?”

“I can’t tell you,” he said.

I never did find out, which irritated me. I never even knew why they made me take it. But nobody tried to make me start wearing a bib when I ate lunch so I guess I did okay on it. □

I had been thinking about college a lot that spring and it had me kind of down because I figured I wasn’t going to be able to go. Dad wasn’t selling farm implements any more and was working as a salesman for U.S. Homes. Every so often he’d go off on one of his ‘value of a dollar’ kicks, usually when he saw how many models I had by now, so I knew we didn’t have much money and college was expensive. I’d pretty much ignore him when he’d go on one of these rants because I knew my six bucks a week selling papers wasn’t going to pay for college. I went on building models. But I had time to brood about college during art class while waiting for my pottery stuff to dry. I wasn’t much of a potter. My pottery and ceramics stuff looked pretty terrible and I couldn’t get the hang of how to do it right. About the only thing I was halfway good at in art class was sketching faces of cats or doing wood cuts of faces of cats. Melody would laugh scornfully at my art stuff. She could do anything that was art and whatever she did was just beautiful. And she hadn’t even taken art yet. She just had the talent for it.

I was a little better, but not much, in shop class. All the boys were required to take shop and it was taught by a man with the appropriate sounding name of Mr. Fix. We were taught wood working, metal shop, and toward the end even how to do leather working. My stuff was passable but I didn’t think any of my stuff was anything to be proud of. If I couldn’t go to college, it looked like I’d be stuck for my whole life having to do unimportant things that I wasn’t too good at and really weren’t any fun and wouldn’t do anything for my country. So this college problem really had me down.

There was a guidance counselor at school and he had information about colleges in his office I could borrow so long as I brought it back by the end of the day. I found out that if a kid could get appointed to one of the military academies he could go to college for free. That’s what President Eisenhower had done when he was a kid. That looked promising to me and I knew I’d probably like having a career in the military. On top of that, I knew the military had the best computers so I’d probably be able to do something there to help make them smarter.

My first choice was the Air Force Academy. All the astronauts were pilots. Besides, when the time came when they sent me to go fight in Vietnam I’d rather do it from the cockpit of a fighter plane than from anywhere else. There just wasn’t anything more glorious than being a fighter pilot. Except being an astronaut, of course. The guidance counselor had some stuff about the Air Force Academy and I took it to study hall to see what I’d have to do to get into the Air Force Academy. I finished doing my school stuff and then opened up the brochure. I got stopped cold right on page one. It said you had to have 20-20 vision to get into the Air Force Academy. Kids who wore glasses couldn’t go. I was terribly disappointed by this. I was mad about it too, but the disappointment was a lot bigger than the mad.

So I turned to my second choice: The Naval Academy at Annapolis. The Navy had fighter pilots too plus I’d get to live on ships. If I couldn’t go to the Air Force Academy, the Naval Academy was the next best thing. But, again, no dice. The Naval Academy required 20-20 vision too.

Lastly, and without much enthusiasm, I got the brochure for West Point. I was just being thorough with this because I really didn’t want to join the Army. They didn’t have any computers because they

didn't need any. In Vietnam they spent a lot of time wading around in rice paddies and getting shot. That was on the news all the time. There wasn't anything glorious about being shot in a rice paddy. It was brave, yes; but it wasn't glorious. The Green Berets were pretty cool and they were glorious. But everybody knew only the best of the best could be a Green Beret. I wasn't the best football player, I wasn't the best baseball player, and I sure as heck wasn't the best wrestler. So there was no way they'd let me be a Green Beret. The army had helicopters of course. The Air Cavalry. So maybe they'd let me fly helicopters. That's what they did at Fort Rucker where Bill was stationed. It wasn't glorious like being a fighter pilot, but it was better than being a foot soldier and almost as brave.

But there was another catch. To get into any of the military academies you had to be nominated by one of your Congressmen and I didn't know any of Iowa's Congressmen. Why would they nominate me when they didn't even know me? It was really looking like I wasn't going to get to go to college and that really depressed me. The guidance counselor had told me I should certainly go to college, but he didn't seem to have any good advice on how to make that possible. And if I couldn't go to college I couldn't keep my Promise. All I seemed to have to look forward to was some job I wasn't much good at or getting drafted, sent to Vietnam, and shot in a rice paddy. My future looked pretty bleak at that point. □

While I really liked Mr. Bittner's science class and even liked world geography, there was another class I didn't find interesting in the least: Civics. I didn't dislike it. I just thought the class was boring. I already knew about voting and the two houses of Congress and the President and the Supreme Court and the Constitution. The state government was just like the federal government only smaller and less important. I didn't give a hoot about the city or county governments. Maquoketa's City Manager lived right next door to us and it didn't look to me like what he did was anything special. It was the first and only time I found myself not bothering to pay attention to what the teacher was saying. I'd sit in the back of the room and read something else while he was talking.

At the end of one day as I was leaving the building, I was surprised to see Dad sitting in the car in front of the door. That had me puzzled. What's *he* doing here? Why isn't he at work? I walked down the steps and got into the front seat. He turned to me with a weird, pleased, happy look on his face. "Congratulations," he said. It wasn't phony congratulations, like when you use irony. He meant it. The next thing he said was, "You're not a bookworm like your mother."

Huh? I had no idea what he was talking about. Then he handed me a piece of paper. It was a notice the school had mailed to our house informing Mom and Dad that I had an F going in civics class. He seemed unaccountably pleased about it and I started to get irritated. *What a dumb thing to congratulate me for,* I thought. *What's the matter with him?* What? You *want* me to be dumb like Randy? But I didn't say any of these things. He drove us home and on the way he seemed happier to talk to me than I'd seen in months. I just kept my mouth shut and grew more and more irritated. Failure isn't something to be proud of. If I had to be a failure for him to like me, then he was just going to have to get used to not liking me. I wasn't going to let myself be a failure just to be liked. I'd go get shot in a rice paddy before I'd do that.

When we got home Mom sure didn't feel the same way Dad did. No congratulations from her. She didn't say much but she did give me that look she wore when she wanted me to know she was disappointed in me. I buckled down in civics class after that and started paying attention no matter how boring it was. In the end I must have passed because they didn't make me take it again or go to summer school. What grade did I end up with? I have no idea. □

When the school year finally ended they converted the annex where we had lunch into a Youth Center. Even though I lived clear on the other side of town, I'd bike over there in the evenings once in awhile because they had chess sets and I could find kids who wanted to play. One particular night I went over there and got into a chess game with a kid I didn't know very well. He wasn't a bad little player and we'd had a couple good close games. Then we decided to take a break long enough to get some soda pop. When we got back to our table two other boys were sitting there. One of them I didn't know at all, the other seemed to look familiar but I couldn't place him. He was the bigger of the two, about three inches

taller than me, and was obviously the leader.

"You're sitting at our table," I told him.

"So what?" he answered.

Things got noisy from there and soon we were facing off. But before the shoving started the guy that ran the place walked over. He kicked the kid and his friend out but he let me stay, which wasn't according to what the boys' code required. The code said we had to settle it between ourselves, so it wasn't right.

That Thursday I had to go over to Fulton for the dumb Zioneers group and there he was. He had looked familiar because he was one of the Zioneers. After the meeting was over he accosted me out behind the church. It seemed he was still ticked off about the Youth Center incident. With his left hand he shoved me up against the wall of the church and with his right he pulled out a jackknife. He started waving it around in front of my face uttering threats about what he was going to do to me if I ever 'ratted him out' again.

All the while I was looking into his eyes. Bluster. He was trying to look menacing but the menace just wasn't in there. I put my left hand on the dull side of the blade and pushed it closed. He had to move his fingers in a big hurry to get them out of the way. "Nice knife," I said. "Now put it away."

He looked sort of flabbergasted for a second. That hadn't been in the script. Then he recovered, opened his knife again and again shoved me against the wall. This time he put the point of the blade on my cheek right under my left eye so he could make his threats uninterrupted. While he was enlightening me on how bad he could cut up my face with a 'church key' – I presume he meant a bottle opener – I became more and more angry. But with that knife blade right under my eye there wasn't much of anything I could do right at that moment.

He finally finished his tirade and walked off into the night. I was still pretty angry but I stopped myself from going after him. If I did push him into a fight right there he might find out he could use that knife for more than a prop. I thought all his threats were empty, though. He just hadn't had the toughness or meanness in his face a person would have if he really intended to use that knife. After I calmed down a bit, I could even sort of see things from his side. I'd been the instrument of his being embarrassed in public in front of his pal and the honor code hadn't been followed. This was all honor posturing. A very dumb and extreme form of it, true, but honor posturing none the less. The odds were probably around five to three in favor that he'd soon be telling his pals how "terrified" I'd been.

I decided to let it go. He wasn't going to follow through on any of that empty talk. Still, you can never be one hundred percent sure of these things, so after that I started carrying a pocket knife of my own for awhile. Just in case. If he and his pals did try anything, I wouldn't be the only one bleeding. But he never did try anything and he never did try to get tough with me again so after awhile I put my knife back in the drawer where it belonged. The two of us never became friends, but two years later when we were both in Maquoketa High we got along well enough in the hallways. □

Around midsummer I decided I needed to make more money than the six bucks a week I was making hawking *The Des Moines Sunday Register*. My bike needed a new seat, the cost of models had gone up, and just generally life seemed to be getting more expensive. So I strolled down to the TV and Appliance store and talked to Sherri about the possibility of working for them in the store. I didn't want to bag groceries – and besides, there was still that little problem of getting a work permit – and I figured working around Gary might give me a chance to learn a little more about electronics, which I needed to figure out this computer and electronic brain stuff. Sherri didn't exactly jump at the chance to hire me right away, but I saw that 'this is my little brother' look in her eyes so I knew she'd talk herself into needing some kind of part time help. Janitor was what she came up with. She offered fifty cents an hour. I countered with a dollar an hour. We settled for seventy-five cents an hour and just like that I was a janitor.

In addition to routine sweeping up and washing the store windows, one of my duties was to clean

moldy refrigerators. The basement of the store was full of old refrigerators they'd taken in trade, most of them had had standing water in them from the day they'd been unplugged, and you can probably imagine how filthy they'd become on the inside. I was armed with a can of obnoxious cleaning spray they could have probably used to end the war in Vietnam and a generous supply of cloths so I got work.

There wasn't any such thing in 1967 as the practice of wearing some kind of mask when working with this kind of chemical. I'd spray this stuff inside the refrigerator, the gas would build up all nice and strong and putrid, and come boiling back out right in my face. Its smell combined with the mold was pretty awful. If any potential buyers had come by just then and gotten a whiff of the stink pouring out of those 'fridges, they sure would have thought long and hard before ever putting food in it or eating that food afterwards. But eventually I did get through them all. The Hicks' hazardous waste dump site became just an ordinary basement again.

When Gary found out Sherri had hired me he saw a silver lining right away. I might have been small but I was big enough to help him deliver heavy TVs and appliances. So, next thing I knew I was helping out there, too. All things considered, helping lug a ten ton refrigerator up an endless flight of steep stairs and then manhandling it through a doorway built for midgets beat cleaning moldy refrigerators in a walk. My hours piled up in a big hurry and eventually I didn't need my Sunday corner job anymore.

I had long ago marked Gary down as being quiet and bashful. He had been every time I'd ever seen him. Wrong again. The first time I climbed in the van with him to deliver a TV, closing the doors triggered the most amazing Jekyll and Hyde transformation I'd ever seen. The quiet bashful man disappeared and was replaced by a laughing, joke-telling, comedy cut-up lunatic. *Geez!* I thought in alarm, *the guy's gone nuts!* For a moment I considered opening that door and getting the heck away just as fast as I could run. But I didn't. I rode with the lunatic out to the customer's house, we opened the doors, and the quiet man came back. It took me a few days to get used to the fact my boss was crazy, but eventually I did. □

As the year wore on and I kept having those weird spells, Mom's patience with Dr. Duh finally started wearing thin. One day late in the summer she caught me having another one and hauled me off to see a chiropractor. He was an old gentleman about whom rumor had it that he'd once given Moses an adjustment. He put me on this little table covered with a black cushion-like thing and started working me over good. I'd never been to a chiropractor before and I can't say I wasn't nervous when he'd take hold of my head and make my neck start making these loud cracking noises. I was not having fun. It went on and on until he had given my whole body a really thorough thumping. At long last he finally said, "There. That ought to do it." He released me from his torture chamber and Mom and I went home.

I never had another of those spells. Not a single one. □

The Civil Air Patrol cadet

Despite the fact I was cured I was still made to suffer from an over-abundance of Mom's caution. There would be no sports for me in ninth grade either and I had to find other ways to fill the gap. One of them was the Civil Air Patrol. A slightly older boy named Larry, who I knew slightly from the Zioneers, told me about the CAP cadet program in Maquoketa. It didn't sound like it would be great barrels of fun but it did sound interesting so I joined. They didn't care that I wore glasses and I figured it might be good preparation for the Air Force after graduation if I didn't find a way to go to college. I knew the Air Force wouldn't let me be a pilot but maybe I could be a crewman on a bomber or something where at least I could be part of aviation. Larry, as it turned out, was the highest ranking cadet in Maquoketa.

I can best describe the CAP cadet program as 'Boy Scouts for the Air Force.' I had never cared for the regular Boy Scouts all the way back from the time when I was in elementary school. Despite all their

slogans about building character and moral fiber, the boys in the Maquoketa troop included Randy and his other disreputable pals, who I equally disliked. If those hoods were Boy Scout material, it was an organization I didn't want any part of. The boys in the Maquoketa flight of the CAP, on the other hand, were good kids and I was okay with being associated with them. There weren't very many of us but I've always preferred quality to quantity in everything, the sole exception being Christmas presents where it is, as they always said, the thought that counts.

The CAP cadet program is basically an education program. Naturally we also learned military drill and ceremonies and were expected to learn how to look sharp in our uniforms and practice military courtesy. But the main emphasis was on education. Each cadet moved through a series of assignments in which we learned about the history of general aviation and the aviation industry, the basics of the aircraft in flight and the general systems in an aircraft that made controlled flight possible, aircraft engines, airports and airways and the role of electronics in aviation, aircraft navigation and the effects of weather on flight, the problems of aerospace power in the military and civilian uses of aviation, and moral leadership. All in all, I thought the things we were learning in CAP cadet training were infinitely more important in preparing a boy to do something for his country than anything the Boy Scouts were learning to do. Each time you completed a tier in the training program and demonstrated your proficiency by passing a test you received a promotion and a ribbon for your uniform that signified what parts of the education program you had successfully completed. I suppose a boy's appearance and proficiency in drill and ceremonies counted too, as a condition for promotion, but since our flight never had any problems with slovenly appearance or with lack of proficiency in drill and ceremonies I never actually got to see what disciplinary action they take in such a case.

CAP headquarters for the Maquoketa flight was located in City Hall. The guy in overall charge was an adult who was both a member of the Civil Air Patrol proper and an Air Force reservist. He administered the various examinations we had to take and he'd watch our performance and appearance in drill and ceremony, but the actual instruction in drill and ceremony was carried out by our own cadet officers and noncoms. On joining the CAP one of the first things they had me do was outfit myself with the two different types of uniforms I would use. There was an inventory of Air Force surplus uniforms kept in the CAP room at City Hall and the first thing I learned about uniforms was they all came in the same size: Too Big. Larry hadn't bothered to mention to me that tailoring was one of the first things I'd be learning how to do. But Mom helped with that – which is to say she showed me how to do it – and in a fairly short time I was able to look presentable in my uniforms. I knew when I had reached that milestone because Larry stopped making rather blunt and unkind comments to me about how I looked during inspection and drill. □

I tried to get Lyle interested in the CAP but he passed on that. Lyle and I had slowly and steadily gotten to be better and better friends since that first time when he walked into our back yard. The junior high annex was right next to the Maquoketa swimming pool and right across the street from the house where Lyle lived, and so I'd run into him more and more often for that reason and we'd started doing more and more things together after school. Lyle had an older brother, Mike, who was in high school and two little brothers, Brian and Steve, who were a couple years younger. He also had a darling little baby sister named Bucky who was barely more than a toddler. Lyle and I shared a common passion for rockets. The little Fourth of July bottle rockets that are so common everywhere were very illegal in Maquoketa but Lyle and I never seemed to have much problem laying in a black market supply of them and we were always thinking of things we could do to add to their pizzazz. *Rocket Manual for Amateurs* by Capt. Bertrand R. Brinley of the Army Amateur Rocket Program became sort of our rocket bible. We talked about maybe setting up our own rocket range someplace, but the main problem was how to do this without getting busted by the cops. We both kind of got to wondering how the Viet Cong managed to do this sort of thing, which they seemed to be doing very well, but, of course, nobody knew how they did it. If they did, the VC wouldn't have been able to do it.

After Lyle and I had gotten pretty close, I learned something that surprised me. I had gotten curious

about what he'd been doing over on the north side of town that day we'd first met. He didn't usually wander all the way over there, as I found out after we started doing more stuff together. So what had he been doing there that day? He didn't play league baseball, which would have explained it. So why had he been down there? It turned out our first meeting hadn't been the accident I'd always assumed it was. He'd been there on a dare. Apparently his family must not have been in town all that long at the time – which explained why I hadn't known him; we *were* in the same grade – and some other boys had told him he wouldn't have the guts to just walk up and start talking to that Wells kid. Well, that surprised the heck out of me. I hadn't had any idea that I had the reputation among some kids of being some kind of ogre. After all, I never looked for fights and I never picked on anybody. If you left me alone, I left you alone. So I couldn't understand why anybody would think *I* was somebody so fearsome that a new boy wouldn't dare to talk to me. Lyle wouldn't tell me who the boys were behind the dare and I never found out.

But I wasn't surprised Lyle would take the dare. He was one of those boys who was fearless. *I* wasn't one of those kinds of kids. Oh, I could be brave enough if circumstances called for it – or maybe it was a case of just being too proud and stubborn to back down – but I didn't exactly go around looking for opportunities to be brave about something. Lyle, on the other hand, was a daredevil. Between us we shared that interesting kind of equality where Lyle usually decided what we were going to do and I was happy to do it with him. It's what they call 'leadership.' He was a born leader and one of those kinds of leaders who could talk you into thinking something had been *your* idea instead of his. Lao Tsu, who was one of the people we learned about in CAP moral leadership lessons, said, "As for the best leader, the people do not even know he exists." Lyle was the best kind of leader and it just came natural to him. I couldn't even tell you whether Lyle was a good fighter or not. He never *got* into fights. I don't mean he steered clear of them. I mean nobody ever even *wanted* to have a fight with him. He was one of those guys everybody just naturally liked *and* respected. You don't get to meet many people like that. □

Dad was doing okay selling U.S. Homes. U.S. Homes was a company that built new houses and Dad received an award for his work that he was pretty proud of. In the summer of 1967 we purchased an empty lot on Judson Street only a couple doors down from Lyle's house and we began to build a new house for ourselves. Dad did the design work for it and it started taking shape. In what seemed like no time at all the foundation was in, then the wood frame, quickly followed by outer walls. It was a small house having only three bedrooms – one for Mom and Dad, one for Melody, and one for me. It was a single story house with no basement and so was actually much smaller than our house on Niagara Street. But it was a *new* house and to Mom that was what really, really counted. It also had a detached garage, which we lacked at our Niagara Street house, and a driveway.

Not long before the sheet rocking was to begin, Dad came to me out of the blue one day and said he wanted me to take on the installation of the house's insulation. He told me what he was going to pay for the job and instructed me to form a crew. I was to be the foreman for the job. "Make sure you pay yourself more than you pay the workers," he said. "You're in charge of this." I recruited Lyle and a boy our age who lived next door to Lyle named Rusty. Rusty was soon to have the distinction of being the first person I ever came to regard as a personal enemy. Even today there are very, very few people I count as enemies – you can count them on the fingers of one hand and not run out of fingers – but Rusty was the first.

I met him through my friend Bob ("Bones"), although I don't remember the circumstances very well. Bob and Rusty were interested in forming a chemistry club and Bob wanted me to join as well. I thought it sounded fun so I agreed and that's how I got to know Rusty. The club never got off the ground. My idea of a chemistry club was we would get together and do some chemistry. Rusty had a bit different idea. He insisted at our first get-together that a club needed a set of by-laws, an officer organization, and some other things equally unnecessary to actually doing chemistry. Fine. I figured we would waste one get-together on this nonsense – there were only three of us; we needed a legal document to work together? – and after that we'd do some chemistry. After three such meetings we were still arguing about by-laws and I told Bob I was through with our little club. To the best of my knowledge, they never did get around to

actually doing any chemistry. The experience should have served as a warning, but it didn't.

The insulation was fiber glass insulation that came in great big rolls. What we did was unroll them, mount them, and staple them to the wood using a stapling gun. Nothing to it. The trick was keeping fiber glass from getting on our skin because it would dig its way in and itch like all get out. What Lyle and I did was first powder ourselves head to toe with corn starch before we started the day's work. The corn starch would keep the fiber glass off our skin and at the end of the day we would just wash the corn starch and fiber glass off with a hose. Worked like a champ but we did look like a pretty strange crew with all that corn starch on. Lyle's brother Mike would drop by once in awhile to make fun of the way we looked. One day he picked up an empty staple box cover, slid a finger in it, and dared Lyle to fire a staple into the box cover. Lyle was only too happy to oblige. I imagine Mike planned on the sharp staple passing harmlessly on either side of his finger. Wrong. Big mistake. Lyle shot the staple right into Mike's finger and he started hopping around and shaking his hand, trying to get the box cover and staple to fly off. Turns out it stays mighty put when it's stapled to a finger. Lyle and I were rolling on the floor laughing at him. Mike quit coming by after that.

The job was pretty far along when a dispute came up between Rusty and me over how much money I owed him. I honestly don't even remember anymore what the details were about – overtime or something like that I guess. The main point was Rusty thought I owed him some amount of money and I thought I didn't owe him that much. Had we talked it out we probably could have reached some kind of amicable compromise, but Rusty is one of those people with a way-overdeveloped self-righteous streak. It didn't surprise me years later when I heard he had become a preacher. He was just the type. His solution was to go get his dad, who came down and threatened me with a lien on the house. All over maybe five bucks or so. At the time I didn't even know what a 'lien' was, but I did know it was some kind of legalese.

Now, believe it or not there is – or at least there was in those days; I'd bet there still is – a kind of code that boys honored among ourselves. We settled things among ourselves kid to kid. I saw what Rusty had done as an unforgivable violation of this code and I was furious. Not over the money; that was the trivial part of it. I was outraged on the matter of personal honor and I took it as an insult too great to be borne. What I wanted to do was pound the two of them, father and son, into the ground right there on the spot but self control got the better of me. I paid Rusty his extortion money out of my own pocket, fired him on the spot with some colorful language, and Lyle and I finished the job.

I also went out of my way to make his life unpleasant every time I saw him after that. That's another distinction he has; he is the only person on earth I have ever picked on. I always made it a point after that to tell him what a dirty rotten so-and-so I thought he was. Yes, I guess I *was* always trying to egg him into a fight after that. I never did that to anyone else. He is the one blemish on my otherwise perfect record of not looking for trouble. Rusty, who was quite a bit taller than me, would try to reason with me. "Don't be stupid. I'm bigger than you and my arms are longer. I've got the reach advantage. You wouldn't stand a chance," he'd say. "You just put 'em up and we'll find out, you dirty gutless so-and-so," I'd reply. Rusty's theory was all abstract book learning about fighting; I was going with the time-tested maxim that its not the size of the dog in the fight, it's the size of the fight in the dog.

But he wouldn't fight. To his credit, he didn't run away either. He'd walk, but he didn't run. I didn't chase him when he walked away. This was a duel, an affair of honor. You don't chase someone walking away from a duel so honor was never satisfied. We never reconciled, although Bones tried pretty hard to get us to make peace. Never happened, not to this very day. I'm pretty sure Rusty must have ended up eventually hating me as much as I hated him. Lyle, I will note in passing, stayed out of the whole fracas altogether with a diplomatic ease the State Department would envy.

The Judson house was still not finished when school began and we didn't move into it until later in the school year. After the move Dave and I began losing touch with each other, as did Jim and I. On the other hand, from that point on Lyle and I were in touch practically all the time. Proximity carries with it a certain formidable amount of power over what you do and who you do it with. Mom loved the new house.

I thought it was alright. But I did miss not having my special place anymore. □

In ninth grade they let us have some choice in what classes we took. There were some we all had to take, but there was opportunity to pick what you were going to learn and that was new to us. I got some advice from the guidance counselor over what to choose and pretty much ended up following his advice. I decided not to take any more shop; I liked Mr. Fix but I knew I wasn't much good at it and I wasn't going to be getting much better. Instead, and with no small amount of apprehension, I took something with the mysterious and somewhat evil-sounding name 'algebra.' That was the guidance counselor's idea. He said I'd need algebra if I went to college. The algebra teacher was a short man named Mr. Fleming. His real job was to be head coach of the high school basketball team but he was also the ninth grade algebra teacher. Mr. Fleming didn't smile very often and he wasn't very friendly, so I never liked him very much. But it turned out there were patterns in algebra, too, so it wasn't very hard after all. You learned a few tricks about how to manipulate the equations into a form you knew how to get the answer to and that was that.

Another class I chose was Latin. When I was about ten or eleven, Bill had given me a book and record called "German in Record Time" and I'd taught myself how to speak German. I found out it was kind of fun to know a whole other language, although not having anyone around to talk to with it made it very hard to keep it from being forgotten over time. Unfortunately, German wasn't available, either in junior high or in high school. Our only choices were Latin and French. Jim had taken French when he was in ninth grade. But America wasn't getting along too good with the French just then and on top of that I thought the French language sounded kind of snobbish and sissy. Latin, on the other hand, was the language of the Romans and how cool was that! For a long time it had also been the language of the Catholic church, but several years earlier they had stopped using it. I thought that was a mistake because now wouldn't they sound just like all the other ministers and preachers? I wasn't a Catholic – Bones was – but I'd always thought the Catholics were kind of special with their Latin and their priests and nuns and rituals and ceremonies. They didn't know very much about God either, but at least they'd been cool and most of the Catholic boys turned out to be really good kids I could trust. Now their church was more like all the rest of the different churches and not quite as cool anymore. I liked Latin.

The guidance counselor had told me I should keep taking science classes too, so I did. In ninth grade the science class was 'earth science.' Coming after Mr. Bittner's great science class, earth science was just D-U-L-L. This kind of rock is a such-and-such; this kind of rock is a so-and-so; this kind of rock . . . If the teacher had taught us about fossils along with the rocks I'd have really dug that class – so to speak – but he didn't so I just sat there day after day listening to him talk about rocks and dirt. The only thing interesting about earth science class was the blowguns.

You see, we all used Bic pens in junior high. They were made from a long tube with the pen tip and ink tube inserted in one end and a little plastic stopper in the other to keep the ink from running out and staining your shirt. (Turned out that stopper didn't really work too good for that anyway). One of the guys had figured out you could remove the tip and tube, pry that stopper out, and what you had left was a very, very fine blowgun. We'd take straight pins and shish kabob two little pieces of eraser on them, one in front and one in back, for stability. The pin goes in the tube and just like that you've got a working blow-gun. With a little practice a guy could shoot one of those pins all the way across the room.

Once one of the boys had figured this out, the rest of us followed suit and within two days just about every boy in earth science had his own personal blowgun and a generous supply of ammunition. We'd be sitting in earth science listening to the teacher drone away. At least once a class, when his back was turned, somebody would quietly get out his blowgun and *puff!* a pin would go flying across the room and stick in some other boy's arm or in his back. A guy really had to watch his back in earth science class. The back row in front of the windows started to get real popular.

Blowguns gradually began to proliferate outside of earth science and pretty soon they were all over the junior high. Then you had to watch your back pretty much everywhere. But after a couple of weeks word

about our blowguns seeped up to the Principal's office and he took kind of a dim view of the matter. One day – I was sitting in earth science at the time – he came on the loudspeaker, really mad, and said that anyone caught in possession of a blowgun was going to be expelled. So just like that all the blowguns disappeared and earth science went back to being D-U-L-L.

Ninth grade was also the year I started writing little short stories. This wasn't part of any class I was taking. But I read all the time and had noticed some writers were a lot better than others at telling stories. Gradually I began to wonder whether or not *I* could write stories too. It didn't take long for me to realize that writing fiction involved a lot more than just making stuff up. If I knew what I wanted to say writing it wasn't very hard. The hard part was putting little pieces of story together to make a whole story. *Plot* was the problem. The stuff I was trying to write was science fiction action-adventure kind of stuff and my biggest problem was none of my stories really had a plot to them. I'd get an idea for one action scene, and I could write that pretty well. But because I was starting out from just one scene I usually had no real idea how to lead up to that scene or where to go with it afterward. As a result, those first stories weren't very good. But at least I had some idea *why* they weren't very good, and I started to see that the big difference between writers I thought were good writers – guys like Heinlein and Asimov – and writers I thought were not as good most often boiled down to whether or not they had good, well-integrated *plots*.

I started paying more attention after that to how writers put their stories together and, to my surprise, I started to see patterns in *that* too. Again, these patterns were very different from the patterns in mathematics. But they were patterns. I noticed, for example, that the good writers never wrote *anything* in the early parts of their stories that didn't come up again somehow *later* in the story. I noticed that a lot of times that early stuff would create some kind of *conflict* and that would lead to that conflict *developing* and that would lead to the hero trying to find ways to deal with the conflict and that would lead to a *climax* and that would lead to the end. Stories were built around this and that gave them a *theme*. (Theme was something I learned more about later in speech class because a speech had to have a theme). Well, I figured I could learn how to do that. It wasn't easy, but it was something I could practice and make mistakes at and, by understanding those mistakes, slowly learn how to do it better. Writing had patterns. □

I was still working at the TV & Appliance store after school and on Saturdays as a janitor and delivery helper. Gary let me try my hand at trying to fix some of the little transistor radios that would come in for repair. I had no idea what I was doing, though, so I wasn't very successful. Sherri was trying to learn how to do this too. In the spring some people from Iowa State University started offering a Saturday extension class for electronic technicians in Maquoketa. Sherri and I signed up for it and took it together. There was a little paperback book for the course, *Basic Electricity/Electronics A Programmed Learning Course*. The book talked about everything and it was set up so you could learn about things at your own pace. Each chapter had questions at the end you tried to answer and then gave the right answers so you could learn from your mistakes.

That extension course and that little book were gold mines. Everything was explained from basic electricity and electric circuits to how to measure electrical things, to different electronic devices like vacuum tubes and transistors to how telephones worked to how radios worked to how televisions worked. I was even able to concoct some experiments of my own like building a little electromagnetic telegraph and a little circuit that would ring a bell. Telephones had two bells in them and I didn't figure our phone would miss one of them. Mom didn't mind my telegraph but she wasn't as enthusiastic about my bell-ringer circuit. Suddenly my quest to understand electronic brains seemed to be taking a big leap forward.

Small, battery-powered transistor radios were still very new gizmos at that time. By today's standards they sounded tinny and the fidelity wasn't very good, but for the first time just anybody could buy a small portable radio they could take with them wherever they went. At home we always listened to Maquoketa's local radio station – KMAQ, Thirteen-twenty on your Dial! – but I bought one of those transistor radios and my favorite radio station quickly became WLS in Chicago. The more transistors your transistor radio had, the better it sounded. Radio manufacturers would brag about how many transistors

their radios had – ‘mine has three transistors’; ‘yeah? mine has four’; ‘oh, yeah? mine has five’. It became a kind of transistor arms race. □

The bluff where I fell in spring of ‘68

The woods around Maquoketa hide a lot of small caves and Lyle and I liked to hike out there and go exploring. So on one fine Sunday early in the spring the two of us set out on a spelunking expedition. We walked about four or five miles back into the woods looking for caves we hadn’t discovered yet and generally having a good time. I mentioned before that Iowa is quite hilly. It is also sprinkled with numerous bluffs, some of which get quite high. At one point on the return leg of our expedition we found ourselves on top of one of these and, rather than walk all the way around it, Lyle wanted to take a shortcut by climbing down the bluff. I wasn’t too wild about this idea because we were standing right at the edge of what was pretty much a sheer cliff face going almost straight down. Lyle, the daredevil, didn’t hesitate a second. He started climbing down – no ropes or climbing gear, you understand – and called back up to me to not be a pussy. I still didn’t think I could make that climb, but nonetheless I started following him down the cliff face.

It didn’t take long before I was stuck. I was sitting on a little ledge outcropping looking around for anyplace I might be able to get handholds and footholds so I could continue to climb down. I didn’t see any place I thought I could manage and I said to myself, ‘Oh, screw this. I’m heading back up.’

At that very second the ledge gave way from beneath me.

I made a grab for the stalk of some kind of plant that was growing out from the side of the cliff, but it just slid through my fingers, depositing a few dozen thorns in them in the process. All the way down I didn’t *think* anything. First the cliff wall was a kaleidoscopic blur in front of my eyes, then I began to rotate out backwards and I was seeing clean blue sky. Something hit me *thump!* in the small of my back and the blue sky became *two* blue skies seen as if through a tunnel of black rings. The blackness closed in from outside to inside.

Lyle told me what had happened to me later. I had fallen twenty feet and struck a small rock outcropping with the lower half of my body. I’d bounced like a basketball and continued to fall headfirst the remaining ten feet to the ground below. At the last possible second I’d flipped over and did a kind of spin and landed flat on my back in a gooseberry bush on a reclining slope, which cushioned the fall and turned me into a pin cushion as well. He said if I hadn’t flipped over like that I’d have hit the ground head first and been killed for sure. I’d been knocked unconscious when my back struck that ledge, so I had nothing to do with that flip and spin. That had to be either an act of God or incredibly lucky sheer random chance.

I don’t believe there is any such thing as sheer random chance.

When I regained consciousness I was lying flat on my back on top of what was left of the gooseberry bush looking straight up at the sky again. I’d just fallen thirty feet and I was still alive. My glasses were gone so the world looked pretty blurry, but I could see well enough to see an amazing sight. Lyle was racing down the side of the cliff in a series of controlled falls, waving his arms and yelling *Rick! Rick! Rick!* He landed right next to me and knelt down just as I tried to sit up. He put both hands on my shoulders and urgently said, “Don’t move. Don’t move.” His face looked scared but not panicky.

It wasn’t until then that I actually realized what had happened. I hadn’t had a single thought in my mind all the way down and when I’d first opened my eyes the sight of Lyle and the way he was defying gravity had been so amazing I hadn’t thought about anything else. I don’t know how he managed to come down that cliff the way he had without getting killed himself.

But now I realized I'd fallen off the cliff and I started feeling myself to find out how badly I was hurt. My back was *very* sore and I had thorns sticking in me all over the place from that plant up above and the bush underneath me. My nose was bleeding in a river, but other than these things and feeling sore all over, I wasn't broken. It didn't fully hit me until much later how amazing that was.

"I'm alright," I said, "let me up." He let me sit up and stripped off his Tee shirt. He gave it to me to use to staunch the nose bleed. "I lost my glasses," I said. "We've got to find them."

Lyle shook his head in the negative. "I'll find them later," he said. "I've got to get you home." Lyle didn't wear glasses and I don't think he believed me when I'd said I was alright. His number one priority was getting me to a doctor before I died. He helped me to my feet, and when it turned out I was very unsteady on my legs he wrapped my right arm over his shoulder and held me by the wrist. He put his left arm around my back and under my left armpit and half carried me every step of the four miles we had to go to reach my house.

Well inside the first mile of that long walk back the nose bleed had stopped. By then Lyle's shirt was a sodden red mess. My body started to ache more and more as we went and by the time we got to my house I was exhausted. Lyle helped me sit down on our driveway and I rested my head on my knees as he ran to our door and stuck his head in the house. "Come out here quick!" he shouted. "Rick fell off a cliff!"

Well, that brought Mom and Dad running so fast they almost trampled Lyle as they came out the door. They both looked scared – a lot more scared than I ever was during the whole thing – and the next thing I knew I was laid across the back seat of our car and we were all on the way to the hospital.

By the time we got there I had gotten some of my strength back and insisted on walking into the emergency room on my own two feet, although Mom and Lyle insisted on helping me walk. Aside from feeling sore all over, being a pin cushion for thorns, and having a lump the size of a football on the small of my back, I really didn't feel all that bad. What bothered me most was not having my glasses and not being able to see anything clearly. So when the doctor said I had to stay in the hospital I didn't see any earthly reason why and I said so pretty bluntly. He explained to me that he wanted to be sure I hadn't ruptured my spleen during the fall because sometimes just falling is enough to do that. I didn't know what a spleen was but I didn't feel ruptured anywhere. He said that nevertheless I was staying in the hospital until they were really sure I was okay. I was out-voted everybody to one.

After the doctor had assured everyone I was going to be alright, Dad had Lyle take him to the place where the accident had happened. He must have taken our camera along because he took some pictures of the bluff and the Jackson County Sentinel printed one of them in the paper along with a brief story about the accident that week. While they were out there Lyle found my glasses for me and brought them to me in my hospital room. I didn't have to thank him with words; looks were enough. Lyle and I were brothers.

They made me stay in the hospital three more days and I hated almost every minute of it and almost everything about it. First there was that blasted hospital gown. It was open all down the back and the only thing that kept it from coming off were a couple lousy little strings. It always left my bare behind exposed for all the world to see and I really hated that. *What is it about doctors,* I thought to myself, *that they always do everything they can do to embarrass you and make you feel bad?* Doctors almost never treat you like a person.

Next, they wouldn't let me get out of bed. I had to stay in bed all the time and there was a nurse who came in a lot and made sure I stayed there. She was a big, tough-looking middle-aged woman and I didn't entertain any illusion that she couldn't take me in a wrestling match. But she was actually pretty nice in a tough way and she never failed to call me 'Mr. Wells.' Nobody had ever called me 'Mr.' before and I liked it. Between us we had a little standing joke. I kept telling her I was going to escape and she kept telling me I'd better not even try it if I knew what was good for me. But I was supposed to stay in that bed all the time, even when I had to go to the bathroom. I was supposed to use this bedpan they kept on a little table next to the bed. *Oh, screw that!* I thought to myself, and whenever I had to go I'd sneak out of bed

and use the bathroom that was there in the room. Nobody ever caught me doing it, either.

I had visitors part of every day, but for most of the day I'd be all by myself except when the nurse or the doctor came to look me over or take me someplace for x-rays or some kinds of tests. Soap operas were the only thing on TV and I couldn't stand them. I was going out of my mind with boredom at first, but there was a candy-striper who'd come by a couple times a day with a cart that had candy, magazines, and a few paperback books. I didn't care for the candy or the magazines, but I did buy a paperback book every day and passed the time reading it. I hated missing school, although not the earth science part of it. You see, all in all I *liked* school. I liked learning how to do things and I liked learning about things. Once when I was still a little boy – about third or fourth grade, I don't remember which – I'd gotten some kind of blood poisoning and the doctor had put my arm in this splint-like contraption and told Mom to make sure I kept my arm in this one particular position so the poison didn't spread up my arm to my heart. "How am I supposed to go to school with this thing on?" I'd demanded. The doctor had looked amazed and replied, "You're not!" Even after I got out of the splint thing I had to keep my right arm in a sling and for awhile at school I had to print everything left-handed. My penmanship wasn't the best even with my right hand; left-handed it was a real mess.

The absolutely worst thing of all about the hospital was having my temperature taken. At home whenever I was sick Mom would have me put the thermometer in my mouth under my tongue, so the first time the nurse came in and announced it was time to have my temperature taken I reached out my hand to take the thermometer. She wouldn't give it to me. "This kind of thermometer goes in your rectum," she said.

I couldn't believe she was serious. She was. "Couldn't I take it in my mouth?" I pleaded.

She brandished it. "If you want to put *this* in *your* mouth after where *it's* been," she said, "be my guest." Oh. She had a point there. So I reluctantly rolled over and she stuck that thing up my rectum. It doesn't hurt but there just isn't anything creepier than having something stuck up your behind like that. It was a twice-a-day indignity and I just had to suffer through it. It was far more irritating than when the night nurse would wake me up and tell me it was time to take my sleeping pill, which she did every night.

Finally one morning the doctor came in all cheerful and said all the tests were done and I was alright. I could go home. Well, I didn't waste any time after being told that. As he was leaving I jumped out of that bed and started putting my clothes on. I'd just finished zipping up my pants when the nurse came in.

"Mr. Wells!" she exclaimed, shocked. Then she started coming at me like a heavyweight wrestling champion.

I held up both hands defensively. "It's okay! It's okay!" I yelped. "The doctor said I could go home!" She looked at me kind of dubiously and said, "Stay right where you are." It wasn't a request; it was a warning. She went to go check and found out I really had been discharged and then she let me finish dressing. I couldn't get out of that blasted hospital fast enough to suit myself. □

Up through the end of 1967 the war in Vietnam was more and more in the news as America sent ever increasing numbers of soldiers there to fight. I still didn't know why we were fighting in Vietnam in the first place and I still was very uncomfortable with and confused about how we could be in a war when Congress had never declared a war. But nobody else I knew seemed to be very bothered by what was going on. The war only came to Maquoketa when somebody's son was drafted and sent to fight there. Nobody actually *liked* the war, but it looked like we were winning and most people just wanted to get it won and over with as soon as possible. For our family even the possibility that Bill might have to go there was now a thing of the past. He had finished his tour of active duty with the Army and was now working as a salesman for IBM. He was back in Iowa and living in Coralville, which is sort of a little bedroom community in Iowa City near what was now being called the University of Iowa (somebody had decided to drop the 'State' from the front of its name).

Bill had thought very seriously about re-enlisting and staying in the Army. I knew this because I

overheard him talking to Dad about it one time. Dad's position had been adamant: Bill was to do no such thing. Although Dad disapproved of the relatively few people who were already protesting the war, he disapproved of the war, too. He thought America had no business going to war for the sake of another nation and his attitude toward what was known as 'the domino theory' was: So what? Who cares? When Vietnam had first begun to be talked about, pretty much everybody had been saying the Russians were behind it. But by the start of 1968, most people were saying it was Red China that was mostly behind it. Dad wasn't convinced the Red Chinese were bad guys, though. He had been in China at the close of World War II and what he had seen there had made him hate Chiang Kai-shek and his old government. A lot of people knew he didn't like Chiang Kai-shek because Dad didn't mind saying so. Not that many people knew he thought the Communists in China were a big improvement over Chiang. That was something a person didn't talk about loosely.

But I knew he thought that, and I knew why he thought it. Dad had tried for awhile to write about his experiences in World War II and had been unable to interest anyone in publishing his stories. But *I* had read what he'd written:

> Only a few of the sailors were interested in the living conditions and way of life of the Chinese people. I was one of those. I wandered the streets through a mass of millions who were milling around aimlessly, begging, stealing, and selling everything, even their daughters. Always that 'Here, Joe, you like?' . . . I wandered off an adjoining street and the farther I walked, the less crowded the streets. Little children, hungry-looking and neglected, were playing hopscotch. . .
>
> On the third day one young shipmate, white as a sheet, returned from liberty right after he had left. I asked what was the matter. He replied, 'I just got on the beach and started up Nanking Road when I found a woman, screaming and moaning, lying on the sidewalk. I stopped, wondering what I should do, when right there before my eyes she gave birth to a baby. A passing Chinese picked up the baby and threw it into the Wangpoo River. I don't know whether or not it was dead. The mother got up and staggered weakly up the street. I had enough. I came back.'
>
> Life is worthless in Shanghai. Children die by the thousands from starvation every day. If a cow dies on a farm, it isn't sent to a rendering works as in the U.S.A., but it is hauled into the city to be butchered and sold for food. Our garbage cans on the ship were a banquet to two Chinese men from an outcast sampan who scrubbed the floors and washed the dishes in our galley just for our leftovers. These outcast Chinese are not allowed to go ashore. They are marked with silver neck rings and live entirely in small boats the size of our row boats. They cook their meals, produce their babies, and live completely on these boats. They urinate over the side of their boat and dip their drinking water from the same river. . . All I have to do when I get to feeling sorry for myself is remember these sights.

But a lot of people started to feel different about Vietnam on the last day of January, 1968. The cause was something called the Tet offensive. Just a couple weeks before President Johnson had made a speech that sounded like he was saying the war was all but won and would be over soon. Those weren't the words he used, but that was what it sounded like he was saying. When Tet came it was such a big shock that people started to not trust President Johnson any more. Even Walter Cronkite said right on television about a month later that he thought we were not going to win in Vietnam.

But for me the final thing that settled it in my mind came a day or two after Tet started. I was watching a news show and the pictures were being taken in Saigon. They had a prisoner, some man they said was suspected of being a communist sympathizer. His hands were tied behind his back and a South Vietnamese general walked up to him, put a pistol to his head, and fired a bullet into his brain. The man collapsed with a big fountain of blood spurting from his head. It was cold blooded murder right there on television and it had been done by an important Vietnamese government man – a general! It made me feel sick. The people we were fighting for were doing the very things we should be fighting *against*. Even if I was only fourteen, I knew it was just plain *evil* and America was just plain wrong for being on their side. That was the moment I became one hundred percent against the war in Vietnam deep down in my soul.

Except for feelings and opinions, the terrible things that were happening in 1968 did not come home to Maquoketa. It seemed like the whole rest of the country was descending into chaos but I didn't see any of it on Main Street in Maquoketa. But terrible things were going on. At the end of March, President Johnson said he wasn't going to run for President again. He had given up. At least that's what I thought. He had given up on Vietnam. He had given up on the Great Society. I wanted us to get out of Vietnam and I wanted us to do it right now. But give up on the Great Society? That was just exactly what we *should not* give up on. The things it was trying to do were the *right* things we should be trying to do.

Then less than a week later the news came that Dr. Martin Luther King had been assassinated in Memphis. For a long time I hadn't known very much about Martin Luther King. I had known he was on the side of the people who were right during all the troubles in Alabama. But I also knew he was a preacher and in my mind that had always weighed against him because preachers were so often so completely wrong about most things, including the one thing they *should* have been careful to be most right about. But I had changed my mind about Martin Luther King when they showed us a movie in school one day. It was from 1963, the famous 'I Have a Dream' speech. I hadn't heard this speech in 1963. As those beautiful, powerful, soul-piercing, heart-penetrating words flooded over me, I had realized that this man really *was* one of the good guys, he *really did* stand for those *most-important* things that are *so fundamentally right* and were the very things we had *all* promised to be on the side of in the Pledge of Allegiance. And now he was martyred and cities all over America were going up in flames.

Then in June there was another shock. Bobby Kennedy had been shot in the head in California. All day at work the day I heard about it, I kept hoping he would pull through. But he didn't. I didn't feel the same way about Bobby Kennedy's murder as I had felt about President Kennedy's murder. I had liked Bobby Kennedy, but he had never reached inside me the way President Kennedy had. I was shocked and saddened when he died, and his brother Teddy's eulogy speech moved me very deeply. But I didn't feel the same awful, devastating grief I had when President Kennedy died. I knew Death by now and I felt seething anger, not the terrible icy rage and the awful, awful sadness I knew in 1963.

I wanted to do *something*. I really felt it was my *duty* to do *something*. But I couldn't think of one single thing I *could* do. I was a fourteen year old boy in a small little farming town that might just as well have been a million miles away from where all the troubles and terrible catastrophes were erupting one after another. I kept *asking* myself what *I* could do for my country *right now*.

But the answer kept coming back the same: Nothing. And I didn't like it one bit. □

Lyle's little brother Steve lifting weights in our back yard (summer, 1968)

I had started growing closer and closer to the rest of Lyle's family. I didn't know Mike all that well, but I really liked Lyle's mom and dad, his two younger brothers Brian and Steve, and his sweet baby sister Bucky. They were a happy, boisterous family and if they had any family problems *I* never saw them. I even started spending time at their house in the evenings every once in awhile, which was something I *never* did with anyone who wasn't family. I might not actually have been one of the clan, but they made me feel like at least a cousin.

I felt towards Brian and Steve just like they were my own little brothers. Brian was a year or so younger than me, Steve a year younger than him. They were great kids with infectious grins and they could both swim like they were fish. Of course, both Lyle and I occasionally sort of rough-housed them around a little, like older boys do to younger ones every now and again. But we wouldn't have let anyone else do that.

I was usually so grim and serious that Lyle's family rarely missed an opportunity to have a laugh at my expense. I was sitting with them in their living room one night when little Bucky, who was maybe three years old or so, maybe four at the outside, came running into the room buck naked. I didn't say anything, but I didn't have to. I was so embarrassed my face turned as red as a stop light. The whole family roared with laughter at my reaction. Which made me turn even redder. Even little Bucky laughed at me. You know something? I really didn't mind them laughing at me. They were family.

Lyle had a hobby melting down lead and making fishing line sinkers. I don't know where he got the lead, and in those days we had no idea how big a health hazard lead was. He also put it to another good use. It was traditional at Halloween to carve Jack O' Lanterns out of pumpkins, stick a candle inside, and set them outside. One Halloween somebody – probably one of the hoods – was engaging in a little vandalism. He'd sneak into people's yards at night and kick their Jack O' Lanterns apart. Considering it was usually the little kids who carved the pumpkins and made the Jack O' Lanterns, it was a mean, rotten thing to do. Lyle had just the right remedy. He filled the bottom of their Jack O' Lantern with lead and set it out in a nice enticing spot. It *looked* like a regular Jack O' Lantern from the outside, but it weighed a ton and it wasn't going to move an inch if somebody came running up and kicked it. It was a broken toe waiting to happen. The next day, sure enough, there were marks on it where it had been kicked. Once. Maybe it was coincidence, but the Jack O' Lantern vandalism stopped after that. □

Observing fire fighting drills at Chanute AFB (1968)

The fact I opposed the war in Vietnam did not mean I was against the military or service in the armed forces any more than it meant I was against my country. The three just aren't the same thing. The military doesn't start wars. The people who serve in it didn't cause Vietnam. There was no conflict in my mind, no contradiction between knowing the war was wrong and being a CAP cadet. 'The individual who refuses to defend his rights when called by his Government deserves to be a slave and must be punished as an enemy of his country and a friend to her foe.' Andrew Jackson said that. 'I cannot ask of heaven success, even for my country, in a cause where she should be in the wrong. . . My toast would be, may our country always be successful, but whether successful or otherwise, always right.' John Quincy Adams said that. They were both right. It never entered my mind to quit the CAP just because the President and the Congress were breaking their oaths to preserve, protect, and defend the Constitution. I blamed the people who were to blame, not the ones who weren't. Only an ignorant person doesn't know the difference.

In the summer of '68 the Iowa wing of the CAP went on summer encampment to Chanute Air Force Base in Rantoul, Illinois. Cadets aren't required to go on these encampments. Encampments were something you *got* to do, not something you *had* to do. They were adventures just as much as training experiences. So one day that summer I and a whole plane load of other boys from all over got on board a C-119 (which they nicknamed 'the dollar nineteen') and we took off for Chanute AFB.

Everything about it – from flying in an airplane to being immersed in military life to all the different training activities – was completely new to me. There was so much new in it that the whole thing was kind of a blur. Everything I saw, everything I did, I was seeing and doing for the first time. Chanute was a training base, not a combat base. We attended lectures on different subjects every day, got to observe different Air Force exercises being carried out by real Air Force guys, and we ourselves got to learn first hand what drill and ceremonies were like when the whole wing was gathered together as a unit.

There was so much we did that my memories of that encampment come in little flashes. I didn't have any rank to speak of yet and so I only had to go where they told me to go and do what they told me to do.

I was free to just be and do and feel and thoroughly enjoy myself. The coolest thing I remember was watching the fire fighting drills. They had guys in fireproof white suits who almost looked like astronauts and who could actually charge right through enormous roaring fires. The Air Force guys wouldn't let us try that, but if they had I'd have been the first volunteer. It was just amazing to see.

We attended lectures on strategic doctrines of force, counterforce, and counterinsurgency, and these were fascinating to listen to. During the question and answer period, I remember one kid asking the officer who had given the lecture how big an atomic bomb was. The officer hesitated for just a second and then said, "Bigger than a bread basket and smaller than this room."

A few of the guys in our squadron en route to Chanute

We lived in our own barracks they had set aside for us and did a lot of drilling and marching. They had gotten a band from somewhere that marched with us and blared out the music for all to hear. Having the band made it easy to stay in step and keep time, but even more important, it put a *soul* into the marching and passing in review. There was a lot of ceremony built right into all of this, and I just loved that. I know a lot of people who don't like ceremony and who say it's all pointless and just for show. They're part right. It is for show. But it's not pointless. It's hard to describe, but the point is all in how it makes you *feel*. It lets you know that as different as all of us were from one another, we all had something important in common, we were all *comrades*, and we were all part of something bigger and grander than any one of us by ourselves. It helped me understand in my *gut* what it meant to be an *American*. One person, keeping all to himself and alone, can never be an American. Not really. It takes *all* of us for *any* of us to *fully* be an American. The drill and ceremonies helped me understand, in a way words never could, what a French guy named Rousseau had called 'the social contract.' Rousseau's idea was so supremely important the Founding Fathers used it as a keystone in setting up the Constitution in the first place. All this was a lot to live, and the Chanute encampment came to its end way too soon as far as I was concerned. □

Lyle and I were always trying to figure out ways to built bigger and grander rockets. Our biggest problem in doing this was fuel. It was illegal to possess rocket fuel of any kind. That meant we couldn't buy any from anybody from anywhere. There wasn't a black market in rocket fuel the way there was for fireworks and bottle rockets. However, it wasn't illegal to buy the individual chemicals you could use to *make* rocket fuel. That gave us an idea. We did some research to find out how rocket propellant was made and what chemicals went into it. And pharmacies carried chemicals.

Armed with this knowledge, I went down to one of the local pharmacies and told the man there I needed some chemicals. He asked what kind and I handed him my list. He read it silently and an amused little smile slowly spread across his face. "You boys planning to make some rockets, are you?" he asked. I was stunned. How did he know that? I denied it, nervously, and he just laughed. And refused to sell me any chemicals.

Checked in our attempt to become rocket fuel manufacturers, Lyle and I went back to figuring out new and different things we could do with bottle rockets to give them more pizzazz. We figured one good way to built a bigger rocket was to put together a whole bunch of smaller ones. After all, the Saturn V rocket used multiple rocket engines and it was the biggest rocket anyone had ever seen. Why not do the same thing with bottle rockets?

So one warm summer afternoon we set to work in Lyle's back yard to build our first multi-rocket rocket. Brian and Steve and Bucky gathered round to watch as we methodically began tying bottle rockets together. By the time we were done we had assembled something like twelve of them together to make a

single, very fat rocket. We tied the fuses so they would all burn together at the same time and set up our creation on a specially constructed launch pad. Lyle lit the fuses.

Normally a bottle rocket goes up *swoosh!* so fast you can't see it. The Big Rocket didn't. What we hadn't counted on was that the fuses burned at different rates and all the rocket engines didn't fire at the same time or at the same rate. Anything could have happened. What did happen was the Big Rocket stayed on the pad for a couple of seconds hissing and spitting and then began to rise ever so slowly. In a few seconds it had lifted about a dozen feet straight up from the ground and then went no further. It hovered there like some kind of improbable helicopter, quivering and shaking. All of us except Bucky dived for cover as our straps holding the rockets together started coming apart. The Big Rocket flew apart, individual rockets flipping over and fanning out in all directions. They all came crashing in, engines smoking, in a big circle, at the center of which sat Bucky.

"Ooh! Neat!" she cried, delighted. *"Do it again!"* □

Also that summer I had come across an ad for a 'mechanical computer.' It was irresistible if a little pricey so I sent away for one. When it came I was a bit disappointed. One of the key components in a computer is a thing called a 'flipflop.' Flipflops are what a computer uses for "memory" and, like the name implies, they flip and flop from one state – representing '0' – to another – representing '1' – or vice versa. A real computer at that time had thousands and thousands of these.

This one had three. They were each made of a flat plastic plate with pairs of stubs sticking out at fixed intervals. You 'programmed' it – set it up to do what you wanted – by slipping little plastic tubes over one or the other of these pairs of stubs. You operated it by cycling a metal rod back and forth, which in turn moved another metal rod, which in turn would move or not move the flipflops left ('0') or right ('1') depending on where you put the plastic tubes. It actually was quite a clever little gizmo, as I could tell while I was putting it together, but with only three flipflops it was pretty limited in what it could do.

Still, it could do some things. It came with a little pamphlet explaining how to make it do a number of different example 'computations' in arithmetic and logic. It could, for example, count from 0 ('000') to seven ('111') in order and then start all over again. It could add or subtract a pair of binary numbers and give you the correct answer ('0' + '0' = '00'; '0' + '1' = '01'; '1' + '0' = '01'; '1' + '1' = '10'). It could also solve simple riddles. One of them was this one: *There are two islands in the Pacific called Ho and Hum. The natives of Ho always tell the truth. The natives of Hum always lie. You see two natives on the beach and you ask the first one, 'Where are you from?' He answers, 'Blahbablaba!' You don't speak his language so you ask the second native, 'What did he say?' He answers, 'He say he come from Ho.' What island is the <u>second</u> native from?* The answer to the riddle is 'Ho' and the computer could figure that out once I put the little tubes in the right places.

Even though my little plastic computer was disappointingly simple, it still was very useful in understanding what computer people meant when they said computer circuits were 'logic' circuits. You see, the plastic 'flipflop' plates *moved* as I cycled the machine and so I could vividly see the *patterns* it went through as it operated. That just made a lot more intuitive sense to me than the mathematical stuff I'd been reading about in the encyclopedia. By watching how the mechanics worked I was getting a feel for how the math/logic stuff worked, not just what the answers should come out to be. With a mechanical gadget – whether it was my little computer, Mom's stylus-operated mechanical calculator, or even just an abacus – I could *see* the patterns in the mathematics at work, and that made the math real and meaningful. Without being able to see the patterns, all I could do was try to memorize everything and nobody can do that. There's just too much to remember. Want your little kid to be good at math? Buy him or her an abacus, not an electronic calculator. □

As the long summer finally faded into fall, I was determined that this year I was going to make them let me take part in sports again. Dad was in my corner on this, I hadn't had any more of those weird spells since the chiropractor had worked me over, and even Dr. Duh had to admit there was nothing wrong with

me now. Like most medical doctors, he didn't like chiropractors; he would say they weren't really doctors and that what they did didn't really work. *That's the pot calling the kettle black,* I thought to myself. Mom was outnumbered and gave in and so, at long last, I finally had a signature on that blasted medical form the school required. Finally I was an athlete again.

Our new house was right next to Goodenow Field where football games and track meets were held. The field was surrounded by one of those high metal fences and the gates were always locked except when a sporting event was being held. But Lyle and I would just climb over that fence so we could use the field. We would run on the cinder track, use the high jump gear they would just leave sitting out there all summer, practice doing long jumps in the sandy long jump pit, throw shot puts, and practice kicking field goals on the football field. Sometimes they would leave the hurdles out and when they did we'd set those up and run high hurdle races. And, of course, we'd get a few guys together and play football there too. It also occurred to us that the football field would be a great place for launching bottle rockets at each other from opposite goal lines and we did lay some plans for having a Great Bottle Rocket War there, but we never did. Nobody seemed to mind it when we'd climb over the fence and use the field for sports, but we figured the Maquoketa police would take a dim view of the Great Bottle Rocket War.

Lyle's sport was cross country, which never interested me because I didn't like running just for the sake of running. Plus, I already knew I wasn't the fastest kid by a long shot so there wasn't much chance I'd win any races. My idea of running involved a forty yard dash with a ball carrier to hit at the end of it. *That* I knew I could do. I was happy to race with Lyle when he wanted to run 440-yard dashes around the cinder track because he was my brother. I never once beat him in one of those sprints but I would usually lose by a small enough margin to keep it interesting. I suspect, though, that was more Lyle's doing than mine. He could run like a gazelle when he wanted to. He would have made a great wide receiver.

Dick Fosbury had electrified everybody in the '68 Olympics by winning the high jump with his new and very unorthodox style of jumping. Lyle was the first kid in Maquoketa to copy the 'Fosbury flop' and I was the first kid to copy Lyle. In PE I'd never been a very good high jumper and it was just amazing how much higher I could jump using Fosbury's new method. With it I could almost high jump my own height, which I'd never even come close to before. Lyle, who was a much better jumper than me, could out jump his own height.

Grass drills for football started a couple of weeks before school began. Maquoketa High School was as long a walk from our new house as the junior high had been from our house on Niagara Street and so I had to set out early in order to dress and get out onto the practice field in time. I knew I was really going to have my work cut out for me that fall. I'd missed two whole years of football and I figured the boys who had those extra two years of experience were going to be very hard to beat out for any of the starter spots on the junior varsity team.

Grass drills involved a *lot* of running. There were two drills a day, one in the morning and one in the afternoon with a lunch break in between. The main purpose, of course, was to get us into top physical shape. I heard the coaches chew out a couple of guys for not staying in shape over the summer. They were guys who had played all the way through junior high, had been told to keep running all summer, and hadn't. But the second purpose of grass drills was to get kids to quit. Anybody could try out for the team, and when the drills started there were probably three times more the number of guys on the field than could possibly make the team. By the time grass drills were over, we were almost down to squad strength. We would run and run and run some more and most of the boys just couldn't handle the physical demands. My friend Dave tried out for the team, and toward the end of the first morning I saw him bent over and throwing up from all the running they had us doing. Dave was one of the guys who ended up dropping out.

After morning drills we'd run back to the high school building, shower, dress in street clothes, take the salt tablets they gave us, and suck the drinking fountains dry. All that running had me sweating so much I couldn't have been more soaked if somebody had tossed me into the Maquoketa River. Then we'd line up

along the hallways waiting for the coaches to come and give us chalk talks in one of the classrooms. Guys would just collapse in rows along the hallway waiting for coach. Chalk talk went probably about an hour and then they let us go home for lunch. It was a much longer walk going home than it ever was going to school in the morning, believe you me. When I got home I wouldn't have any appetite at all and I'd just collapse on the couch in the living room until it was time to go back for afternoon grass drills. In the beginning there were so many of us they didn't have enough lockers for us all so they didn't assign lockers to anybody. We carried our gym clothes back and forth in our gym bags. They'd get so soaked with sweat you had to wash them every night, which was how and why I first learned how to use our washer and dryer. I didn't dare let Mom see how tired I was when she got home from work; she wasn't the least bit happy about me playing football anyway and she was alarmed when she heard about how much distance we were running every single day. "Ah, it's not *that* bad," I told her.

My height had started to shoot up when I was thirteen and my weight hadn't kept up. I was not the Bubba I had been anymore, and by the time grass drills were over I was almost skinny. Not really an advantage for a football player, especially for a linebacker. After a little over a week, so many guys had dropped out that there were few enough of us so they could issue practice uniforms, pads, and a helmet. Then we ran grass drills in full gear. More guys dropped out. Finally, at long last, all that running started giving way to contact drills – blocking sleds, tackling dummies, and 'live bait,' i.e. we got to start hitting each other. More guys dropped out and finally we were down to squad strength. You might think that moment – that is, making the team – would have been a big event but it wasn't for me. I never had a moment of doubt that I was going to make the team. I was determined to either make it or die trying. There were times during grass drills, though, where I wouldn't have laid odds on which of the two it was going to turn out to be. The really big prize – nailing down a starting position on the squad – hadn't been accomplished yet. *That* was what I knew was going to be the toughest thing.

After grass drills were over they divided us into three groups for practice: the backs; the quarterbacks and ends; and 'the fat linemen.' Naturally, I was one of the fat linemen; all one hundred thirty-five pounds of me. If I wasn't the smallest guy on the team, I couldn't tell you who was. Maybe one of the freshman quarterbacks. Maybe. After school started and before the first game we had football practice after school every afternoon. Practice always started out with calisthenics and then some running. We'd do some one hundred yard dashes followed by an endless series of 440-yard dashes before the actual hitting drills began. I hated those 440s. The coach would have us run in our three groups. The first group would be the quarterbacks and ends, who were generally the speediest kids on the team. When they were halfway around the track the backs would go. As soon as the quarterbacks and ends got back to the starting line, we – the fat linemen – would go. The only rest break we got was the few seconds between the time we got back to the starting line and the time the first guys from the next group got there. Then off we'd go again. If the quarterbacks and ends were the fastest guys, you won't be surprised to find out the fat linemen were the slowest guys on the squad. The order in which we ran was set up so the quarterbacks and ends were always chasing us. As we'd run, the coach would yell, "C'mon, fat linemen! You're dogging it! You better not let them catch you! . . ." – inspirational stuff like that. Our breaks always seemed like I'd only have time to gasp in about a dozen deep lungfuls of air and *tweet!* it would be time to run again. The backs weren't as fast as the quarterbacks and ends – although they were faster than us fat linemen – so those pussy quarterbacks always had it easy during the 440-yard dashes.

My quest to win a starting position on the JV squad wasn't going too well and I knew it. Part of it was my small size, but most of it was my lack of playing experience. My teammates who had played during eighth and ninth grade had learned how to do a lot of things second-nature that I was now trying to learn for the first time. I just had to try harder. Sometimes, though, I'd get to trying so hard I'd forget some of the things I was supposed to do as a linebacker. For example, we had a set defensive system such that if the quarterback dropped straight back or rolled away from my side, I'd drop back into a zone defense position and pick up any back who came out of the backfield into my zone. If the quarterback rolled to my side, it was an automatic red dog. The term 'blitz' hadn't become common at the high school level yet

– I don't even remember if the pros were using that term or not yet – but a 'red dog' was basically a blitz. The idea was you attacked the quarterback like a red dog. I loved being a red dog. I didn't much like quarterbacks anyway – they were all smug, snobby characters who thought the team revolved around them – and nothing made my day more than getting my hands on one and slamming him into the ground. *Any* quarterback. Ours just as much as another team's. Like my hero Dick Butkus, I played no favorites.

BUT there was an exception to the red dog play. If one of the backs drifted out wide to the sidelines and the quarterback rolled out my way, I was supposed to pick up the back instead. I almost never remembered to do that. I'd get so charged up about getting to the quarterback I'd completely miss that back sneaking out wide. He'd be wide open and Coach would chew my hind end out pretty good. In a lot of ways you could say I was a dumb football player. Probably the dumbest on the squad.

That might have had something to do with my playing nose tackle. Normally we played a 4-4-3 formation on defense – four guys on the line, four linebackers, and three backs. But sometimes we played a 5-3-3 or even an 8-3 formation and when we did one of the linebackers lined up in the four-point stance right across from the center's nose – hence 'nose tackle.' I was the smallest nose tackle in the conference but it was a position that didn't take much in the way of brains or skill. Just aggression. And *that* I had in plentiful supply. Every offensive center and guard in the universe was bigger and stronger than me. But a center has one really important thing to do first, namely hike the ball. The instant I'd see that ball start to move, I'd bash the center along one side of the head or the other – it's called a forearm shiver – and bolt for the hole that would leave. There wasn't anything wrong with my reflexes and if they were bigger than me, at least I was faster than them. Well, most of them anyway. One time I got through into the backfield so fast the quarterback hadn't gone more than a couple steps before I got my arms around him and planted his face in the field's nice grass and dirt. As we re-huddled I saw him pointing me out to his linemen and the next play the center and both guards just buried me. I was awfully proud of that. They'd had to triple-team *me*. The pride was worth getting squashed like a bug. It was a *good* hurt.

Anyway, during the practices working up to our first game I was trying really hard to learn the skills and improve enough to win that coveted starter position. Then a little over a week before our first game disaster struck. We were scrimmaging and the offense ran a sweep around my side. In this play, one of the halfbacks carries the ball and the fullback is assigned to take out the linebacker. Our fullback was a big kid named Don, who was possibly the best athlete in the conference and was certainly the best player on our team. He was also one of the nicest kids anywhere off the field, but on the field he was all business. Don and I collided head on and I went flying. I most have flown ten feet straight backward and I landed on my hind end with my right foot tucked up underneath it. I'd hardly hit the ground when Don smashed into me again. He drove me at least another five yards up field with my cleats stuck in the ground like the blade of a plow. I could feel my ankle ripping apart. When Don finally released me and went charging off looking for somebody else to kill, I didn't even try to stand up. My ankle was twice as big around as it usually was and it really hurt like all get out. One of our tackles helped me limp over to the sidelines on one foot and after practice was over I went to the hospital again to have my ankle x-rayed.

It turned out nothing was broken or so torn up that surgery was needed. It was just a really, really bad sprain. They wrapped it in an Ace bandage and sent me home. I was out on crutches for three weeks. When I finally could stand to put any weight on my right foot, my heel felt like I was standing on a red-hot spike. But as soon as I could limp I got rid of those crutches and went right back to football practice. By then the starter spots were gone and I knew it. But I'd been a long-shot at best and I wasn't about to quit the team. Coach didn't exactly greet my return as the season's salvation; surprise and astonishment probably better describe his reaction. But I think he was at least a little impressed that I came back and was trying just as hard as before, even if my limp now rendered me the slowest guy on the squad as well as the smallest. And the dumbest. At practice during a scrimmage if somebody just planted me during a play, Coach would yell, "Are you gonna take that from him, Wells?" "No, sir!" I'd yell back and I'd put my nose right in there again even harder on the next play. The other guys had more size; they had more speed; most of them had more skills; what I had going for me was guts and determination. That was all I

had, so that's what I used. I think Coach respected me for that at least a little. I think maybe the guys did too. They didn't treat me like I was the team mascot; they treated me like I was one of *us*.

I suited up for every game after I came back and I even got some playing time, although not nearly enough to suit me. Of course, anything less than playing every defensive play of every game wouldn't have been nearly enough. I was stoic about it, though. Next season. Next season I'd win a starting spot. On the Varsity. As a junior. All I had to do was get about ten times better. If you don't convince yourself you can do it when the odds are against you, you'll never do it. I was completely convinced I could win a starting spot next year. I'd do it or die trying.

One reason I thought I could do it was our Varsity wasn't having all that good a season. Our JV team, on the other hand, was in a race for the conference championship. We just barely failed, losing a heartbreaker to the team from Marion the second to last game of the season. I played in that game during the fourth quarter, when we were behind, and I was playing in such a rage at losing that a couple of my teammates had to start telling me to cool it. They didn't want things to get worse by having us get penalized for unnecessary roughness, and the way I was hitting everything I could hit that wasn't wearing our uniform, I was definitely just an inch away from getting called for it. All in vain, though. Marion ran the clock out on us and went on to take the JV championship that year. We played one more game after that, an away game, and football season was over. I was never so proud of anything in my life as the little M – the JV letter – they gave me at the end of the season. □

1968 was an election year and there were three candidates for President: Vice President Humphrey, Nixon, and the racist from Alabama, George Wallace. '68 had turned into the worst year for America I'd ever seen; I think maybe it was the worst year anybody alive had ever seen. It had become a year dominated by Vietnam on the one hand and the radical revolutionaries – black and white – on the other hand. It seemed like the country was polarized right to the extremes on both ends. The Republicans were all 'law and order' and out to crush the 'long haired hippies' they blamed for all the domestic trouble. The Democrats weren't democrats any more. They had become dominated by the liberals and while they were against the war in Vietnam, they weren't interested in the Great Society and fixing the real problems. They seemed instead to be on the side of the radicals, who in their own way were just as bad as the Selma police had been, or the rioters who had burned out their own neighbors in Watts and other cities. I wasn't on anybody's side that year because there wasn't anybody who was on my side. Everybody had forgotten all about the New Frontier. Everybody, it seemed, but me.

Although I wasn't too keen on the poetry we had to read every once in awhile in English class, there was a stanza from a poem by a guy named Yeats I had taken notice of:

> Things fall apart; the center cannot hold;
> Mere anarchy is loosed upon the world,
> The blood-dimmed tide is loosed, and everywhere
> The ceremony of innocence is drowned;
> The best lack all conviction, while the worst
> Are full of passionate intensity.

That was America in 1968.

I figured things would get better no matter who won as long as it wasn't Wallace. The way I saw it, things really couldn't get any worse. But better wouldn't mean 'alright.' The way I saw it, Republicans basically wanted to deal with things by making more people criminals, putting more people in jail, and cutting back on the very parts of the Great Society programs that were *right*. The liberals – I really had a hard time seeing them as Democrats – seemed bent on helping some people by hurting others and it looked to me like they had people like us – people like me and my family – in mind as the ones they were going to hurt in order to help the radicals. We couldn't expect any good from the Republicans either. Their attitude seemed to be: if you weren't rich you weren't anything. Both sides were against the space program, both sides were against all the best parts of President Kennedy's New Frontier. The best men

weren't going to win this time. The best men were dead. In Dallas, in Memphis, and in Los Angeles.

It wasn't hard to stop paying attention to the election in 1968. They wouldn't let me vote and my side was going to lose no matter who won. □

High school had a whole different feel to it than junior high. It was something that was hard to put my finger on. It was regimented, but not as regimented as junior high had been. In junior high I felt like a kid; in high school I didn't feel like a kid *as much*. Teachers seemed to talk *with* us more than before, rather than just talking *to* us. My favorite classes were chemistry and geometry. Chemistry because it was interesting and the teacher, Mr. Dickinson, had a way of making it even more interesting. Mr. Dickinson was much older than Mr. Bittner had been. Sherri told me he'd been the science teacher when *she* was in high school. Geometry was interesting because it was just interesting and because Coach was the teacher. There were a few of us from the football team in the geometry class, and when he called on us Coach invariably referred to us as 'you knuckleheads.' That always got a chuckle from the other kids, and from us too. We knew Coach liked us.

The class I most dreaded that year was speech. The reason was simple. In that class we had to get up in front of everybody and make speeches. I didn't mind talking to people one on one or in small groups, but there was something about standing up there with all those people looking at me while I gave a speech that felt very, very uncomfortable. After all, I hadn't done much talking at school since Miss Young's first grade class. Even worse was what came after the speech. Then you had to listen while the other kids told everybody what they had thought of your speech.

One of the boys in my speech class was the boy from the Zioneers who had pulled the knife on me outside the church in Fulton that one time. It turned out he was actually a pretty smart kid and he seemed very confident and self-assured when his turns came to get up and make speeches. The fact that he was smart and not the hood I'd originally taken him for made it all the more mysterious how he could have done such a dumb thing as pull a knife on me in the first place. After all, what if I'd had one, too?

I was a little wary of him at first, given our history, but we had no problems with each other at all. We weren't chums by a long shot, but he treated me with the sort of casual friendliness you'd use with any neighbor you didn't know too well and I treated him the same way. I guess he figured we were even and he was willing to let bygones be bygones. That was fine by me. I envied how self-assured he looked when he gave speeches and began trying to copy some of the mannerisms and gestures he'd use during his speeches. It wasn't easy, but by the end of the school year I'd at least learned how not to show how petrified I felt every time I had to make a speech. Sometimes you learn things from the most unexpected teachers.

Part of the reason high school felt different was probably because *I* was different. There's a lot of horseplay that goes on in a football team's locker room and this had a kind of socializing effect on me. I wasn't as outwardly grim and serious after I started playing football. Inwardly I was still pretty serious, but I had learned how to laugh again and tell jokes and, basically, be a more regular kid. I talked to people more often in the hallways and generally just became friendlier. At the same time, there's a kind of status that goes with being a football player. Kids who aren't athletes treat you differently in a nice way. I don't really know why they do, but they do. If you're an athlete, you're a celebrity of sorts and I found I sort of liked being a celebrity. I didn't let it go to my head – after all, I wasn't a starter yet – but it made me feel at ease in school, which was another new experience for me. That old smoldering rage I'd carried inside me for such a long time had finally started to go out.

Something else new about high school were the hoods (hoodlums). There had always been boys in school who were basically bad kids. I'd known most of them since I was in kindergarten. Individually they had never been anything to worry about in the lower grades. In high school, though, they had started to socialize into a kind of gang. They weren't the Hells Angels by a long shot, but they tended to travel in a pack and liked to gang up on smaller boys or boys who were scared of them when they could catch

somebody alone in the hallways or the bathrooms. Individually they were cowards. In a gang of seven or eight, you needed to watch out for them. But they never gave me any kind of trouble. I was a football player. My gang was bigger than theirs and a lot tougher and they knew it.

After football season I needed a new sport for the winter and the choices were wrestling or basketball. The head football coach was also the wrestling coach, and he pretty much made it plain that wrestling rather than 'round ball' was the only manly sport for any self-respecting football player. On the other hand, there were a *lot* of really good wrestlers and not all of them were on the football team. There's a big difference between tackling and wrestling. I didn't have any illusions about my ability as a wrestler. PE class in junior high had given me all the evidence I needed to know my chances of making the wrestling squad were slightly poorer than my chances of being elected mayor of Maquoketa. In basketball, on the other hand, I might have a shot at making the team. I chose basketball.

I'd never had the same passion for basketball that I had for football. In my heart of hearts I actually agreed with Coach about wrestling being intrinsically superior. But you use the talents you have and whatever talent I might lack in basketball, the lack was even bigger in wrestling. I *did* enjoy playing basketball and after football season the running and jumping and conditioning they put us through during basketball practice wasn't all that bad. If I remember correctly, I was the only football player who chose basketball over wrestling.

There were a dozen spots available on the JV basketball team, although during games a team was only allowed to let ten players dress. The five guys who made the starting squad were much better basketball players than I was, no doubt about it. Shooting, ball handling, defense – you name it. The margin between me and the next five guys was smaller, though, and I did manage to make the team. My big weakness was accuracy. You don't score points unless you put the ball through the hoop and we had ten guys who did this more often than I did. Adding to this was the fact that I was one of the short guys so I played guard. The lanky behemoths who played forward and center didn't have to have really great ball handling skill, but a guard did and the other shorter guys on the squad were just that much better at ball handling than me. The coach said I played basketball like a football player and I couldn't really argue with that.

Consequently, I made the team but couldn't break into the top ten. One of the starting guards would have to get injured before I'd see any game action and, fortunately, none of them ever did. Not enough, anyway, to not be able to play. I didn't have any hard feelings about being third string; none at all. These guys were my friends, this was *their* Big Sport, and I was happy just to be on the squad. Like I said, I never had the same passion for basketball as for football. And it was better to be third string with the team than to be a spectator in the stands. That's the way I felt about it. A sport is, at the end of the day, just a game. The important part about a sport is *taking part* in it. Everything else is icing on the cake.

V. The Nixon Years

Nixon won the presidency and the liberals won control of the Congress. Since I didn't like either one of them, and since what each of them wanted to do was wrong but in opposite directions, I figured it was about as good an outcome as could be hoped for in 1968. Maybe the extremes would cancel each other out. I had some hope that the center *would* hold as a consequence.

Turned out that was wrong. 1969 was the start of something nobody had ever seen before: a recession *and* inflation both going on at the exact same time. With all the uproar still going strong over Vietnam and Black Power and the radicals and, something else we started hearing more and more about, drugs, this new economic wonder was hard to see for awhile. It would eventually become known as Nixonomics and it would get worse for a long time before it got better and it would lead to still worse things to come.

1968 had ended up being an awful year for America but a pretty good year for me personally. It ended in what was probably the best way that star-crossed year could have ended: the Christmas orbiting of the moon by Apollo 8. We were getting close at last.

It is possible to hide from the big world inside the world of athletics, and if ever there had been a time when the big world needed to be hidden from, it had been 1968. Not that the big world was trying to make this easy. 1968 was a year when the extremists from both sides were trying to rally supporters to their respective causes. But there was no choice to be had here; both sides were just *wrong*. No matter which side I might have picked, I'd be enlisting to hurt somebody. America's social contract was in shreds and nobody seemed to remember the important aims, the things that *should* have been what we came together to do something about. It all made me feel very, very small and very, very insignificant and I shut that world out by immersing myself in all the things closer to home. It was at this time that I was taking the moral leadership lessons that were part of the CAP education program, and from these lessons I was starting to learn about great men who had a lot to say about *right* and *duty* and what it meant to be a *citizen* of your country. There was an American philosopher, George Santayana, who had said,

> Fanaticism consists of redoubling your efforts when you have forgotten your aim.

I saw fanaticism at work in the tumult of 1968. But an even bigger impression was made on me by something a man named John Stuart Mill had written:

> A state which dwarfs its men in order that they may be more docile instruments in its hands, even for beneficial purposes, will find that with small men no great thing can really be accomplished.

To me this seemed to be exactly what Nixon and his Republicans and what the liberals who called themselves Democrats wanted to do. They each, in their own way, had their ideas about what to do about all the troubles and they each wanted to just force everyone to do as they wanted. How very different this was from President Kennedy's *ask what you can do for your country.* It was the difference between wanting to *rule* us and wanting to *lead* us. I would have been happy to follow a wise leader who was seeking to accomplish the six true and only aims of American government, which are

To form a more perfect union
To establish justice
To ensure domestic tranquility
To provide for the common defense
To promote the general welfare
To secure the blessings of liberty to ourselves and our posterity.

But these men who would be our rulers did not seem interested in doing *all* these things and doing them all together. The liberals were the worst of the two because nothing they wanted to do would do all of these things for all of us; they would take some of it away from some of us to give it to others of us. And I wasn't so sure the Republicans would do *any* of them. I *was* sure they would *not* do some of these things even at best. Between my parents, coaches, and teachers I had all the rulers I needed. I was not in the mood for any more of them.

There was still that unsettled affair of honor hanging between me and Rusty. We didn't run into each other very often; unlike junior high, the high school building was pretty spread out and I don't remember he and I being in any of the same classes at the same time. Whenever I did see him, I'd remind him what I thought about him and he'd usually lip off right back at me. But I couldn't goad him into moving past the posturing and name-calling stage of the ritual. *I* couldn't initiate the next step because I was an athlete and he wasn't. There was kind of an unwritten rule that someone who was on the team couldn't start a fight, especially with somebody who wasn't on the team. Technically, though, posturing and name-calling wasn't fighting; it was arguing. Rusty was still taller than me and, now that I'd dropped so much weight, he had a pretty fair size advantage. If *he* was the one who got physical first, we could have our fight without me disgracing myself or the team. But he just wouldn't do it.

We got close just one time though. It was at the end of the school day and I happened to run into him in the crowded hallway near the front door. As usual, I had some things to say about him I thought he

ought to know. He lipped back and the name calling escalated in full view of an amused audience of boys. We were about thirty feet down the hall from the Principal's office. I don't know if it was the presence of all those spectators or if Rusty had just had enough of me, but I called him something, his faced reddened, he called me something back and then he flipped his fingers up, thumbing me under the nose.

At last! At long last! He had put his hands on me and taken that next step in the fight ritual. Thumbing somebody's nose wasn't actually shoving, but it counted just the same. In fact, it was worse because that gesture was a well-recognized insult that as much as said, 'let's fight.' *Now* I could hit him. I shoved him backwards hard with both fists to his chest and went after him.

But, oops, I'd forgotten something. We were standing right in the middle of the school hallway and there was another unwritten rule that said you could *never* have a fight in the hallway. When there was a fight in the hallway *everybody* who was there got into trouble. Not just the combatants; everybody. The innocent with the guilty. It was one of the ways teachers had of discouraging trouble on the school grounds. What we were supposed to do was take the fight someplace else.

But in the heat of the moment, I'd forgotten about that rule and I'd forgotten we were only thirty feet from the Principal's office. As I lunged at Rusty, a half dozen boys grabbed me and held me back. Two more stepped between Rusty and me to make sure he didn't try anything. Rusty walked away. Quickly.

The guys wouldn't let go of me until he was out the door and out of sight and they were sure I'd calmed down enough that I wouldn't go straight after him. One of the boys was the kid from the Zioneers. He watched Rusty disappear then turned to me and remarked in a calm voice, "It would appear Rusty is afraid."

"He's a gutless so-and-so," I said.

We never again came close to having a fight. In fact, I don't remember whether or not I ever saw him again after that one. But I was finally satisfied. By starting a fight – which technically he had – and then running away instead of arranging a more suitable place for a duel, he had disgraced himself in front of that whole crowd of boys. The scales of honor were balanced now. Of course, he'd also – probably without even knowing it – made it so I *couldn't* pick on him anymore. You see, it is disgraceful to pick on a coward. Anyone who did was marked down as being a lousy bully. That was the code we lived by.

There was one interesting final note about the Rusty affair. That summer his family moved away somewhere. When I say moved, I mean *moved*. They even took their house with them. That was pretty amazing. I didn't even know they could move a whole house. But they can. A huge machine came one day and lifted the whole house right off its foundations, leaving nothing but a hole in the ground. Everybody in the neighborhood came and watched. I never found out where they had gone and I never really even wanted to know. I was pretty sure it didn't have anything to do with me. Pretty sure. I never saw him again after that. □

After basketball season ended and spring came, I found myself without a sport to participate in. The only thing available in the spring was track and field, which I had no interest in at all. I'd go to the track meets when they were in town, and I'd cheer for our team. But track and field just wasn't for me. In those days soccer was nothing. It would make its appearance every once in awhile in PE, but nobody took it as a serious sport. It ranked two or three notches below dodge ball – which was some fiendish invention that was probably dreamed up by an adult who liked to watch boys hurt each other as much as possible. In theory the object of soccer was to kick the ball into this big net. In practice, it seemed like the real object of the game was to kick as many people in the shins as possible. I hated soccer.

And so it was that I didn't have practice after school in the spring. Larry, the older boy who had introduced me to the CAP, suggested I should come with him and audition for a part in the school play. There was a high school drama club; it was called The Thespians. Larry belonged to it and for some reason he thought I should give it a try too. I wasn't so sure about that. It didn't seem like the kind of

thing a football player should do. “There’s girls there,” Larry said. Oh. Well, in that case . . .

The Thespians club was run by our English teacher, Mr. Railsbach. He was an interesting character. I’d never had another teacher quite like him. Prim and a bit prissy, he was a very small man and always kind of seemed like he never thought you measured up to some standard. At first I got the idea he was a pretty unfriendly guy. But it turned out he had kind of a subtle sense of dead-pan humor. He could make me laugh at the most unexpected times, and when he did there’d be this ghost of a smile on his face and his eyes would twinkle. As different as he was from anyone else I knew, I came to like and respect him quite a bit. Mr. Railsbach was the producer and director of the spring play the Thespians would put on every year. That night he was casting director.

There were a lot of kids there that night at the ‘tryouts’ – as I thought of it – and, just like Larry had promised, there were a lot of girls. Most of the kids were juniors and seniors, but I wasn’t the only sophomore there. I hadn’t had any idea the Thespians was such a popular activity. Not all the kids were there looking for a spot as one of the actors. I found out in talking to some of the girls that there were a lot of ways to participate besides acting. They needed kids to design and build sets, make costumes, be makeup artists, manage the set, run the stage lights and curtains – all kinds of stuff. Apparently Mr. Railsbach’s productions rivaled Broadway. The Thespians were an excited, happy group.

I didn’t know it, but I’d happened to sit down with the group who were there specifically to audition for the cast. I’d just basically followed Larry and sat down where the prettiest girls were sitting. I didn’t even know what the play was going to be. We were told the play was going to be a Peter Ustinov comedy called *Romanov and Juliet*, which I’d never heard of. I found out I was auditioning when Mr. Railsbach handed me something to read.

I’d just been watching the auditions after the meeting started. Kids would stand up one by one in front of the room and read whatever Mr. Railsbach had handed them. They were given a couple minutes to look over whatever it was and then they’d act out whatever it said. I thought most of them were pretty good, too. In Mr. Railsbach’s English class he made us read stuff out loud a lot and always made *how* we read it a big point. It was pretty obvious these kids had soaked up his lessons well when they had been in his class. He had the older kids audition first, so when, to my surprise, he handed me something to read I had a pretty good idea of what I supposed to do. I don’t remember any more exactly what I was asked to read, but whatever it was I got up and gamely did my best to imitate what the other kids had been doing. I wasn’t actually expecting or even particularly looking to be cast for the play but I didn’t want to embarrass myself, especially in front of the girls.

After everyone who wanted to audition had auditioned, Mr. Railsbach announced, one by one, who had gotten which part. Each time a kid’s name was announced there was a happy buzz and he or she would be congratulated by the other kids. The Thespians, I decided, had pretty good team spirit. Then, to my amazement, Mr. Railsbach announced *my* name. I was to be ‘the Archbishop,’ a speaking part. I was the only sophomore there to get a speaking part.

Before I could get over being flabbergasted, I found myself being hugged and congratulated by all the girls sitting around me. They thought it was just *wonderful* a little *sophomore* had been picked for one of the cast. I was so surprised at being hugged that even though I was grinning, my face turned all red. The girls thought *that* was *so adorable* and they kind of adopted me right then and there. That made me forget about any idea of turning down the part. The senior who had been cast in the lead role of Juliet was the prettiest girl in high school, and if she wanted to make me her pet boy – well, that was A-Okay with me. For her I’d gladly brave getting up on a stage in front of a whole auditorium of strangers.

After the cast had been selected the remaining kids signed up for doing the many and various other jobs that were essential to putting on one of Mr. Railsbach’s productions. Not surprisingly, the boys tended to want to build sets and manage the stage, while the girls tended to want to be the makeup artists or design and create the costumes. Some of the kids were ‘understudies’ – backup actors who could step

in if for any reason one of the main cast members couldn't perform the night of the play. I had thought some of the plays in our playbook on the football team had been complicated; that was nothing compared to how complicated all this was.

Larry had gotten a part too. He was 'the Russian Spy.' I was glad of that, not only because he was my friend but also because I barely knew – or didn't know at all – most of the other kids. It was good to have a comrade in the cast because I was slowly starting to appreciate just what I'd gotten myself into. And not just 'into.' I'd come to this meeting just to meet some girls and all of a sudden I wasn't only a Thespian; I was in the 'starting lineup.' *Rick,* I thought to myself, *you sure better not screw this up*. All of a sudden facing a whole squad of charging fullbacks seemed less intimidating than being a Thespian.

I went home that night carrying a script, which I'd have to learn before the rehearsals started in a couple of days. Mom greeted the news I was in the school play with a kind of mild surprise and casual approval. Melody was a bit more expressive. *"You?"* she said. She walked away laughing and shaking her head. I didn't tell Dad about it; I had a pretty good idea of what he'd think about the whole thing. I just hoped Coach and the guys on the football team didn't go to school plays.

Fortunately, my part was the smallest speaking role in the play. I would only have to appear in two scenes. If you're not familiar with *Romanov and Juliet*, it's a spoof on *Romeo and Juliet*. It takes place in 'The Smallest Country Left in Europe' and the lead character, the General – who was the latest leader of the country after the latest of their on-going revolutions – spends the play trying to figure out how to keep the country from having to become allied with either the United States or with Russia. He hits on the idea that the only way to do this is to get the American ambassador's daughter, Juliet, and the Russian ambassador's son, Romanov, to get married. My character, the Archbishop, is a super old and somewhat senile guy with an interesting hearing problem. He can hear just fine if you speak to him in a soft whisper, but he's deaf as a post if you yell. He's pretty much in his own world and unaware of anything that's really going on around him, and the General decides the way to get the ambassadors' kids married is to substitute them for a couple of statues during a ceremonial 'wedding' I was to perform in the last act. The senile old Archbishop would never notice the difference. It's a pretty funny play.

We rehearsed every night for about a month before the scheduled night of the play. Mr. Railsbach proved to be a tough, demanding, exacting director and he got us whipped into shape pretty good. By the time 'opening night' arrived, he had us as ready as anybody could possibly be. I don't think anybody blew even a single line during the performance.

I did have one big question about my part during rehearsals. In the big wedding scene I'm performing the ceremony kind of in the background while all kinds of uproar is breaking out all around me. The ambassadors are shouting to stop the ceremony and soldiers with guns are forcing them to stand back and not interfere. The General shouts at the top of his lungs, "The Archbishop is stone deaf!" and, of course, I can't hear any of the commotion, still think Romanov and Juliet are statues, and when he kisses the bride I proclaim it to be a miracle – which was one of the biggest laugh lines in the play. The problem was there were no lines for my character during the actual ceremony. The script just said to ad lib it.

I asked Mr. Railsbach what that meant and he said I was to just fake it but under no circumstance was I to use any real Catholic mass stuff. He didn't want to offend anybody in the audience. His suggestion was that I kind of go 'blah, blah, blah' during the ceremony, but that sounded awful dorky to me. What I did instead was translate the words to 'My Country 'Tis of Thee' into Latin and work them into kind of a chant. I figured nobody in the audience except the Latin teacher and the odd priest or nun here and there would know what I was saying anyway, and this way it *sounded* like a real ceremony. It worked so well that after the play a couple of the Catholic guys I knew asked me if I wasn't worried about being excommunicated. The first time I did it during rehearsal, Mr. Railsbach demanded to know just exactly what I thought I was doing, but he calmed down and even thought it was funny when he found out it was just 'My Country 'Tis of Thee.'

The kids who built the sets and made the costumes and did the makeup work were just amazing. They certainly rose to meet Mr. Railsbach's exacting standards. I mean, there just wasn't anything *amateur* about any of it. For the first full dress rehearsal, the girls who put the makeup on me outfitted me with a long white beard, sprayed stuff in my hair that turned it snowy white, and put makeup on my face that made me really look like I was about two hundred years old. Looking in the mirror, *I* couldn't recognize me, so I knew nobody in the audience was going to recognize me either. I had a perfect disguise, and that made me a lot less nervous about the looming prospect of standing up there in front of the whole town. I was jittery enough about that as it was, and when the play went on I tried very hard to ignore all those people sitting out there in the dark and just focused on what I was doing.

One thing nearly did go wrong, though. Larry, the Russian Spy, has an attack of conscience during the play and becomes a monk. During my first appearance, he shows up walking on his knees behind me and lifting this enormous cape I was wearing. The cape was sprinkled with thousands and thousands of these tiny little paper glitter things. At one point where I'm talking to the General – who is astonished to see the Spy now serving as one of my monks – I'm telling him about what a good monk Larry is. I even hint that I think he could be the next Archbishop. At my big line, "*Maybe,* when I am gone . . ." Larry was supposed to cry out, *"Oh, no!"* and kiss that cape. He did, and he got about a hundred of those little glitter things in his mouth. Through the rest of the scene I could hear him quietly going, "ptui, ptui" as he tried to spit them out. It was so funny the General and I had all we could do to keep from laughing out loud, but somehow we managed it and got through the scene.

Backstage right after the last act and before curtain call, 'Juliet' came rushing up to me all happy and smiling and telling me how wonderfully I'd done. She gave me a giant hug and a great big kiss on the cheek that made me blush cherry-red. I felt thrilled right down to my toes.

This acting stuff was alright. Definitely. □

Cadets Wells (left) and Tim Schroeder (right) at a monument near Kirtland AFB (1969)

For CAP encampment in the summer of '69 the Iowa wing went to Kirtland Air Force Base near Albuquerque, New Mexico. KAFB was home to the 377th Air Base Wing as well as to the 150th Fighter Wing of the New Mexico Air National Guard. As such, it was an all around cooler place than Chanute had been and New Mexico was definitely a cooler place to visit than Illinois. It was my first trip out west and I loved every minute of it.

The training program they had for us at KAFB was better organized and more comprehensive than the previous year's program at Chanute had been. We all had classes in The United States Air Force, Civil Air Patrol and the United States Air Force, Moral Leadership Lectures, Small Arms Firing, and a Leadership Laboratory. I also signed up for two elective courses, the B-52 Laboratory and Weather Squadron. In addition, we had numerous physical activities, marching, and parade to keep us busy.

They housed us guys in a couple of two-story barracks on the base. One very nice addition to the encampment that summer was a squadron of female CAP cadets. Unfortunately, they were housed in a third nearby barracks and cadet sentries were posted at night to see to it the girls' barracks did not find a way to go co-ed after dark. Similar sentries were posted outside the boys' barracks for pretty much the same reason. Naturally, this was not the reason given for our having to pull sentry duty. In fact, no reason was ever actually given to any of us who weren't cadet officers. But I figured the odds were heavily

stacked against KAFB being invaded by either Russians, VC, or coyotes at night.

The sentries weren't armed, of course, except with great big flashlights. Nobody was nuts enough to place firearms in the hands of a bunch of teenagers. I was a cadet tech sergeant by then and NCO of one of the flights in my squadron. Among other things, this meant I had the fun of being Sergeant of the Guard one night while we were there. KAFB at night was big and dark and quiet. With the New Mexico desert stretching out flat all around us and the clear, star-speckled sky above, I had a keen sense of how vast the world can seem at night. You never get this same sense of vastness in Iowa because all the hills make everything seem pretty close. But in New Mexico everything always looks very far away. Sentry duty was mostly pretty dull, more so for the guys posted at specific spots than for me because at least I got to roam around a little from post to post. The night I had the duty we did have one brief flurry of excitement when five guys tried to sneak over to the girls' barracks. We chased them back to our own barracks before they could reach their objective. I recognized them; they were all members of my squadron. But I didn't turn them in with an official report. Instead I told our squadron leader, Cadet Lt. Ball, about it, and he and I had a quiet word with these fellows the next day. Lt. Ball was a very big guy and there weren't any repetitions of the incident after that.

Cadets Wells (top) and Hilyard (bottom) discussing the theory of chain-of-command in the barracks at KAFB (1969)

Although as CAP cadets we belonged to a quasi-military organization, in point of fact we were civilians and teenagers, and some of what you might call the fine points of military order and discipline were lost from time to time on a few of the guys. The officers largely expected us sergeants to see to it that some semblance of military protocol was followed more or less all the time. Barracks horseplay usually proved to be a pretty effective means of accomplishing this. With some guys the fact I could out-wrestle them carried a lot more weight – so to speak – than the stripes on my sleeve did. And word gets around.

Cadet Colonel Nash, our wing commander at KAFB. He was popularly known as Col. Cuddles.

For the most part our officers were older guys, as you would expect from the fact they had been in the CAP longer than those of us in the lower ranks. But not all of them were older than, say, me. This had a tendency to puzzle the airmen serving in the real Air Force that we'd encounter from time to time. These guys generally had no idea who the heck these kids were or what we were doing there. They knew we weren't Air Force and consequently they weren't too sure whether they had to salute our officers or what. One day I overheard two curious airmen ask one of our guys, "How old are you, Lieutenant?" When he answered, "Fifteen," they both just looked at each other with a sort of 'what's this country coming to?' expression on their faces.

One of the boys in my flight was a very young kid who hadn't been in the CAP very long. He was just

a little guy, and I'm pretty sure this was probably the first time he'd ever been away from home because he was awfully homesick the entire time we were at Kirtland. The poor little guy was just as blue as blue could be. I don't remember hearing him say one single word all the time we were there. I felt pretty sorry for him and kind of took him under my wing, watched out for him, kept him company as much as I could, and made sure none of the guys picked on him. After encampment was over he sat next to me on the plane coming back to Iowa. I'd have been happy to stay at Kirtland awhile longer, say about fifty years, but I suspect that for him KAFB probably seemed like fifty years. When the wheels hit the ground and the door of the plane opened, he turned to me with the biggest, happiest, most animated grin I've ever seen and wordlessly pumped my hand up and down with everything he had. He was Home! You've never seen anybody as overjoyed as he was at that moment and I couldn't help but feel happy for him. I could tell from the look on his face that I'd succeeded in being a good buddy to him during encampment. I never saw him again after that, but I've never forgotten him either. He was a neat little kid and I liked him.

Scenes of the runways across from our barracks. Left: a B-52 begins rolling for takeoff. Right: an Air National Guard fighter comes in for a landing.

Flight operations at Kirtland went on regularly pretty much all the time day or night. Our barracks was across a street and a small field from the runway, which might have had something to do with why they were available to house a bunch of cadets from Iowa. The Air National Guard jet fighters only operated during the day, but the B-52s came and went all the time. They never disturbed my sleep at night; we were kept pretty busy and on the go all the time, so when my head hit the pillow I was out like a light. I never heard any of the guys complain about the noise from screaming jet engines. As far as we were concerned, our barracks were in the perfect spot. You couldn't *get* any closer to the jets without actually being in the Air Force and that was the way we liked it.

The B-52 was an awesome machine. It defied belief anything so huge could actually fly. But they could; I saw it with my own eyes. I got to see one up close – I mean actually touching it close – in one of my training classes. The *wheels* were bigger around than I was tall. Its wing span was incredible. The wings were so long they actually drooped when the plane was sitting still on the ground. A football thrown from one wingtip to the other would have made a pretty exciting long distance pass. The cockpit stood so far off the ground the pilot could have gone eyeball to eyeball with a dinosaur if there'd been any around. I would have dearly loved to have the chance to actually go up in one of them but, unfortunately, our training didn't go quite that far.

One exercise that was hugely popular with everybody – or at least with all the boys; the girls weren't into it – was small arms firing. Small arms in this case meant the M1 rifle. They took us to a firing range where an Air Force sergeant gave us instructions on the M1. The only weapon I'd ever fired was Dad's

small 22 caliber single-shot squirrel rifle. The M1 was bigger, heavier, and packed a lot more of a kick when it was fired. It took a little getting used to. After the sergeant had instructed us, including some helpful tips for avoiding having your shoulder knocked off when you fired, he let us cut loose and scare the targets. We fired from the prone position and my first several shots went all over the place. But gradually I got used to the sighting and the feel of the weapon and my shots became better grouped and closer to the center. I even managed to put one round through the bull's-eye. They let us have our targets after we were through scaring them as souvenirs. The grand finale was a demonstration of the M16. The sergeant showed one to us and demonstrated it in both semi-automatic and full automatic modes. When he cut loose on full automatic it was pretty awesome. The M16 fires a *very* nasty bullet. It's designed so that after it penetrates the human body it just tumbles around inside, ripping its victim's internal organs to shreds. Anybody shot in the torso with an M16 round is going down and he isn't getting up again.

My pal Alan from Waterloo, IA. Left: horsing around in the barracks. Right: sightseeing in the mountains near Albuquerque.

View from the mountains near Albuquerque.

I had been the only cadet from Maquoketa to go on the Kirtland encampment and had expected that fact to put something of a damper on the fun. But I hadn't counted on meeting Alan. Alan was a cadet from the Waterloo flight. He was the same age as me and was one of those kind of kids you meet and just immediately take a liking to. As a rule I made friends pretty slowly, but Alan and I became pals before the first day at Kirtland was done. He was in my squadron but in a different flight. We just hit it off right away and spent what little free time they did let us have chumming around together.

Albuquerque isn't far from a small mountain range and one day they let us pile aboard a couple of Air Force busses and go sightseeing. I had seen mountains before, during the drive to Alabama. But those could not hold a candle to the rough scenic beauty of New Mexico. Our time was our own for this sightseeing

trip so long as we got back to the bus on time, and Alan and I clambered around all over the place drinking in the views. I had thought the desert had looked incredibly vast; it was nothing against the splendor of the High View, from which the countryside receded endlessly, turning more and more blue until finally it blended with the sky and the clouds on the far horizon. It was impossible to tell where in the far distance the earth ended and the clouds began. In elementary school they had taught us 'America the Beautiful' and I had sung the line 'purple mountain's majesty' many times. I had always assumed that was just poetry. No. In the distance they really are purple and they really are majestic. New Mexico shared its enchantments with Alan and me one warm summer day in 1969 and for a few brief hours banished the troubles of the world to somewhere far, far away. God had another special place. After Kirtland I never saw New Mexico again and I never saw Alan again. They were summer friends. But sometimes summer friends last a lifetime. □

Bill was doing well with IBM and when he came home for a visit that summer he was driving something new and exciting: an MGB sports car. I had my instruction permit by then, which allowed me to drive provided an adult was with me. Good old Bill. It took him about two seconds to see I wanted to get behind the wheel of that car pretty bad. We climbed in and off we went.

Driving an MGB feels like you're sitting on the ground. I took it pretty easy at first, getting a feel for the car and figuring out how to run through the gears. Then it was time to *drive*. An MGB isn't meant to sit still and look pretty. It's meant to break the sound barrier. I suspect it didn't take Bill too long to start having second thoughts about how good an idea this had been. I'm not a reckless driver, you understand. Never have been. But speed limits? Speed limits are for pussies and old men. Move over, Chuck Yeager. The Wells brothers are coming. Somehow Bill forgot to let me drive his car again after that.

A couple days later I was stretched out on the couch in the living room reading something when Bill came in and sat down. He asked me what I planned to study in college. I still didn't know if I'd even be able to go to college, but I knew what I wanted to learn about if I did get to go. "Computer science," I answered. The University of Iowa had a program in computer science; it was part of their math department. Bill frowned at me. "Why do you want to study something so limited?" he asked.

Limited? How could computer science be limited? What I didn't know was that at that time 'computer science' really meant nothing more than 'computer programming,' which was not at all what I had in mind. I wanted to know how these things *worked* and that's what I told him.

"Then you should study electrical engineering," Bill said. "Those are the guys who design computers."

I hadn't known that. Okay. Bill would know better than I would about this sort of thing. After all, he'd already been to college. Electrical engineering at the University of Iowa it would be. But he shook his head again. "The engineering school at Iowa City isn't very good," Bill said. "You should go to Iowa State. That's where the good engineering program is." I hadn't even known there *was* an Iowa State University. The Hawkeyes ruled eastern Iowa. But, again, Bill would know better than I. He'd not only already been to college. He worked for IBM, the biggest and best computer company in the world. If this Iowa State place was good enough for IBM, it was good enough for me. Just like that, my college plans were finalized.

But, "I'm not sure I'll be able to go," I said. He asked why not and I told him about how worried I was we couldn't afford for me to go to college. "You don't worry about that," he said. "You're going."

I felt like a giant weight had been lifted off my shoulders. My brother always kept his promises. □

Since he had gotten out of the Army, Bill had started to put on a little extra weight and that really bugged him. Secretly, I was very amused by this. When I'd been a Bubba, he'd ridden me mercilessly about it, calling me "fat brother" in a pidgin Indian accent. I'd hated that. Now *I* was in the best physical condition in my life and *he* was "fat brother." The irony was so sweet I could taste it. And it got better.

"You know," I said casually when he mentioned something about his own weight, "there's a cinder

track just outside."

He got my point and outside we went. Goodenow Field was locked up, but we climbed over the fence, just like Lyle and I usually did, and around the track we went. Once around. One and a half times. Bill slowed to a walk and I kept going. As I started my third lap I noticed he was jogging again. I caught up to him at the start of my fourth lap. "Something wrong?" I asked him as I came up beside him.

"Had a rock in my shoe," he replied. I noticed he was puffing quite a little. "Is it still in there?" I asked him as I went on by him.

He started pushing himself and caught up to me. He kept up for another half a lap. Then he broke and started walking again. I waited for him back at our starting line as he walked across the football field. He was really puffing now. "Maybe you shouldn't over do it," I suggested. He nodded and we climbed the fence again to go back to the house. I was grinning from ear to ear.

Mom was in the kitchen when we came in. "How was your run, boys?" she asked.

Bill replied, "I had to stop twice. The first time because of a rock. The second time because I was dying."

Butter would have melted in my mouth. □

Six days after I returned home from Kirtland, I was doing the same thing the entire rest of the world was doing. I was fixed to the television set as a spidery looking spacecraft touched down on a sea of gray dust and we all heard the words, "Houston, Tranquility Base here. The Eagle has landed." We were on the moon. At long last. We were on the moon. I felt so proud of my country and all of us in that moment I thought my chest would explode. *We* had done it. We had gone to the moon. We had answered President Kennedy's call, the decade of the sixties wasn't over yet, and *we* had gone to the moon.

Lao Tzu, a great Chinese philosopher who had lived six hundred years before Christ, said, "When the best leader's job is done, the people say, 'We did it ourselves'." We had done it ourselves.

We had reached the moon. □

Bellevue, IA, on the Mississippi River.

In August of '69 I was sitting on top of my world and happier than I'd been in years. I had a lot of big plans for my upcoming junior year at Maquoketa High. That was why I was dumbstruck when Dad made an announcement from out of the blue: We were all moving to Bellevue and starting a bakery.

I was shocked. Move to Bellevue? Why? Maquoketa was a small town, but Bellevue was even smaller, around two thousand people. It sat on the banks of the Mississippi River and had a reputation, like most river towns, for being a rough, uncouth place. Everybody I knew thought it was a nothing town and I didn't know a single one of the 'river rats' who lived there. In an instant, my world was crashing down around me. Why did we have to move to Bellevue? I demanded an answer.

Dad tried to explain how the recession had wrecked the housing market and we had to do this. I couldn't believe it. Hadn't we just barely gotten done building a new house of our own? Dad must have known from the look on my face how I felt about this. He tried to soften the blow by telling me how in a small town I'd have a better chance of making the team – which was completely illogical since I *had* made the team. Somehow he'd managed to not know that? Shock started giving way to anger.

Besides, Bellevue didn't even *have* a football team. He didn't know that either?

Adding to the shock was the way this had come from out of nowhere. I hadn't heard one word about it, hadn't even known Dad was thinking about it, until he told me. He and Mom *must* have at least discussed it. How could I not have even had a clue what Dad was thinking until now? How could he just pull the ground out from under my feet like this and not even ask me how I felt about it?

But he wasn't asking me, even now. He was telling me. We were moving to Bellevue and there wasn't a single thing I could do about it. I was a kid and kids were property with no rights at all. There wasn't any justice to it, but that was the way things were. If an adult decided to ruin your life, it was ruined and that was that. The shock was so great I didn't even know what I felt at first. But the dead ashes of my old smoldering inner anger would soon rekindle and return to be my constant companion again.

My view of Bellevue from my room above the bakery.

Nobody even bothered to tell me *when* this awful thing was going to happen. It turned out to be almost immediately. I found out when Mom came home from work a day later and got mad at me when she found I hadn't started packing my things for the move, which was to be in two days. What? I should have taken a class in mind reading last year? It turned out Mom hated the whole idea at least as much as I did. I guess Dad had discussed it with her the same way he had with me. The only person who wasn't projecting how she felt about all this was Melody. I never did know whether she was happy, mad, or indifferent about it.

There didn't seem to be much point in trying to take everything I owned with me. We weren't even going to live in a house in Bellevue. We were going to live in a crummy apartment above the bakery. My room overlooked an alley and the ugly, squat buildings of downtown Bellevue. It was barely big enough for me, much less big enough to hold the things I owned. I gave a lot of stuff to Lyle's little brother Steve and threw away most of the rest of it, including all my models. About the only things I kept were my clothes and my books. And my football letter. It was like going to prison and that was pretty much exactly the way I felt about it.

The bakery part of the building downstairs hadn't been a bakery before Dad bought it. It had been a doctor's office or something. It was congested with a lot of interior walls and small, useless rooms that made it hard to run the baking operations. Over the course of the next few months, Dad had all these interior walls ripped out, leaving only a single wall separating the front room and its display cases from the bakery itself in the back. He didn't ask for my help in doing any of this, and I didn't volunteer it. I didn't want to have anything to do with this cursed place. Being here wasn't *my* idea. When we first moved in, the downstairs was already set up as a bakery, with oven, proof box, mixers, the donut fryer, work benches, etc. tucked into wherever they'd fit and all ready to go. It was immediately obvious to me Dad had been planning this for quite some time. That made me even more resentful.

But I was going to have something to do with this cursed place whether I liked it or not. Dad made that clear from day one. When I wasn't actually going to school, I was going to be working in the bakery. That meant every day including Saturdays and Sunday mornings, although on Sunday morning there wasn't anything to do other than run the front room and sell whatever was left over from Saturday. Apparently Dad expected me to rebel against all this and efficiently cut out the middle man by having his argument with me all in his own head before he told me. As a result, when he did tell me he was already mad at me for arguing with him about it. I didn't say a word, but inside I was seething.

I guess he didn't expect me to be all that useful anyway because he hired a local kid named Kennard to help him with the actual baking that August. My duties were limited to slicing bread in the bread slicing machine, lugging hundred pound sacks of flour and fifty pound boxes of shortening up from the basement, and manning the sales counter out front. It turned out Kennard was going to be one of my class mates when school started. He was a tough but likable kid and I guess he must have been a good worker because Dad didn't lose an opportunity to tell everyone what a good kid he was. Usually in front of me. How I ever managed not to end up hating Kennard I don't know. But I didn't blame him. I blamed Dad.

Unfortunately for Dad, Kennard quit just as soon as school started and he didn't have any choice but to have me start helping with the baking. Baking is pretty much a night job. Dad usually went to work around midnight or 1 A.M. and normally he'd be through by one or two in the afternoon. I'm pretty sure he'd have made me go to work right when he did but Mom would have had a fit about that. In her mind, my doing well in school was infinitely more important than any of Dad's 'family business' fantasies. It's pretty tough to do well in school if you're asleep in your seat.

Consequently, I didn't have to report for work until usually around five o'clock. My actual starting time varied a bit because it was driven by when the donuts were ready for frying. There was a sheet metal ductwork pipe running up from the bakery to my room, and when Dad was ready for me he'd pound on that pipe to wake me up. I'd climb out of bed, thrown on my white baker's uniform, and troop downstairs to fry to the donuts. I'd work until it was time to go to school. Then I had to race back upstairs, change into my school clothes, and hurry to catch the bus to school. Even though Bellevue was a tiny little speck on the map, the high school was located on the highway clear out at the very edge of the city limits and it was too far to walk. I wouldn't even have time to properly wash up, so I'd go to school smelling of bakery odors and with my hair greasy from the fumes of the donut fryer. Even after I got my driver's license a few weeks later and starting driving our car – a little blue Ford Falcon – out to school, I still didn't have time to clean up first because having my license just meant I had to work a little later every morning. I came to wish I had PE first thing in the morning every day so I could at least have a shower.

To say I was in a constant bad mood from all this would be like saying Attila the Hun wasn't the friendliest neighbor you could have. I expected to be challenged by somebody out at school within the first few days. After all, I was 'that Maquoketa kid' and I didn't have one single friend in that town. The new boy always gets challenged. The other boys want to know where he's going to be in the social hierarchy. They want to know what he's made of. In my case, the Bellevue kids didn't like Maquoketa kids anyway. They knew we didn't think much of them, and they sure didn't think much of us. Some kind of confrontation was inevitable.

It came the very first day on the bus before it even got all the way out to the school. Some boy made an insulting remark about me with me sitting just a couple of seats away. He meant for me to overhear it. I got up, grabbed him by the hair and shoved my face right into his, nose to nose. I snarled at him, asking if he wanted to die right now or after we got off the bus. Either way was fine with me.

The bus driver yelled back at me to sit down, so I gave this kid a good long glare, let go of him and returned to my seat. I guess all the rage I was feeling about even being here must have shown in my face because when the bus rolled to a stop next to Bellevue High that kid bolted off it so fast you'd have thought he was being chased by wolves. Word of the bus incident must have gotten around pretty fast, because the other kids treaded pretty warily around me for the next few weeks. Not the seniors, of course. But I was a junior and therefore unworthy of their slightest notice. I didn't bother them and they didn't bother me.

I quickly picked up a few facts about my new school. For one thing, none of the kids called it Bellevue High. It was known as P.S. 1 (Public School 1). This was kind of a local joke. There was a Catholic high school, Marquette, and a Catholic lower school, St. Joe's, in town. Bellevue had a very large Catholic population and the cross town rivalry between the schools was pretty much on par with the way the French and the Germans had felt about each other in 1913. Academically, Marquette was by far the

superior school. The only Catholic boys who went to P.S. 1 were either the ones who weren't good enough to pass the classes at Marquette, or whose parents couldn't afford to send them there, or who had reputations for being troublemakers. Not infrequently, I found all three traits in the same kid.

The next thing I found out was that, despite the fact the school was so small compared to Maquoketa, the kids segregated themselves even further into social cliques. The main division was the one between the Putman clan and everybody else. The extended Putman family occupied much of the south side of town. Almost everybody down there, it seemed, was either a Putman or a cousin to a Putman. Although in fact the family was into a lot of different trades, most people described them as being commercial fishermen who wrested a living from the Mississippi. This reputation was in fact being overstated, but what wasn't overstated was that their family did spring from a commercial fishing background, and in a river town commercial fishermen were generally known to be the toughest of the tough. It's a hard life.

The Putman boys were Catholics and, not surprisingly, every one of them had a reputation for being a very tough kid nobody wanted to mess with. That little incident on the school bus had thrown me into the 'tough kid' clique in the eyes of the other kids, so I knew I'd have to do something pretty fast to establish myself with the Putmans or there was going to be big trouble. The Putman clan stuck together and I sure didn't want half the boys in Bellevue out for my hide. I also knew the first move was going to be up to me. I was 'that Maquoketa kid' and either I made friends with the Putmans or they would be coming after me. That much nobody had to tell me. I was sure of it.

The third day or so, I saw one of the Putman boys, Danny, shooting baskets by himself in the gym during the lunch hour. Bellevue didn't have a football team, but they did have a basketball team and the whole town was nuts for basketball. That wasn't too surprising. The only other sports they had were track and field, baseball, and golf. Basketball was the big deal in Bellevue twelve months a year.

Anyway, here was Danny by himself shooting baskets. He was a pretty big kid. Not fat; just big. I strolled over to where he was and, sure enough, pretty soon he missed a shot and the ball bounced my way. I caught it, tossed it back to him, and asked if he minded if I joined him. From his reaction I got the idea not too many kids hung around with Danny other than his brother and his cousins. Danny didn't talk much and he wasn't much of a scholar. That made most of the other kids think he was dumb, which he wasn't. Danny's knowledge was practical knowledge, not book knowledge, and – as I came to find out later – he had a lot of people knowledge. Danny was a mighty good judge of character and I came to find out later on that he was awfully particular about who he'd associate with. If he thought somebody was a bum or a hood or a snob, he wouldn't have anything to do with them and they'd best not try to force themselves on him. Danny was awfully strong even for his size and he had great big fists that he knew how to use. But, like a lot of big guys, Danny was a peaceful guy at heart and pretty much all he wanted was for people he didn't like to leave him alone. Danny was as choosy about his friends as a gourmet is about food.

But I'd find all this out later. That day he gave me a hard, searching look then nodded his assent. We shot baskets and chatted until it was time to go back to class. Turned out I did most of the chatting. Danny only talked when he had something to say. He must have decided I was alright, because he let me chum around with him from that day on. In pretty much no time at all, he was my best friend at P.S. 1. Of course, for awhile he was my *only* friend. We started hanging around together after school. My first meeting with his brother Ricky a few weeks later didn't start out as well.

If you saw Danny and Ricky standing side by side you might not know they were brothers. Danny was tall, big-boned, and pacific. Ricky was short, wiry, and fiery. Like with Danny, I met Ricky on the basketball court. This was during a pickup game a bunch of us were having during the lunch hour. I was on one side, Ricky on the other. The other boys on my team were reluctant to guard Ricky on defense, so I found myself guarding him.

Like a lot of tough kids who didn't go out for athletics, Ricky wasn't as skilled at dribbling, passing,

or ball handling as someone who competed in the sport and practiced a lot would be. I had a pretty easy time guarding him and, I admit it, after the competitive juices started flowing I was starting to show off a bit. Stealing the ball from him, blocking shots, intercepting passes meant for him – I was doing a pretty good job of showing him up and he didn't like it. Finally, I intercepted a pass meant for him and was on my way to making an easy lay up when suddenly there was a hairy, muscular arm wrapped tightly around my neck and somebody riding on my back.

It was Ricky, of course. I stopped dribbling and gave kind of a twist and he hopped off. We stood there about five feet apart, glaring at each other. This being just a pickup game, there was no referee to call the foul and everybody in the gym was just standing there waiting to see what would happen. This was *the* confrontation and everybody knew it. I was still holding the ball in my hands, Ricky was standing there waiting to see what I was going to do. It was my move. I wound back and threw the ball at his feet, hitting him with it in the shins. Challenge accepted.

But my throw didn't knock him down. Ricky immediately began walking toward me with his fists clenched, and I stepped forward to meet him. It looked like we were going to have it out right in the middle of the basketball court, but the coach saw what was happening and yelled, *Put!* – short for Putman. There was no mistaking the warning in his voice and both of us stopped and turned to face him. He made Ricky leave the gym to go cool off, and he made me stay right where I was until Ricky was out of sight and I'd cooled down. It stopped the fight before it had started and the pickup game as well.

As the crowd of kids started to break up, I happened to walk past Ricky's cousin, John. Danny, Ricky, and John Putman were all sophomores, although Danny and Ricky were both a little older than me. John was a tall, gangly, good looking kid who was a year younger than me. He looked down at me – I was quite a bit shorter than he was – and remarked in a strangely casual voice, "You picked the wrong guy to mess with today, Wells." It wasn't a friendly warning, nor, oddly enough, an unfriendly one. But it was a warning nonetheless, spoken in a tone that pretty much said he planned to have fun watching me get what was coming to me.

There was only one thing I could say in reply to it, though. I looked up at him and said, "So did he."

I fully expected to find Ricky waiting for me in the parking lot after school. That's the way it would have played out in Maquoketa. The coach had only postponed the fight, not stopped it. I wasn't scared about what I figured was going to happen, but that didn't mean I wasn't worried about it. In those few minutes in the gym Ricky had looked like he knew how to handle himself in a fight and he *did* have the reputation of being a guy you didn't want to mess with. I noticed that for the rest of the day the other kids kind of kept their distance from me while trying not to *look* like they were keeping their distance. It wasn't a good sign.

After the last class was over, I didn't hurry to leave the building but I didn't dawdle either. I just acted as casually as I normally did, as though nothing in the world was wrong. To do anything else would have been read by everybody as a sign that I was scared, and that would have been the worst possible thing that could happen. Whatever was going to go down in the parking lot, it was better to just face it and get it over with than to give anybody the idea I was intimidated and thereby stretch one incident into a way of life in this town. So I followed my same end-of-the-day routine and walked out into the parking lot like I didn't have a worry in the world.

He wasn't out there. I looked around, and he was just nowhere to be seen. *That* bothered me because I didn't know what it meant. I wasn't idiot enough to think Ricky was scared of *me*. And I wasn't optimist enough to think this meant the entire incident was all over. It wouldn't have been in Maquoketa. Ricky hadn't walked away from me in the gym; the coach had *made* him walk away. There was a big difference. So when he wasn't in the parking lot where I expected him to be, and he didn't show up before I had to get on the bus, I didn't know *what* was going on. Maybe he wasn't the kind of guy who held a grudge. Or maybe he had something in mind for me you couldn't do out in public in the middle of a parking lot. I just

didn't know. I didn't know how to read these Bellevue kids yet.

The next morning when I met Danny at school, he acted like nothing at all had happened between his brother and me the day before. He didn't bring it up, which meant I couldn't either, and he didn't behave like anything at all had changed between us. I already knew Danny was no actor – with Danny what you saw was what it was – so at least this meant one thing: I didn't have to worry about getting jumped by three or four guys on some deserted street, or in some alley, or at the public basketball courts. If there was anything like that in the works, I was sure Danny would have been in on it. After all, Ricky was his brother. So there weren't any plans to gang up on me in the works.

Another cousin of theirs, Steve Putman, was a junior and in one of my morning classes. Steve had the reputation of being the very toughest guy in that very tough clan. He was the one guy *nobody* messed with, period. But when he saw me, Steve just gave me a casual nod, neither friendly nor unfriendly. Again, it was like the day before had never happened.

Later that day, I happened to come upon Ricky himself in the hallway. His manner toward me was definitely chilly and unfriendly, but he didn't do or say anything impolite or aggressive and I didn't either. I sure didn't want Ricky Putman for an enemy if there was any honorable way to avoid it.

It was kind of hard for me to believe, but it turned out the incident on the basketball court really was over. No winner. No loser. Honor intact on both sides. It had been just something that had happened in the heat of competition when tempers flared briefly. Over time I would gradually come to learn that to the Putmans something like that was 'just one of them things' and of no real importance at all. Once tempers cooled off, they just forgot about it and life went on. *That's* the kind of self respect *truly* tough guys have.

But if the confrontation in the gym was a matter of no importance to the Putmans, the same turned out not to be the case in the eyes of the other kids. I found out later there were quite a few of them who had kind of been looking forward to seeing 'that Maquoketa kid' get his at the hands of the Putman clan. When it didn't turn out that way they didn't quite know what to make of it. Eventually I guess a lot of them figured that since Ricky and I hadn't gone to war over it, and since Danny and I were pals, that could only mean I was one of 'them' – not actually a Putman, but no longer 'that Maquoketa kid.' I was now a 'south side kid.' My place in the Bellevue social culture had been settled because I was a show off, Ricky lost his temper, and the coach prevented a fight. Sometimes life *is* stranger than fiction. □

I was sixteen now and after taking the brief obligatory course in driver's ed obtained my first driver's license. The driver's ed training was pretty simple. Mr. Janssen, the driver's ed instructor, had us learn the various traffic laws and watch a horror flick or two featuring bad highway crashes. We practiced driving in the driver's ed car, which had an automatic transmission. I kind of wondered at the usefulness of that; our Ford Falcon had a manual transmission. Finally we got the go-ahead to take the actual driving test required to get our licenses. The test had three parts – a written test, an eye test, and a driving test. The written part was easy. It was a multiple-choice test and the answer was always the civics book answer. All you had to do to pass the eye test was be able to see and know the alphabet. With my glasses on that one was no sweat. The nice lady who gave the eye test then asked me to take it again without wearing my glasses. I told her that wouldn't work very well, but she insisted. I took my glasses off, couldn't see anything but blurs except on the top line where the blurs had some kind of shape, and so my license would carry a little notation "restricted to corrective lenses." The actual driving test made everyone a little tense because it was a 'no mistakes' test. If you did anything wrong at all, you failed. But this, too, ended up not being too tough. All you had to do was drive wherever the examiner told you to, demonstrate you knew all the hand signals, not break any traffic laws, and prove you could parallel park.

So far as I know, everyone who had been in my driver's ed group passed all the tests so we all got our licenses on the same day. For sixteen year olds these licenses were probationary. That meant if you got a ticket for any kind of moving violation your license would be suspended for six months. The next day at school, I found out that six of my driver's ed classmates had been caught doing donuts in the school

parking lot the night before and all six had lost their licenses. They were licensed drivers for less than twelve hours and then went back to being bus riders for another six months.

Aside from not being a bus rider anymore, when I got to use the car that is, there were two main consequences of having a driver's license. One was that I found myself being Dad's chauffeur whenever the two of us went anywhere together in the car. Maybe some small part of this might have been that he wanted to make sure I wasn't a careless driver, but I doubt it. More of it had to do with two other things. One, of course, was he knew I preferred to drive rather than just be a passenger. But the other reason surprised me. It turned out that Dad was actually always pretty nervous about driving in traffic for some reason. I realized this for myself, and later quietly confirmed it with Mom. This nervousness had a lot to do with the fact that on long trips Dad had a habit of losing his temper pretty easily if the least little thing went wrong, which was the main reason Mom didn't like to go on long car trips with him. Why he would have been less nervous about riding as a passenger with his Mario Andretti teenager than doing the driving himself remains a mystery to this day. Maybe it was because driving in traffic, no matter how heavy, has never bothered me. I always kept up pretty good other-traffic awareness, always expected other drivers to do something stupid, and knew in advance what I'd do when they did. They call it 'defensive driving' but I sort of thought of it as boxing taken to a new level. What makes *me* nervous is drivers who keep turning their head to look at everything *but* the road right in front of them.

Mom, on the other hand, was a bit less relaxed about riding with me. She'd always ask me if I wanted to drive, I'd always say 'yes,' and she'd always kind of wince a little bit. She was an awful back seat driver. For that matter, she was an awful passenger seat driver, too. If there was one other car five miles ahead and going in the same direction we were, she'd make sure to point it out to me. "Yeah, I see it," I'd growl. Since she never saw anything I hadn't already seen, it got to be pretty irritating. As a back seat driver, Melody was even worse. Her way of making sure I'd see something was to suddenly yell, "Look out!" in my ear, which is about the worst possible thing anybody can do unless they *want* you to lose control of the car. I never let Melody ride with me anywhere if I could possibly help it.

The second consequence of having my driver's license was I could get the heck out of Bellevue when I wanted to, and that first year I wanted to a lot. Does a convict miss an opportunity to get out of prison if he has the chance? I tried to keep up the close ties I had with my old friends in Maquoketa – which was twenty miles away – and especially with Lyle and my 'second family' over there. But, sadly, this ended up not being very practical. Aside from the fact that such long gaps inevitably existed between when we'd see each other, the plain fact was I wasn't one of 'us' any more. I was a Bellevue river rat now. Nobody said that to my face, of course, but the feeling was there. I was out of the happenings in Maquoketa and it didn't take long for a kind of uncomfortable awkwardness to develop. Eventually I just stopped trying.

I was also trying to keep up my participation in the CAP, but this proved difficult too and eventually proved impossible. I blamed this on all the anti-war sentiment, which continued to rise steadily all during 1969 and beyond. I did manage to pass my "Billy Mitchell" exam and become a cadet second lieutenant. But the unpopularity of the war was spilling over and becoming an unpopularity of all things connected to the military in any way, and this included the CAP. New kids weren't coming in to replace the older ones who were leaving it, and the program in my part of Iowa just basically disintegrated. The Maquoketa flight disappeared first. I tried for awhile to hook up with the Dubuque squadron, where I knew some of the kids from different activities we'd done together, including the Kirtland encampment and the fly in breakfasts we used to raise money for the Maquoketa flight. Dubuque was a co-ed squadron and one of the girls in it – her name was Patty – was, for a number of reasons, my favorite person in CAP. But the disintegration was affecting them, too, and before the end of my first year in Bellevue the CAP just wasn't functioning anymore. To my eyes, it all looked like nobody remembered President Kennedy any more and there didn't seem to be any Kennedy Democrats left, not even Teddy Kennedy. As far as I knew, I was the only one and I couldn't even vote yet. It went way beyond being a terrible shame.

Athletics was another disappointment. I missed football terribly, of course. The only football I could

find was the occasional pickup game at one of the parks on the north side of town, which was how I came to meet some of the kids who went to Marquette and St. Joe's. I never did share Bellevue's passion for basketball, but initially I thought about going out for the team anyway. The problem here was that the basketball team was entirely made up of 'north side' kids. There were a lot of them who were good kids and I liked them. One guy in particular – his name was Mort – was a great guy. But there were also a lot of them I didn't like at all and the feeling was mutual. You can't have that kind of ill feeling on a team; it hurts the team and ends up making the sport not much fun for anybody. So, after a brief time, I decided that, all things considered, it just wasn't worth the effort and I dropped out of organized sports. My all-too-few days as an athlete were over forever. This was something else I blamed on Dad because I really did miss it. A lot. Like it says in a Whittier poem somewhere, *For all sad words of tongue or pen, The saddest are these: "It might have been!"* □

There isn't any school on Sunday and for me that meant a full day's work in the bakery on Saturday. I didn't have any enthusiasm for it, of course. My working there was Duty. The fact that I was harboring a lot of resentment toward Dad didn't change the fact that I felt it was my duty to our family. There had been a time – long ago it seemed, but real nonetheless – when this man hadn't been Dad. He'd been Daddy and we had loved each other. To me that did count for something. So it was that while Dad had a sullen teenager on his hands, at least he didn't have a rebellious one. Well, not openly rebellious anyway. I just did what he told me to do and when he started teaching me more about how to be a baker I listened, learned, and did that too. To me it was just my job. Besides, baking isn't rocket science and the only thing hard about it is the physical labor. If you don't think baking involves much physical labor, *you* lug a few hundred-pound sacks of flour up a flight of stairs or hoist a few more-than-shoulder-width-diameter steel mixing bowls full of bread dough from the floor to the top of a work bench. Then talk to me about how it isn't all that physical.

The better baker I became, the earlier my Saturday starting time became. In what seemed like no time at all, I was down there at work at three o'clock in the morning. In the summer, of course, that would be my start time every day from Monday through Saturday. It meant I didn't have to pull Sunday morning counter duty in the front room anymore, but it didn't leave a lot of room for any Friday night social life. Like dating. At around four o'clock or so, Dad would cook up some bacon and eggs and we'd have breakfast. We'd time this to coincide with when the first loaves of hot bread would be out of the oven and be getting just cool enough to be able to slice. That was also about the time the first hot Danish rolls would be ready too. There's one good thing about being a baker: You eat a more delicious breakfast than anybody else on earth. Eldon, Bellevue's night shift cop, learned to time his patrol rounds so that he'd come by the bakery just about the time breakfast was served. One thing I never did have to put up with as a teenager was being hassled at night by the Bellevue police the way most of my friends were.

The Mississippi carries a lot of barge traffic day and night until the river freezes over in the winter. Sometimes during a rare lull in the work pace, I'd step outside in the cool pre-dawn darkness and watch the barges feeling their way with their spotlights up the river. Every now and again one would get out of the channel and run aground. I could tell when that happened because the spotlight would be swinging around here and there but the barge wouldn't be moving. On a few rare occasions one would bump into the concrete lock at Lock & Dam Number 12, which was pretty much right across the street from the bakery, and then there'd be this big *boom* and the walls would tremble a little.

Around ten in the morning Dad and I would take a break and go next door to the pharmacy for a root beer. We'd sit at the counter, drink our root beers, and chat with each other and with the other people who came by. Dad was apparently surprised and pleased that I'd turned out to be a good baker because he soon started bragging to people about what a good worker I'd turned out to be. That didn't win him any points with me, though. I already knew that I knew how to work; why hadn't he before now? Plus, he lost points with me for sounding surprised about it at first. It was about that time he started hinting at the possibility of me taking over the business after he retired. I know he wanted that. *Fat chance,* I'd think to myself. My prison sentence in Bellevue was only two years. After that would be college and I'd be getting out of here

for good and never coming back. Knowing I wasn't facing a life sentence here was what kept me going.

I remember staying up New Year's Eve of 1969 to witness the 1970s begin. I wasn't celebrating that night. My mood was a mixture of melancholy and hope. The 1960s had begun alive with hope and promise and optimism that for a time had seemed to brighten the world. Then the troubles had come and deepened and brought growing darkness. Now the sixties were over and I deeply hoped the dark times would end with those awful last years. I didn't have any reason for thinking they would. Just a few weeks before we had all heard about the worst thing yet. The newspapers and the television had told us about a place called My Lai where *our army* had gone in and massacred hundreds of people in cold blood. They had even killed all the little children. They had murdered an entire village of unarmed people and nobody was even punished for it. In July I had never been prouder of my country. Now I had never been more ashamed. So I didn't have any reason to think the evil times would end just because of a calendar.

But I hoped they would. □

Without sports I had a lot of empty time on my hands when I wasn't working or in school. We used to hang around the Hotel on the corner a few doors down from our bakery. It wasn't much of a hotel, really just a small diner and adjoining bar with a few rooms upstairs. It was the usual hangout for south side kids for two main reasons. First, it had the only pinball machine in town. Second, the fat woman who ran the diner didn't like us just hanging out there. It was okay with her when we were actually buying things or playing the pinball machine, but she basically just wanted us to drink our sodas or play the machine and then get out immediately when we were through. So, naturally, we'd hang out there all the time just to annoy her. The owner of the Hotel was an equally unfriendly man who would later become a state representative. He wasn't around all that often, but when he was he'd usually kick us out on sight if we weren't actually buying anything right then and there.

Early in the winter of '70 he kicked me out for no particular reason other than that I was a kid, and I treated him to some lip as I left. I went as far as the sidewalk just outside the door, where my continued presence was visible to all inside. Seeing my impertinent show of contempt for his god-like authority, he came outside after me. He grabbed me by my coat then shoved me up against the wall of the Hotel, my feet sliding on the icy sidewalk so much I couldn't fight back. I don't know what he thought he was going to achieve by this. Beat up a kid? Once he had me pinned against the wall he didn't seem to know what to do next. As he was trying to figure out his next move, I knocked his hands away and stood chin to chin with him giving him some more lip. If his plan had been to scare me off, it wasn't going too well for him. His face began to turn red and all he could think of to say was, "How would you like me to tell your father about you?"

Tell him what? That I blew quarters in his dumb pinball machine? "Why don't you?" I brayed in his face. "I'll take you to him and you can tell him everything. Let's go!"

I set off for the bakery, where I knew Dad was still finishing up some end of the day this-or-that, with the Hotel's proprietor kind of trailing along behind me. He must have been wondering just how and when he'd lost control of the situation. He followed me into the bakery and I stuck my head through the doorway into the back and called out, making sure the Hotel man could hear me, "Dad, this S.O.B. wants to tell you something!" I didn't use the abbreviation.

Dad looked up in surprise and came out just as the Hotelier's face flushed purple and he came charging around the counter calling me names and more or less promising me a good beating. Dad, who wasn't known for keeping control of his own temper, intercepted him and added some colorful language of his own. Before he knew what was going on, Mr. Hotel Bigshot found out for himself what it was like to be unceremoniously kicked out onto the sidewalk.

Outside, a crowd of my friends, who had tagged along to watch the show, were screaming with laughter. Over the next few days at school the story didn't lose anything in the telling as they told and re-told it, and for awhile I was kind of a minor hero to the other kids. Even the teachers were overheard

laughing about it in the teachers' lounge. Nobody liked the Hotel man.

Dad never said a cross word to me about the incident, beyond a clear instruction that I wasn't to "take any guff from that S.O.B." I continued to hang out at the Hotel. □

The river was a big part of our lives for a lot of the south side kids. Florida and California kids have their beaches. We had the Mississippi, the Great Father of Waters. For the commercial fishermen the river was their whole livelihood and they fished it twelve months out of the year. In the winter they'd drive their pickup trucks out onto the ice and cut big holes in it so they could continue to fish it. Late in the winter, one of them drove out there, parked his pickup, and walked off a ways and cut a hole. While he was laying his net, there was a huge *crack!* everybody heard all up and down Riverview Street. Everybody looked out on the river just in time to see the ice give way and the pickup truck drop into the water. Fortunately nobody went down with it, but the fisherman lost his truck. The general feeling on the south side was that he should have known better than to drive out there this late in the season.

A lot of us kids lived out there on that river from spring to fall. Most of the south side kids had flat bottom boats we'd go out in. In the spring of '70 Dad came home one day bringing with him a wondrous surprise: A sleek, fast speedboat. Why he'd decided to buy it all of a sudden nobody knew except him. I didn't care why. I was just thrilled to overflowing that he had. She could seat six with no problem at all and she was the MGB of the waves. We couldn't get her in the water fast enough to suit me.

From the very beginning she was practically my boat. Dad hardly ever took her out, but I did all the time. Looking back, I'm not so sure that wasn't what Dad had in mind in the first place. He knew I wasn't happy about living in Bellevue. There was no name painted on her stern, but I called her the *Cindy*. Danny and I took the *Cindy* on expeditions as far down the river as we had gas to get us there and back. Well south of Bellevue we found a little stretch of sandy beach far away from everything that made a perfect spot to anchor and knock back a few beers. Just four to six of us kids at a time, which was what the *Cindy* could carry. It wasn't all that hard for us to get beer; like bottle rockets, there was a black market for that, too. Most of us got to be pretty good little bootleggers, much better than Maquoketa kids.

Bellevue made a lot of its money from the thousands of tourists who would come every year, spring through fall, to enjoy the river and the many pretty little parks and campgrounds that surrounded Bellevue like a necklace. River people know the river, know how to handle boats, and respect the power of the water. A lot of tourists, though, didn't have the first clue that the Mississippi can bite if you don't know what you're doing. Every summer some tourist would manage to kill himself out there. In every case I knew of, they died of stupidity. One dummy had put in north of the lock and dam and decided it would be fun to get a close look at the spillway. He got a close look alright. The river took him backwards right through the spillway, his motor going full throttle, and dragged him under, boat and all, on the other side. They didn't find him or his boat for several days. Another guy wanted to get a nice close look at one of the big barges. Everybody that knows anything about the Mississippi knows you give the barges a wide, wide berth and you *never* come up on the stern of one where its powerful engines create one of the worst undertows imaginable. Everybody on the river that day was screaming and yelling and waving at this moron to veer off. He just grinned and waved back – right up to the second he and his boat disappeared under the water. They didn't find him for awhile either.

Spruce Creek, about seven miles or so north of Bellevue, was one of the nicest parks and trailer campgrounds in the area. The old Spruce Creek Lodge had a big pool table and it was one of the most unlevel pool tables anyone's ever seen. There was pretty much no such thing as a straight shot on that table. Danny and I played that table all the time and knew every curvy inch of it. We'd go out there in the afternoons or evenings to shoot pool and hustle the tourists. □

My New Year's Eve hope that 1970 would bring better times didn't live through the spring. Grandma Wells, my last grandparent, died in the middle of March. I'd never seen Dad so sad. Then came Cambodia. When Nixon had run for the presidency he had promised he would end the war in Vietnam.

But in April he told all of us he had ordered the invasion of Cambodia. He even tried to lie about that by calling it an 'incursion.' Nixon wasn't ending the war; he was making it bigger. He had looked the other way and condoned the hideous murders at My Lai, and now he was breaking the promise he had made to all of us to end the immoral war in Vietnam.

The invasion of Cambodia sparked massive, angry protests at colleges all across the country. At the same time, almost all the older people didn't seem to care. Nixon called the college students 'bums' and a lot of the older people agreed with him. The world was upside down. Young people, just a few years older than me, were demanding the end of an illegal and immoral war that was destroying our country, and older people, the very ones we should have been able to look to for leadership and who should have been demanding that our Government do its duty under the Constitution, were willing to just stand by and let our rulers destroy *everything* America stood for. It had stopped seeming strange to me that nobody recited the Pledge of Allegiance anymore. We weren't one nation any more; we weren't indivisible any more. Then on the first Monday in May, they sent the National Guard to Kent State University in Ohio, and the National Guard opened fire on a crowd of unarmed students, killing four of them.

Now the Government was murdering America's own children. Nixon said the murders 'should remind us all once again that when dissent turns to violence it invites tragedy.' I thought that message was pretty clear: If we didn't knuckle under and crawl and do what our rulers told us to do, it was alright for them to kill us. If we didn't do as they commanded, it was the same as 'inviting' them to murder us. Thomas Jefferson had written, *The tree of liberty must be refreshed from time to time with the blood of patriots and tyrants.*

Well, at least *patriots* didn't have to find a rice paddy to die in anymore. *Screw you, Nixon!* □

That summer there was a nice surprise. My old friend Steve from Maquoketa – the boy whose fight Dad had praised so much so many years ago and whose dad had set me straight about those lawnmowers – came to Bellevue with his folks on vacation. It had been eons since the last time we'd chummed around and I was delighted to see him again. Steve hadn't changed much except for being taller and a little more serious than I'd remembered him being.

One day he and I and another Bellevue friend of mine named Gary decided to go rabbit hunting. Gary was a distant cousin of mine on Grandma Wells' side of the extended family. He lived quite a ways out of town, a couple of miles or so past Spruce Creek, and as a result he was neither a 'north side' nor a 'south side' kid. Instead he was one of the very few kids who could probably best be described as an 'outlaw spirit.' If there had been anyone in eastern Iowa who could have been even remotely compared to James Dean, Gary would be it. The Putmans didn't like him because they thought he was involved with drugs, a reputation Gary liked to encourage. I thought this was pretty much all just empty big talk. *I* never saw him use any drugs. Beer, yes. Drugs, no.

Gary's self-styled outlaw reputation almost got him beat up once. They had showed this horror flick at school about the bad things drugs did to people, and the movie had deeply impressed the Putmans, especially Steve Putman. By now Steve was also a casual friend of mine and I'd had a first-hand chance to learn why he had such an awesome reputation as being the best fighter in Bellevue. He and I happened to get into a discussion about boxing one time and Steve had flatly told me I didn't know what I was talking about. That was something I didn't buy at all, but he was certain of it. My style of boxing was one where there was a pretty clear distinction between defense and offense. Steve's position was that defense *was* offense. He didn't mean 'don't protect yourself' by this. He meant every defensive move you make should be an offensive move at the same time.

He offered to demonstrate this to me. Because we didn't have any boxing gloves handy right then and there – the discussion was taking place in the Hotel next to the pinball machine – we first agreed we'd pull our punches so nobody would get hurt. Thank goodness! We squared off and began to slowly circle each other. I box southpaw, and I threw the first exploratory jab with my right hand. It hadn't gone three

inches when Steve counterpunched with his left. His move knocked my right completely to the side and his big left fist went whistling past my left ear. His follow through pinned my left arm at the same time, opening me up completely, and then his right fist went whistling by my right ear. He'd thrown both punches in less time than it takes to blink. I've never seen anyone else – including pros – whose hands were that fast. If we'd really been boxing, my head would have gone bouncing across the room like a basketball. That was all it took for me to know I wasn't even in the same universe with Steve when it came to boxing. I wouldn't fight him for real armed with anything less than a machine gun.

Anyway, Steve took it upon himself to see to it that nobody tried to push drugs to the younger kids. He had a little brother named Larry – a very cool kid in Melody's grade – who hung around with us a lot at the Hotel. All the older members of the Clan thought Larry was the brightest kid in the whole family, and they were expecting great things from him, including his being the first in the family to go to college. Although I think the Clan's vigilante movement was probably prompted by Steve's concern to keep Larry safe from any and all pushers, the movement rather quickly spread beyond just this. What happened was: Steve gathered up the Clan and they paid a visit to every guy in high school who they even suspected of being involved with drugs. Steve was the spokesman and his promise was the same to every guy they talked to: If he even *heard* you were giving drugs to Larry, you were going to be beaten until there was nothing left of you but bloody pulp. Somehow nobody wanted to take the chance this was really confined to just Larry and it was generally presumed Steve really meant *any* of the younger kids. He even gave *me* this warning – probably because he knew I hung out with Gary sometimes – although in my case it took the form of a chillingly casual evening front porch conversation down in the south end. The basic gist of it was along the lines of 'You're smart enough to know this already, but if you ever . . .' He didn't leave any doubt at all in my mind that he'd already voted Gary 'the kid most likely to be reduced to pulp product.' If anybody had even suggested to Steve – even if it was a flat out lie – that Gary had slipped any drugs to anybody, they'd have gone after Gary and there would have been no trial. All loose talk of drugs dried up almost overnight at the high school.

But getting back to the other Steve, the one from Maquoketa: One morning I picked up Steve and then we went out to get Gary and set off to try and find some rabbits. All three of us sat in the front seat of the Falcon; across the back seat we laid two rifles and a shotgun. Gary insisted on taking the center seat, claiming it was the safest place to ride 'because you had padding' – meaning Steve and me – 'on both sides.' We took a gravel road way back into the countryside, parked, and started hiking along the railroad tracks looking for rabbits. Our hunting expedition lasted about two hours, during which time we saw a sum total of exactly one rabbit. That one moved so fast, and with so many hairpin changes in direction, that none of us got off even a single shot. What we'd have done with it if we *had* managed to shoot it I don't know. None of us was exactly a Great White Hunter. Still, we had a good time.

After we finally gave up on the rabbits, we unloaded our weapons and put them back across the back seat again. We piled back into the car – same seating order as before – and decided to head back to Spruce Creek to shoot some pool. We were flying down the gravel road at about sixty miles an hour. What most people did on those kinds of roads was drive right down the center unless another car was coming head on. Then both cars would move over to their respective sides and they passed each other.

We were approaching the turn that led to the road to Spruce Creek when another car came around the bend ahead of us. Like us, he was going right down the middle and, also like us, he was going fifty or sixty miles an hour. I moved us to our right and expected him to do the same.

He didn't.

Two cars could pass on that gravel road if they were both on their proper sides, but not if one of them was in the middle of the road. When he didn't move, I jerked the wheel and took us further over onto the shoulder. The shoulder wasn't graveled; it was soft sand and just like that we started skidding. The other car flashed by us and vanished down the road without even slowing down.

I had my hands full trying to control that skid and slow down. It was a regular roller coaster ride at the county fair for the next few seconds. Gary, with an unaccountable tone of happy excitement, called out to me, "Hang in there, Wells!" The sharp curve in the road was coming up fast.

If we'd had another fifteen feet of road, we'd have been okay. But we didn't. As the car started to cross the roadway toward the ten foot drop off on the other side, I desperately jammed my foot on the brake just as hard as I could. I knew we weren't going to make it, and I wanted to lose as much speed as possible before we ran out of road. This wasn't panic; my mind was icy calm. A strange and marvelous thing happened then: Time slowed down. Everything looked like it was going in slow motion. I could clearly perceive every detail of what was happening. The car slid right across the road and the front tilted down as we went over the embankment. Directly below and in front of us was a big old tree stump, the only one within a hundred feet of where we were. A barbed wire fence with wooden fence posts ran along the bottom of the ditch. I felt my body fly off the seat, and the side of my face hit the corner of the front windshield. There was an incredibly slow-sounding *boom!* as the front of the car hit that stump, and then, still in slow motion, the car rolled upside down and came to rest against the fence. Oil began to come pouring into the car from all over the place.

I don't know how it happened, but after we stopped rolling I was on the passenger side of the car with my feet still under the steering wheel. Steve was on the driver's side with *his* feet still under the glove compartment. Gary was still in the middle, locked into position by our legs. The passenger side window was open to the outside, but the driver's side window was blocked off by the embankment. As the oil came running down inside, Steve yelled, "Let's get out of here!" and jerked his legs free, which dropped all three of us straight down to the roof of the car. He scrambled out on all fours right over the top of Gary and me. I climbed out right behind him, and Gary climbed out last.

Steve and I scooted up the embankment back to the road lickety split. Gary came up more slowly. At first I thought all three of us were okay, but then Gary, wearing a silly little grin, said, "Oh, wow!" and his knees buckled, dropping him right down on his bottom on the road. Steve and I ran over to him.

It turned out he *was* hurt. Not deadly seriously hurt, but fast-trip-to-the-hospital hurt. He'd hit his head on the steering wheel when we rammed the stump, and when he bounced back from that impact he'd straightened up just in time to catch two rifles and a shotgun across the back of his head as they had come flying out of the backseat. Then when the car rolled over he'd hit the top of his head on the dome light. Finally, as Steve had come scrambling over him, he'd taken a knee in the side and broken one of his ribs. So much for the 'safest seat' theory. Neither Steve nor I had so much as a scratch.

Steve ran off down the road to summon help from a nearby house while I stayed with Gary. He was conscious, able to talk to me and mostly make sense. He said he was okay except for a headache and sore ribs, but he had a goofy-looking expression on his face and it was pretty clear he wasn't okay and he wasn't going to be going anywhere under his own steam. Later at the hospital they confirmed that he'd suffered a mild concussion.

Steve came back and said help was on the way. In not more than a few minutes people were arriving from all over the place, followed by a highway patrolman, an ambulance, Steve's dad, and my dad. They loaded Gary onto the ambulance and blasted off for Bellevue with him. The highway patrolman questioned me and also Steve about what had happened and examined the car and the skid marks in the road. Finally he announced that we couldn't have been going more than ten or fifteen miles an hour when the car left the road. He made it a point to let Steve and me know how lucky we were to be alive, gave me a ticket for 'failure to have vehicle under control,' and that was that. I was a little put out that he didn't seem to be very interested in identifying the other driver; in my mind *he* was the one who caused the accident. But that was my car down there upside down in the ditch, so it was kind of hard to argue with the logic that I hadn't had it under control.

When the patrolman left I expected to get the hind-end chewing to end all hind-end chewings, but it

didn't happen. Our two dads were just happy to have three live teenagers instead of three dead ones, and I guess they figured I'd done everything anybody could do under the circumstances to prevent worse from happening. I felt awful about Gary getting hurt and I went to see him at the hospital as soon as they'd let anybody see him. He was propped up in bed, really looking none the worse for wear, and he actually seemed cheerful about the whole thing. He told me he'd thought about suing me but decided against it when the doctors gave him a huge jar of pain pills to take home. He claimed I'd been the instrument for getting him a legal supply of enough downers to last him for a year. Of course, I didn't actually see this famous gumball-machine-sized jar of pills with my own eyes.

My car was totaled and, of course, I lost my driver's license. I had to appear before a judge to plead to the 'failure to have vehicle under control' charge, and somehow nobody mentioned I might possibly want a lawyer with me. It was just me and the judge all alone in the room. Because it seemed absurd to me to try to claim I had not failed to control my vehicle, I naively pled guilty, expecting I would then get to tell the judge about that other driver. It seemed to me that being forced off the road by the other car ought to be at least a mitigating circumstance.

The judge immediately revoked my license.

My motoring activities were confined to the *Cindy* for the rest of the summer. I was a pedestrian again until my seventeenth birthday that September. Then they allowed me to re-take all the exams and I got my permanent driver's license. Nobody brought up the minor technicality that my old temporary license had been suspended for six months, and I didn't see any reason to ask them about that. By the time I got my license back I even had a new vehicle to drive. It was an old telephone company utility truck we were converting to be a bakery delivery truck. It was an under-powered old rattletrap of a truck, but it was wheels and it would get me anyplace I needed to go.

Just not very fast. □

The P.S. 1 National Honor Society for 1970-71. I'm the short guy with the wet hair in the middle of the back row. Karen Stachura is on the right, center row.

Although I mostly looked at my last year of high school as something I couldn't wait to get through with, I managed to have a lot of fun along the way. Although my place in the order of things was as a 'south side' kid, a number of the 'north side' kids as well as kids from other cliques had become my friends too. Of course, a number of them thought of me as kind of a character. I still was in the habit of not paying any attention at all to what my grades were; everybody else in school seemed to know more about them than I did. How I have no idea. Maybe it was the National Honor Society thing.

Sometime that year – I don't remember when exactly – somebody – I can't remember who – informed me that I had been named a member of the National Honor Society – which I had never heard of. It had to be explained to me that this was a 'recognition' of high school students who were considered by somebody – I don't know who – to be 'top students.' There were fifteen of us at P.S. 1 (eight seniors, five juniors, and two sophomores) who were members. The ones I knew fairly well I also knew to be serious, excellent students who worked hard, so I did feel honored to be associated with them. Other than the fact that I still knocked off my daily school work during study hall, the rest of the time I was kind of a goof-off, so I was surprised somebody would pick me to be in the same group with them. I had to spend so much time working in the bakery that school was about the only chance I had to socialize with most of the kids, and that's where my time there went when we weren't actually sitting in a classroom.

Some classes, though, seemed more like forums than classes. Government class, for example. Mr. Fenton, who taught government and was also the PE coach who had prevented the fight with Ricky the year before, liked to stimulate a lot of classroom discussions and debates about government. With all the bad things going on everywhere that were weighing on my mind, about all he had to do to stimulate a discussion from me was look in my general direction. I'd take it from there. I guess I must have talked a lot more than I realized judging from some of the things my classmates wrote in my Yearbook at the end of our senior year:

> Rick – To a fellow senior who has always kept Mr. Fenton on his toes in gov. (You've also ruined the curve in grading). Best of luck at Ames – Karen
>
> Rick – To a real sweet guy in our great Senior Class. Always stay as smart and talkative as you are right now. Who knows, maybe you'll be our next President. Be good, Rick, and if you can't be good be careful. Good luck – Ellen
>
> Rick, Good luck in your years of the Presidency. Be good and keep arguing. It might get you someplace – Marlene
>
> Rick – Good luck when you get on welfare – Steve

Mr. Fenton was a regular guy. Mr. Strissel, our math teacher, was sort of different. Kind of like you might expect a math teacher to be. In an era where people were no longer using any kind of hair cream, Mr. Strissel wore his hair slicked straight back with no part in it at all. He could have starred in a Brylcreem ad. There were a few of the guys who tended to harass him a bit about that with what passed as witty observations about his hair grooming. 'Grease ball!' was probably the most common heckling he was subjected to, and one of the guys managed to learn to say it without actually moving his lips so that even when Mr. Strissel looked up as fast as he could, he still couldn't tell who had said it.

Math isn't a subject that involves a lot of great oratory; most of the time it is pedantic and very step-by-step, and this suited Mr. Strissel's style to a Tee. He never wrote on the chalkboard. Instead he always used an overhead projector and a grease-marker to write down what he was saying. When the projection area was full, he used a little squirt bottle full of water to clean it so he could get on with the next part of the lesson. The seniors had math just before the lunch hour, and the juniors had it just after the lunch hour. One day some of the guys sneaked back into Mr. Strissel's class room during lunch and stole that water bottle. They took it to the boy's restroom, poured out all the water, and replenished it with urine. I have no idea how many guys were in on it, but it had to be more than one because one guy couldn't fill that whole bottle. They also must have diluted it with water just enough to make it colorless. Then they put the bottle back in Mr. Strissel's classroom. As you might guess, the combination of a hot overhead projector surface and diluted urine produced an awful stench that made pretty much everybody in the juniors' math class that day sick, including Mr. Strissel himself. I had nothing at all to do with it, but I did think it was awfully funny. And, yeah, if somebody had told me about it, I would've been in on it. Despite all the heckling and pranks, though, I thought Mr. Strissel was a good math teacher.

P.S. 1 didn't have a drama club but it did have a tradition of having the seniors put on an annual class play. It was directed by Miss LeMasters, a young fresh-out-of-college teacher who was one of the two English teachers at the school. After my pleasant experience with the Thespians, I was happy to take part in this one too, and for the same reason. That year the play Miss LeMasters chose was a comedy called 'The Curious Savage.' It takes place in a mental institution and revolves around the attempts of Mrs. Savage's three children to get her committed. I landed the role of Senator Savage, who was more or less one of the villains in this play. The production was nowhere near as grand as those Mr. Railsbach put on. We had to supply our own costumes, there wasn't much in the way of makeup, and the stage settings were very simple. But it was still a lot of fun and the town seemed to enjoy it quite a bit.

On a much sadder note, that year was a year that saw an unusual number of auto accidents. One of them led to Ricky and me finally becoming friends, the others were very sad. Just before school started there was a car crash out on the highway that killed five teenagers. I didn't know them but my friends did.

Much closer to home was the death of John Putman late in the school year. Stereo equipment, both car and home, was relatively new on the scene and John had been one of the first to equip his car with a new car stereo system. He was out on the highway one night, driving back to Bellevue from somewhere, when somehow the wiring of his stereo shorted out his car headlights. In the dark he rammed into a bridge and was killed. John was well-liked, the youngest except for Larry of the five Putman boys in high school, and his death was a terrible tragedy for all of us.

I was working in the bakery one Saturday when word came that Lyle had been hurt in a car accident the night before. I don't know the details of this one, but he'd been a passenger in a car with some other Maquoketa high school kids when the accident happened. The word we received was that he was in the hospital with a broken back.

When I heard this, I immediately left work and drove over to Maquoketa. Maquoketa is twenty miles from Bellevue, and all the way over I was sick with worry. I didn't know what I'd see when I got there, but I was fearing the worst. When I finally got to Lyle's room, I found him in great pain and he was suffering as well from nausea caused by his back injury. You see, all the nerves that control the inner organs and bring information about them back to the brain travel through the spinal cord. That is why anything that injures or irritates the spinal cord (without actually severing it) can produce an array of symptoms that look and feel like something is wrong elsewhere in the body. In Lyle's case, his back injury was making him throw up every few minutes.

As bad a shape as he was in, and as awful as he looked, I felt a great relief when I saw him. He was conscious and he was able to move his arms and legs, so my worst fears about how badly he was hurt were laid to rest. He would recover and he would not be left an invalid. It turned out he had only cracked a vertebra and, while this is nothing to take lightly, as back injuries go things could have been much, much worse. I visited him while he was in the hospital when I could as much as I could. The old Lyle returned by the next day, as they got the pain from his injury under control, and he was even able to find a silver lining in all this. "At least now I'm 4F," he said to me cheerfully. This referred to the selective service classification system, i.e. the draft. With the war in Vietnam still raging in full fury, the draft was very much on the minds of all boys our age. Classification 4F meant 'unfit for military service' and having a broken back certainly qualifies for that. No matter what else happened, Lyle would not be going to Vietnam, and we were both happy about that. It turned out, though, that a rich irony was in store for him. When the draft lottery for our age group was finally held, Lyle's lottery number turned out to be 365, the very last number.

It was another accident that led to Ricky and I finally becoming friends. This one developed out of an odd series of events that in an indirect way had started with me. Danny and I had driven over to Maquoketa one afternoon to shoot a little pool and take in the county fair later that night. While we were at the pool hall, a kid I had known from my Maquoketa days walked in with a couple of pals. He and I had a history. When we were both little boys we had played on the same Little League team and had been casual friends. Later, though, he had started hanging out with some of the hoods I detested so much and as a result our friendship ended. This day we got into a fight and the pool hall guy told us to take it outside into the alley.

As he and I were walking back there, his two pals came out behind us. I didn't like the looks of that at all, so I sneered at him, "You need your friends to come along and help?" He had a big grin on his face, but it vanished when he glanced back at his friends. I looked back, too, and here was Danny following the other two guys. Great Big Danny. He had my back. My opponent said to me nervously, "They don't have to come if your friend doesn't."

The fight itself isn't worth talking about very much. About all that needs to be said about it is that it turned into a dirty fight – a street brawl as pointless as it was devoid of honor. Danny thought the both of us were morons for even engaging in it. His actual language was a bit more colorful than this, and when all is said and done, he was right. When it was over I'd come out on top, although I'd gotten careless and

taken a couple of shots that made my cheeks swell up over night. Dad noticed that right away at work the next morning and gave me heck about it. To his way of looking at it, if you let yourself get hit hard enough to leave marks like that, you'd lost no matter what else happened. "If you won," he remarked sarcastically, "the other guy must be in the hospital." I am happy to say this fight turned out to be the last one I was ever in.

The only thing important about that fight was that when it was over one of those two guys who had come in with my former friend stayed behind with Danny and me. His name was Alan and, as it turned out, he wasn't from Maquoketa. He'd just been in town and hooked up by chance with the other two guys. Now he hooked up with Danny and me. Alan rode a motorcycle and he started coming over to Bellevue and hanging out on the south side. That was how he and Ricky met.

Ricky and Alan were out on the highway south of town on Alan's motorcycle one afternoon or evening – I don't remember which it was – when the accident happened. Alan was making a left turn off the highway when his motorcycle was rammed from behind by a Clinton County Sheriff's Office patrol car. I don't actually know who was driving that car, but word around town made it the Sheriff himself. Whether it was or wasn't, it made for a better story that way. 'The Sheriff' was passing illegally when the accident happened. Alan wasn't hurt, aside from getting scratched up a bit, but the Sheriff's car hit Ricky and broke his leg.

I heard about it later that night from someone. Ricky and I weren't pals then, but Danny was my best friend in Bellevue so I went over to the hospital to see how Ricky was doing. That's what you do for a friend. Besides, I saw it as an opportunity to patch things up with Ricky over that old incident on the basketball court. I liked and respected him anyway, and here was a chance to show it.

Ricky was alone in his hospital room and looking pretty glum when I got there. He couldn't have been more startled when I walked in. I could see the question in his eyes, *What's HE doing here?* "I thought I'd come see how you were doing," I said before he could ask. "How do you feel?" I pulled up a chair, sat down and listened while he told me what they'd told him about his broken leg. Then he told me about the accident. Before too long we were chatting like next door neighbors. I started telling him jokes and stories and pretty soon I had him laughing. We visited until the nurse finally came and told me visiting hours were over and I had to leave. "I'll drop by tomorrow," I said as I left. I knew first hand what a miserable place a hospital is. By the time they let him go home, Ricky and I were pals. The duo of Danny-and-Rick became a trio, Danny-and-Rick-and-Ricky, after that. □

I've already mentioned how I was letting my political opinions be known in government class. Danny and Ricky were juniors but that didn't spare Danny from getting to listen to my opinions. Oh, no. We chummed around together all the time. As I said earlier, Danny pretty much only talked when he had something to say, and he put up with listening to all my theories with Job-like patience. But that didn't mean he agreed with everything – or even with most of what – I was saying. And I have always tended to be easily carried away by the sound of my own voice. We were walking down the street one afternoon while I was treating him to some socio-political idea of mine. In the middle of it he looked down at me – Danny was pretty tall and I've always been kind of short – and interrupted the lecture. "You know what your problem is?" he said bluntly. "You're book-smart and life-dumb."

I was startled for a second, then I broke out in a big grin. Book-smart and life-dumb. I thought that was one of the most profound things I'd ever heard. Books can tell you theories, but theories by themselves don't do anything unless they're put into practice. And that meant making them practical. You can't be practical and life-dumb at the same time because eventually *everything* always comes back to people and what theories mean in terms of their actual real lives. I was going to have to work on that life-dumb part. Over the years, I've found out a lot of people need to work on that part and they don't even know it. It's too bad all of us can't have a Danny for a best friend. □

Outside of school, there weren't really any organized youth things set up to keep youths occupied in

Bellevue. Nevertheless, there was surprisingly little in the way of juvenile delinquency in Bellevue. You'd think a tough town like that would have had a lot more. Certainly there were plenty of adults who seemed to think there had to be *some* kind of nefarious deeds going on. After all, this was a time when the news was full of items about exploding drug usage by young people, where kids were defying barbershop convention and letting their hair grow down over their ears – sometimes quite a bit down – and when kids one and all were generally suspected of being rebellious and part of the 'turn on, tune in, drop out' movement (either actually or any second now).

Hair length seemed to agitate the adults more than anything else. Despite the urban legend my generation invented, I never heard any adult refer to any of us as a "long-haired hippy freak." They just used the term "long-haired hippy," inevitably accompanied by the sneering insult, "Is that a boy or a girl?" The word 'freak' was a romanticism kids added. In actual fact, there wasn't anybody in all of Jackson County, not even Gary the Outlaw, who could legitimately be called a hippy with the possible exception of Norval, one of my Marquette friends. But even in Norval's case there wasn't anything remotely political or socio-revolutionary about him. All he wanted was for other people to mind their own business and let him mind his. He was an introverted farm kid who lived near Spragueville, extremely smart, and he just happened to be the only kid in Bellevue capable of growing a full, thick, mountain-man-style beard while still in high school. Next to his, anybody else's beard was a sad, pathetic thing. I couldn't grow even a trace of one. Norval ended up going to Iowa State, graduating with distinction in electrical engineering, and taking a job with the Naval Weapons Laboratory in China Lake.

As for drugs, I'm pretty sure there were some around but I also think 90% or more of all drug talk that went around was empty hot air. I do know some kids who experienced the psychedelic wonders of oregano. Most of them never did get wise to what it was they were really smoking. Since I wasn't an athlete any more, I'd taken up smoking cigarettes every now and again. Actual cigarettes I found a bit hard to come by on our local black market, but pouch tobacco wasn't too hard to obtain and anybody could buy cigarette paper. I obtained a little cigarette-making gizmo and mostly rolled my own cigarettes. I'm sure some of the kids thought it was pot and I was mischievous enough to let them think what they wanted. Of course, that was also one of the reasons Steve had seen fit to warn me of certain health hazards attaching to my little habit that could potentially involve me being turned into pulp product.

There was a lot of heat and very little light cast by all the controversy that went around involving drugs. I was curious what the real story was, so I did a little library research on the matter. The anti-drug material put out by the school was one source. I also read some other books on the subject, including *LSD, The Problem-Solving Psychedelic* and *Narcotics: Nature's Dangerous Gifts*. The conclusions I reached were: (1) Pot was about on par with alcohol; it wasn't until later in college when I met some people who abused pot that I learned if you smoke too much of it, you get stupid; I got to watch that happen to a couple of people; (2) heroin and cocaine were too dangerous to mess with because they were so incredibly addictive; no high was worth becoming a slave to a drug; (3) mescaline and LSD were too dangerous to screw around with because sometimes they damaged your brain very badly; I liked my brain and wanted to keep it in good working order.

The only thing I wasn't sure about was amphetamine. Dad was in the process of quitting smoking right at that time, and to keep himself from over-eating – always an occupational hazard in a bakery – he was taking amphetamine-based diet pills. I sneaked half a dozen of these and tried them for myself. At first, no effect. A little later, they kicked in full force. I was wide awake, hyper, and talking non-stop for the next twenty-four hours. Then, just as abruptly, they wore off in the middle of a Sunday afternoon and sleep came crashing down on me right on the park bench where I was sitting. After I woke up I thought, sarcastically, *My, wasn't that fun?* I figured I was hyper enough and talkative enough in my natural state; I sure didn't find anything attractive in getting boosted into peg-the-dial overdrive in that department. So 'uppers' were out, too. My drug of choice remained cold beer.

Ricky and I did do some whiskey one time. I was able to procure two fifths of some fairly cheap rot-

gut, figuring there were two of us, and we mixed it with coca cola. I wouldn't advise doing this. We hadn't even gotten through the first bottle before I was so blotto I could barely sit in a chair down at the pizza place. Ricky had had enough by then, too. Steve was down there at the pizza place and greatly enjoying the show I was putting on. He asked me if I had any of that whiskey left and I happily cried, "Shhure! Wait right here!" I stumbled out to the truck, fetched the remaining bottle, and weaved right back into the pizza place waving it like a flag. Steve's eyes got as big around as saucers; Iowa was still a 'twenty-one' state at that time and here I was waving that whiskey bottle around for all the world to see. He grabbed the bottle, put it under his coat, and hastily left the establishment.

The remaining details of that evening somehow escape me, but I do remember being helped home by Ricky and Deb, one of my fellow seniors. Something was wrong with my feet. They just wanted to drag behind me on the sidewalk. I had the worst hangover in history for the next *three days*, which I had to carefully conceal from Mom and Dad. They were both dead set against drinking. To this day just the smell of whiskey makes me feel like my body is turning inside out. That's its little way of saying, *Hey, we're not doing THAT again are we?* Nope. We're not. Never ever.

What we did most often to pass the time in Bellevue was play basketball. One-on-one, two-on-two, whatever we could put together on any given day or evening. There were outside basketball courts in several different places in town inside of easy walking distance from anywhere. It could get a little tricky getting up a game when the snows began to fall in winter. However, then Father Knipper would usually let us into the gym at St. Joe's and we'd just move the game inside. If the padre's idea was to keep us off the street and out of mischief, it worked. Bellevue was one basketball-crazy town. Probably because we didn't have a football team. □

Once I had my license back, Dad came to me with a deal. During the Great Depression one of the things he and his brothers had done was carry bakery goods to the several small little towns around Maquoketa. They equipped a truck with a musical horn that the driver could play using buttons mounted on the steering column. The truck would drive slowly down the street playing that horn and the housewives would come right out of their houses and stand at the curb to buy bakery goods. It had worked in the thirties, and Dad figured it still would. That was why he bought and refitted my truck.

The deal he offered me was this. I could get off bakery detail at ten on Saturday mornings, load up that truck, and take it over to the towns whose residents tended to take their bakery business to Maquoketa. After I'd covered the costs of the bakery goods, all the profits would be mine on the condition that I used them to help pay for college. Dad had sort of become resigned to the fact I was determined to go rather than stay around to run the bakery. It sounded to me like a good deal, so I agreed.

Turned out it was a great deal. I learned to play several three-note songs on the truck's horn, and things happened just the way Dad said they would. Occasionally someone who worked nights would complain about my horn playing a little, but they never swore out any complaints with the police. In pretty quick order I'd figured out good routes and times and pretty much always managed to sell everything I'd loaded on the truck. There were two regular calls I'd always be sure to make. One was a little tavern out at the edge of Preston. It was run by an earthy woman in her mid-thirties or so. I'd pull into the parking lot and stick my head in the door to let her know I was there. She'd come out to the truck with me, put her arm around my waist, and snuggle up while she was choosing her bakery goods. I don't think she was flirting so much as trying to embarrass the teenager but I didn't embarrass so easy. Not that way at least. After awhile it sort of became a game with us. But she did get me thinking.

My other regular stop was a house where the woman had a habit of waving to me to come up to the door to take her order. I didn't mind doing that either. The reason she wouldn't come down to the curb was because she was invariably dressed in a pretty revealing little negligee. Hey, if she didn't mind, I sure didn't. A grandma she wasn't. She never did invite me in for a lemonade, though.

I kind of figured it was a good idea not to say very much about my customers back in Bellevue. □

The high school senior (spring 1971, age 17)

As spring of ’71 arrived I started receiving all kinds of different brochures from a bunch of different colleges. I’d look them over even though I’d already made up my mind to go to Iowa State. For one thing, I had it straight from Bill that ISU was the place to go for electrical engineering. For another, these other colleges were out of state and there was simply no way I could afford the extra tuition they charged out of state students. There was one brochure I remember in particular, though. It was from some tiny liberal arts college in southern California and their catalog was laid out in psychedelic artwork. Their pitch wasn’t too inspiring, though. Boiled down to the essentials, it basically said, ‘We’re just looking for bodies to fill the seats.’ I couldn’t imagine anybody being attracted by that pitch, but I was wrong. One of my friends from Marquette thought they were so weird they were cool and he did decide to go there. I’m sure old Father Schmidt over at Marquette must have had an attack of indigestion when he heard about that decision.

I didn’t know Father Schmidt all that well. Melody knew him a lot better than I did. Just as Danny and Ricky were my friends, Melody’s best pal was their little sister Doris. I have a hunch Doris might have been a more regular Catholic than her brothers were, and maybe that’s how Melody came to know Father Schmidt. Even though Melody had already been baptized into Mom’s church, she eventually converted and became a Catholic. But while I didn’t really know Father Schmidt, he knew me. That didn’t surprise me all that much. I was ‘the baker’s boy’ and everybody in town seemed to know me. But I came to find out from Melody a number of years later that Father Schmidt was always worrying that I wasn’t getting a good enough education at P.S. 1. It was mighty nice of him to care. I’m not even Catholic. Now, if Marquette had had a football team . . .

My Marquette pal who ended up going to the psychedelic college and I were over at Marquette a couple of days after graduation. There was something he needed to get from his locker there. As we were walking down the deserted hallway a voice from the briny deep issued from Father Schmidt’s office: *Wells, get in here.*

Curious, I stepped inside his door and gave him a friendly, “Hi, Padre. How’re you doing?” He gave me what passes as a friendly look from a priest, leaned back in his chair, and growled, “What are you going to be doing with yourself now?” I told him I was going to Iowa State to study electrical engineering. He frowned. Senior priests really know how to frown, too. He looked me straight in the eye and said, “Do you know what you’re getting into?” I was a bit taken aback, but I replied that I thought I did. He snorted and waved me out of his office.

I said to my friend, “I wonder what that was about?” He just laughed. About six months later I thought maybe I had a pretty good idea about what Father Schmidt was probably getting at. □

My senior year seemed to pass with lightning speed. My junior year had seemed to last forever, and I’d expected my last year of high school to do the same. I guess it is true that time flies when you’re having fun. Almost before I knew it, it was graduation time and there I was getting my high school diploma. I’d been accepted at Iowa State and would be starting there at the end of August. Only one last Bellevue summer remained, and I’d be spending most of that working and trying to scrape up enough money to pay for that first year of college.

For quite some time, one of the anti-war slogans had been ‘Old enough to fight, old enough to vote.’ I was a hundred percent in favor of that one. I was plain tired of not having any rights at all under the Constitution. On March 23rd Congress had passed the twenty-sixth amendment: *The right of citizens of the United States, who are eighteen years of age or older, to vote shall not be denied or abridged by the United States or by any State on account of age.* The amendment was ratified on July 1, 1971 – just three days before Independence Day. Suddenly there was a huge new block of voters and come September I’d be one of them. I’d also be registering for the draft. And there was an election coming up in 1972. Maybe

at last something could be done to put an end to the war in Vietnam.

An unexpected benefit of the twenty-sixth amendment was the lowering of the drinking age by a number of states. Iowa changed its law by lowering the legal drinking age from twenty-one to nineteen. Being seventeen, I was going to have to wait awhile longer to benefit from that. On the other hand, it happened there was a very strange fringe benefit from having gone to P.S. 1. Most people in town seemed to take it as a matter of course that most of the graduating seniors had taken a little longer than normal to make it through school – especially those of us 'south side' seniors. Consequently, just about every tavern in town took it for granted I must already be nineteen because I had just graduated. They didn't even bother to ask me for ID. That made those ten cent drafts of beer, consumed while sitting right on a bar stool in the tavern, taste extra good. And it beat black market prices to boot. □

The fraternity pledge (fall, 1971)

I had started a growth spurt about midway through my senior year and so by the time I arrived in Ames, IA, to begin college I was almost five feet nine inches in height and weighed in at one hundred fifty-five pounds. I had also started wearing contact lenses and shaving every couple of days. Since it was unthinkable, for a number of reasons, to take my truck with me to college, I scraped up three hundred dollars and was now driving a used 1966 Buick LeSabre. The bakery truck would stay a bakery truck. In addition to being large enough to hold everything I owned, my 'new' Buick was also able to thumb its nose at speed limit signs so it only took just a tad more than three hours to drive from Bellevue to Ames, rather than the four-plus hours it would have taken the truck.

Bill was still with IBM and had been promoted to their office in Des Moines. He had gotten married when I was sixteen and since Des Moines is only thirty miles south of Ames I came to visit him and my new sister-in-law, Maryann, when I came out for a summer orientation trip to Iowa State. Bill took one look at my wardrobe and pronounced it unsuitable for a college man. He insisted on hauling me down to a clothing store and supervised my re-outfitting. I protested that I couldn't afford it, but he waved that aside by simply paying for everything himself. No brother of his was going to appear at college looking like a Bellevue river rat. I began to get the idea school at the college level wasn't going to be much like high school.

One of the main purposes in my trip to Ames was to decide on a place to live. Bill had been a member of a fraternity, Sigma Nu, when he was in college and he sold me on the idea that belonging to a fraternity was infinitely superior to all other forms of college life. So when I went up to Ames and succeeded in being accepted as a pledge at the Sigma Nu chapter there, he was absolutely delighted. I have no doubt he credited my sartorial renovation as playing the central role in this success.

The fact that Bill was a member of Sigma Nu was one factor in my choice to pledge that fraternity, but it wasn't the only factor. A more important factor was that the ISU chapter's members were mostly science and engineering students and the guys there had emphasized to me how big an advantage that was going to be for me. Then as now, electrical engineering was loaded to the gills with tough science, math, and engineering courses, and in the Sigma Nu house I would find plenty of older guys who had already been through the same courses I would be taking and who could tutor me when necessary. Another factor, not quite as important but a factor nonetheless, was the location of the Sigma Nu house. It was the one and only fraternity house on what was known as 'sorority circle.' Back when the house was first built at the start of the twentieth century, the original guys had owned all the land around the house and over the years had sold off lots exclusively to sororities. Any outfit that demonstrated that kind of sage planning for the future had my complete respect.

Of course, it would not have been possible for me to join a fraternity if the cost had not been more or less equal to the cost of living in a dormitory. Iowa State prided itself on having one of the strongest

dormitory systems in the country and the fraternities and sororities had to compete with the various dorm houses economically. Snob factor just didn't play any important role in this. Not for most of us, anyway. Room and board for living in the frat came to just under $1000 per year and tuition at ISU was another $600 per year. Then came the cost of textbooks, which averaged about $20 each in the campus bookstore. For my freshman year that added up to about another $200. Total damage: $1800 per year. It doesn't sound like much by today's standards, but in 1971-72 that was a lot. It was going to take every penny I had saved up for college just to pay for that first year. Naturally, I did go and apply for financial aid at the University's financial aid office, but they told me my family wasn't poor enough to qualify. Nixon and his Republicans had taken dead aim at the Great Society's education programs. They didn't have the votes in the Democrat-controlled Congress to do away with them entirely, but they would have if they could have. They still had an illegal and immoral war to pay for and college students weren't their favorite people just then. Or now, for that matter. It's easier to rule an uneducated citizenry.

There were nine of us in my original pledge class. A fraternity has two classes of citizens. The active members or 'actives' are the full-fledged members. The pledges are the probationary not-members-yet class. Basically, we were the serfs. One of the guys in my pledge class was a holdover from the previous year. He was still a pledge because his grades hadn't been high enough the year before. That was my first clue that I was going to have to at least start paying attention to what my own grades were. ISU was on the quarter system – that is, the school year was divided into three 'quarters' rather than two semesters – and John had been able to get his grades up high enough the previous spring to become an active during fall quarter of '71. That was why, although he was a great guy, we didn't really count him as one of the members of 'our' pledge class. Another guy, Jerry, was majoring in mechanical engineering because he thought 'mechanical engineering' meant 'auto mechanics.' I don't know what kind of chimpanzee he must have had for a high school guidance counselor. Not too surprisingly, he didn't make it through the first quarter of school and dropped out of college.

That left seven of us. I didn't realize it when we started out, but my six fellow pledges were to become my brothers in a very real sense and my dearest friends in life. In all the years since, only one other guy has joined their ranks as my brother and best friend. My new brothers were and are: Glen Wazny, a civil engineering major from Des Moines; Al Welch, a zoology major from the little Iowa town of Jefferson; Jerry Pribyl, a pre-veterinary medicine major from Omaha; Scott Morrison, an electrical engineering major from Des Moines, who would eventually switch majors and get degrees in architecture and civil engineering; Steve McCulloch, a landscape architecture major from Eden Prairie, Minnesota; and Rick Lyons, an industrial engineering major from Libertyville, Illinois. We began our freshman year as total strangers; we ended it as brothers for life. These six plus Bill plus Lyle plus one more guy we'll talk about later are the only people in my life who occupy that place in my heart. Of course, *all* the members of a house are one's fraternity brothers; 'brother' is what the Latin word *frater* means. They, too, become very special friends, just as your teammates on the football team do. But these six are extra special to me.

The Sigma Nu house turned out to be neither animal house nor study grind house. In a peculiar way, it was both and it was neither. Iowa State's full name is Iowa State University of Science & Technology, and most of the guys in the house were studying in the most difficult fields ISU had to offer. If we had had an official motto, it would have been *Work hard, play hard.* For most days of the week, the guys cracked the books hard and in the hallways of the house there would hang a tomb-like silence only occasionally disturbed by some raucous outbreak of horseplay. Of course, it takes some freshmen awhile to adjust to this regimen; it didn't take anyone longer than it took me to make the adjustment. But the actives had their ways of disciplining pledges who didn't quite get it yet and by the end of the first two quarters I wasn't much of a goof-off anymore. Learning *how* to be a serious student took me just a little bit longer and required guidance from two important people, one a great teacher and the other a great leader and motivator who was a sophomore studying civil engineering. His name is Don Munksgaard.

That was the 'work hard' part of the fraternity's character. The 'play hard' part kicked in as soon as classes were done on Friday and roared with full youthful red-blooded energy and passion into the wee

hours of Sunday morning. By the time it ended, the tensions and stresses of the week would be burned away and we were ready to be students again. The rest of the day on Sunday was usually given over to recovery, and right after supper ('dinner') Sunday evening the 'work hard' cycle started all over again.

For pledges the 'play hard' part did not begin on Friday – or at least was not supposed to begin – until we had attended to the cleaning of the fraternity house. The house had four floors: basement, main, second, and third. The basement held the kitchen, chapter room/dining room, furnace room, and a little room that had once served as the cook's room but was unassigned to anything the year I joined. We would later convert that room into a lounge. The main floor had a large ante way, living room, TV room, a corridor where the mail boxes and phone desk were, a guest toilet, and another private room that had once served as the House Mother's room but was now used by our cook. The second and third floors were where the study rooms were located. These floors each also had a bathroom with toilets, sinks and showers. The second floor was where the sleeping porch was located. The study rooms held three or four people, usually two actives and one pledge. They contained desks and a closet but no beds.

We had a number of pledge duties we had to carry out on a rotating basis all week, but Friday night was when we all turned to and did the cleaning. The individual study rooms were the responsibility of their occupants, but all the common areas – kitchen, dining room, main floor, second and third floor hallways and bathrooms – were mopped, scrubbed, and cleaned weekly by the pledge class, nominally under the supervision of a house officer known as the Pledge Marshal. In reality, one of the pledges was assigned to act as 'pledge house manager' and was made responsible for seeing to it this was done. For reasons I no longer remember – probably because no one really wanted the job – my new pledge brothers elected me to act as pledge house manager. It might sound impressive, but all it really meant was if any active was displeased about anything I was the one he yelled at about it. The pledge system worked by peer pressure and, on the infrequent occasions when that didn't work, by disciplinary punishments meted out by the actives through the Pledge Marshal.

Once the Friday night house cleaning was done, we were free to do whatever we felt like. In point of theory it really only took a couple of hours for the group of us to clean the entire house, but in point of fact we usually did a lot of goofing around that stretched things out a lot longer than this, sometimes even late into the night. We would nominally divide up the different cleaning tasks among ourselves; after the first few weeks different guys developed preferences for different jobs. But regardless of who was assigned to do what, the pledge class as a whole was held responsible for the job as a whole. Because none of us were really all that thrilled to be mop jockeys, horseplay could break out at any time. One night I remember the basement crew instigated a long, noisy, boisterous water fight. Everybody in the house could hear it, but I wasn't paying all that much attention to it since I was cleaning the main floor toilet at the time. As far as I was concerned, if my three brothers downstairs wanted to screw around all night, that was fine so long as eventually the job got done. Mop water was mop water no matter how it got on the floor.

Unfortunately, the senior who was serving as vice president of the chapter – officially that office was known at the Lieutenant Commander or LC – did not share my lack of concern about the rowdy uproar emanating from the basement. I guess he thought mopping floors and cleaning sinks should be done with more dignity and decorum, or at least considerably more quietly. Whatever his reason, he did what actives usually did in cases like this: He came downstairs, yelled at me about it, and ordered me to go put a stop to it. Then he left for his date.

I reluctantly went down the stairs into the basement. There were three of the guys, happy as larks and soaking wet from head to foot, standing in the very soggy kitchen. They stopped screwing around as I entered. "I'm sorry to have to do this," I said, "but Carl said you guys have to stop messing around and get on with the job."

Jerry snuck up on me from behind and dumped a mop bucket full of water over my head. I turned and starting chasing him around and around the basement, with him screaming with laughter as he ran. The

water fight erupted all over again. Now there were four of us screwing around down there. The job got done eventually.

During the week we had different small jobs to do. None of them took all that much time because we had studies to attend to as well. One of them was kitchen/waiter duty. The whole house ate in the big basement dining room, which also served for chapter meetings and for parties with sorority guests. The guys on waiter duty did what waiters do. They set up and removed the tables, set out the plates and silverware, brought out the food, and fetched whatever somebody might request in the way of beverages, more bread, etc. They helped our cook, Millie, in the kitchen and saw to the cleanup after the meals. This all happened twice a day, at noon and at five o'clock. Breakfast was self-service. One of the favorite little tricks the guys would play was 'run the waiter.' One guy would ask for something – say a glass of water – and the waiter would bring it. As soon as he did, another guy would ask for something else. When that came, another would ask for something else. You could keep a pledge running back and forth to and from the kitchen the whole time that way.

Another regular job was phone duty. All the study rooms had telephones with five lines you selected with push buttons. However, none of the study room phones had bells in them; it was too noisy and distracted people from studying. The one phone in the house that had a bell was located in a hallway on the main floor. Whoever had phone duty would sit at a little table by that phone and answer it when it rang. He'd find out who the call was for, put the caller on hold, and bong whoever the call was for. The house had a bong system and everybody had their own bong number – a kind of Morse code. If you heard your number being bonged, you knew you had a phone call and you'd pick it up. Phone duty ran from about six to ten in the evenings, Sunday through Thursday. The pledge on phone duty would take his books with him and study at that little table in between phone calls. Phone duty rotated and nobody had to do it more than once a week. Friday and Saturday there was nobody on phone duty and whoever saw or heard the phone ringing was supposed to answer it. The whole idea of this system was to let everybody else concentrate on their studies.

The job everybody hated the most was call boy duty. All the beds in the frat were located in the big sleeping porch on the second floor. This was basically just one big room crammed with bunk beds from one end to the other. Because there was some sort of state code that said there had to be so much volume of air per person in a room, and because so many guys slept in that one room, the only way to meet the code was to open all the windows in the sleeping porch. That way you had all the air on earth. It also meant there were no heating ducts or radiators in the sleeping porch and it would get mighty cold in there in the winter time. The answer to that problem was electric blankets and plenty of covers. Absolutely no alarm clocks were allowed in the sleeping porch.

Because no one could use an alarm clock in there another way had to be found to wake people up in the early hours of the morning in time for early classes. That's where the call boy came in. Every night Sunday through Thursday, one of the pledges had to sleep on the floor in his study room with an alarm clock. It was his job to get up before six, go check a signup sheet hanging in the second floor head, and wake up whoever had signed up for a wakeup call. Hence, 'call boy.' You could sign up to get a wakeup call at either six, six-thirty, or seven. You could also add the notation OOA beside your name, which stood for 'out on ass.' That notation meant the call boy had to either see your feet hit the floor or else get you to sign the call sheet that you'd changed your mind and weren't going to get up. Otherwise the call boy was expected to use any means necessary to get you out of bed. However, 'any means' meant 'any means that didn't wake everybody else up.' Dousing a sleeper with water was frowned upon because of those electric blankets. If you signed up, you got three calls at five minute intervals, e.g. "Carl, first call, six o'clock; second call, six-five; third call, six-ten, c'mon Carl, OOA. Get up." Pulling a two hundred twenty pound senior out of bed *quietly* presented its challenges for a hundred fifty-five pound call boy.

Naturally, a favorite practical joke was to wait until somebody had gone to bed and then sign his name to the call list for a six o'clock OOA call. The victim never knew who had signed him up, but he always

knew who the call boy was and sometimes took it out on him instead. When I had the call boy duty and if some active had been riding me too much lately, it wasn't beneath me to be the one who'd sign him up for a six o'clock OOA call, especially if his first class wasn't until ten o'clock. Another favorite trick in the winter was to wait until he was snoring and then quietly turn off his electric blanket.

We had joined a fraternity in transition. The seniors were guys who had started college in the fall of '68 and had gone through the center of the storms of protests that swept all college campuses over the years since then. Iowa State could not be remotely compared to Berkeley or Stanford when it came to radicalism, but it had its own vigorous if somewhat polite form of anti-war activism. I noticed there were a lot more seniors pictured on the house photograph than there were living in the house, and we did have a lot of vacancies that year. It hinted at some sort of schism that must have taken place, but nobody ever talked about such a thing. The seniors tended to be more the traditionalists, the slightly larger number of juniors less so, and the still slightly larger number of sophomores even less so. We pledges, of course, had no traditions at all to go by. That was one of the things we were expected to learn about the house before we became actives. In a way you could say the seniors were the disciplinarians of the house, the juniors its conscience and moral compass, and the sophomores its fire and passion. My pledge brothers and I tended to follow the lead of the sophomores, listen to the juniors, and stay out of the way of the seniors as much as possible.

One tradition the movies invariably love to portray about fraternities was utterly absent in our house: There was no hazing of the pledges. Absolutely none. None of that stupid business of having to bend over and receive a whack on the fanny from a pledge paddle and say, "Thank you, sir. May I have another?" Of course the national fraternity had always banned hazing, but I knew that rule had been routinely violated by the chapters for years. Bill had told me a story or two about that from his college days. But at our house there was none of that at all. Discipline, yes; hazing, no. Sigma Nu called itself *The Legion of Honor* and every active in the house believed in the high ideals reflected in the creed of the fraternity:

> *To believe in the Life of Love . . .*
> *To walk in the Way of Honor . . .*
> *To serve in the Light of Truth.*

They saw to it that we learned what these noble words meant and learned to make it our creed too. This doesn't mean the 'play hard' aspect of fraternity life was ice cream and lollipops. Drinking, other violations of the blue laws, and general pranksterism were normal parts of the process of blowing off steam for us, and the younger the brother the more steam there was to blow off. We could get pretty wild and most of the things we did would mortally offend all the bible-thumping scolds out there who are never happy unless they can run everybody's lives and make the rest of us as unhappy as they are. I don't think I'd be too wrong in saying that knowing they *would* be offended added to the fun. What we did really was harmless fun and there was a moral center that limited the extent of our wildness. Each pledge had a 'pledge dad' – an active who took it on himself to serve as a mentor and an example to follow. I had a good one. His name is Kevin Wand, known to everybody as Kip. Kip was also from Jefferson, a junior, and a member of Navy ROTC. He was the kind of guy people used to call an All American Boy and was exactly the kind of role model a wild river rat from Bellevue needed. There were, I admit, plenty of times when I was a strain on Kip's patience, but he never gave up on me. Thanks, Kip. □

The fraternity house was the center of my social world and an island of moral values and social duty at a time when the great national social contract that binds society together was being ripped to shreds by the upheavals rocking America. The other part of my college life was, naturally, college itself.

In comparison to anything I had known before, Iowa State was a huge place. Twenty thousand students went to school there; that was ten Bellevue-sized towns or three and a third Maquoketa-sized towns. The city of Ames had half again as big a population. The ISU campus was as majestic as it was beautiful. Its centerpiece was the large, park-like central campus surrounded on all sides by magnificent buildings, many of which at least looked like they'd been constructed from marble. Especially in the

evening, I found central campus utterly enchanting. At night the play of shadows and light on the buildings gave the entire place an almost faerie-like character. Campus was almost deserted at night and the peace and silence of the place combining with the sight of it stirred very primitive feelings in me. It *felt* like a place of reverence and deep knowledge, a feeling so palpable I imagined I could sense it in the very air around me, as if ghosts of great and wise men of the past lingered there. Central campus didn't feel that way during the day. But at night it was for me another special place. In all the years I lived in Ames, it was a place I could come when I was depressed or worried or simply worn out and feel my burdens and problems slowly evaporate in the peace of the night air. It was a place where I could go when I needed to let God sooth my heart.

My heart needed a lot of soothing that first year. In addition to having to prove my worth to the actives – there was a statement right at the beginning of our pledge manual that said, 'You were *given* your Pledge Button. You must *earn* the Badge of an Initiate' – I found college courses to be unexpectedly difficult. I was used to making an occasional mistake on my school assignments in grade school, junior high, and high school, learning what it was, and fixing it. I wasn't used to making the number of mistakes I was seeing when my college assignments were returned to me. Part of the problem was simply the much higher caliber and content of what was being presented in lecture. Before college, the learning pace was much easier and I could just soak things up as we went. In college subjects I was finding layer upon layer of consequences and deductions not immediately obvious from what was presented in lecture. Another part of the problem, closely related to this one, was that I simply didn't know how to do homework. I'd never had to do homework before in my entire life. I was learning – very painfully – that here I had to. I was learning the hard way what the difference is between being a *pupil* and being a *student*.

I'm pretty sure this was what Father Schmidt was thinking about that day over at Marquette. I have to admit it: I *didn't* know what I was getting into. This was school at the pro level. I'd come to college cocky and arrogant and ready to beat the world. Now I was learning what was meant by the old Greeks when they warned, *'Hubris is followed inexorably and inevitably by Nemesis,'* and by the words of Proverbs 16:18, *'Pride goes before destruction and a haughty spirit before a fall.'* It wasn't my grades that worried me; grades still meant nothing to me. It was the fact that I was making *so many* mistakes, which meant there was *so much* I was failing to understand. Probably my academic low point the first quarter came when I got a chemistry assignment back. Written across the top in red ink was a single word: redo. "Red oh?" I thought to myself. "What the heck is 'red oh'?" I went to see the instructor in his office and asked him. He glared at me and said, "*Re*-do." Oh. I walked back to the frat house humiliated and depressed. I had to pay a long visit to central campus that night.

Calculus was another unexpected and very nasty shock. Not long after I had been admitted to ISU, I received a letter from the math department telling me my math scores on the ACT were so good they wanted me to take a special section of calculus, Math 490P. Well, that sure enough tickled my ego in just the right spot. I was so good they wanted me to start math in a course for college *seniors*. What I didn't know was that '490' was the number ISU gave to *all* experimental courses. Math 490P was a freshman calculus course designed for math majors – people who were going to spend their careers proving theorems. And that's all it was: definition – theorem – proof, over and over and over. There were almost no actual calculus *problems* to work, nothing that would pull things down from the blue sky of abstract thinking and put it on a practical plane where I could *see* what was going on. To me it looked like the proofs in the book were just a series of unrelated tricks of memorization. For the first time in my life, I just couldn't spot the *patterns* in mathematics that I so much relied on. Nobody else had ever taken that course before; it was brand new and there was nobody in the house I could go to with questions. Don told me I was out of my mind to be taking that calculus course. "You should get your dumb butt over into the regular calculus course," he told me. My pledge brother Scott had also started out in that course, but he saw the light – or listened to Don's advice – almost right away and bailed out. Me? I rode that flaming, wingless aircraft all the way, right into the ground: Five credits of C.

If I'm nothing else, I'm stubborn. The next quarter I signed up for the next course in that same

sequence. The first day of class I was sitting in the third row when the instructor came in. He was one of the big name professors in the math department; I had heard that he was world famous. I never saw an odder character in my life. He walked into class down the middle aisle, a vacant smile on his face, his eyes turning from side to side and staring at something on the far away horizon. When he got to the front, he introduced himself, wrote his office number on the blackboard, and said, "Let's review." Those were the last words out of his mouth I understood for the rest of the period. As soon as the class ended, I made a beeline straight to the registrar's office, dropped that class, and got my dumb butt into the second calculus course in the regular sequence. That course, as it happened, wasn't as far along as my 490P course had ended up, so I got to see again for the first time the material we had zoomed through the previous quarter. The big difference was *this time* the course involved working problem after problem after problem. *Now* I could find the patterns again. *Now* it made sense. After that, even the proofs of the theorems started making sense and I could start to find some patterns in them, too. I went back to being an A student in math.

A week later, I happened to see my former math professor cutting across central campus on the way back to his office. He still wore the same vacant smile, his eyes still turned from side to side staring off into the distance at something only he could see. I watched in fascination as he walked right into a tree. He bounced off it, his eyes unglazed just a little, and he said to the tree, "Oh, excuse me." He walked around it, eyes scanning the horizon again, and continued on his way. I just stood there watching him go and shaking my head. At that moment, I was sure glad I wasn't trying to become a mathematician. □

Actives had permanent study rooms in the frat house, but the pledges were moved from room to room each new quarter. The idea was so we could get to know more of the actives better. My first quarter I was assigned to Kip's room. My study habits were non-existent and Kip, bless his heart, rode me with spurs trying to get me to properly study and do my homework. I improved a little, although not nearly enough. One challenge that was almost insurmountable was the dryness of the writing style in which chemistry, economics, and mathematics textbooks are written. The Sahara desert isn't as dry as my books were. Pharmaceutical companies don't make sleeping pills as potent as those books. On top of this, I was habitually staying up until midnight and then having to get up at six the next morning to have time to shower, eat breakfast, and catch my five-days-a-week eight o'clock calculus class. I was constantly short on sleep. We had been seated alphabetically – which meant I was in the back row about fifteen miles from the blackboard and the droning, soft-spoken graduate student with the tiny handwriting who was teaching the class. The room was hot and, inevitably, I couldn't keep my eyes open. Economics class, which was held immediately after lunch, was just as bad. I ended up my first quarter with a 2.61 GPA, out of a possible 4.00. My grades of C in math and the sciences were offset only by an A in English and in labs.

The next quarter I was assigned to the room that belonged to Don Munksgaard and Steve Linduska. Lindy was tall, laid back, and a natural athlete – the ISU coaches had been very disappointed he had decided not to play for the school's team – and, like Kip and Al, hailed from Jefferson. Don was short, slender, and a spirit of fire from eastern Iowa. They made kind of an odd couple, but of course they were best friends. Don, as I mentioned before, was studying civil engineering. He was one of those guys who had to study his rear end off to get B grades and during study hours he'd chain himself to his desk and just attack his assignments. Don succeeds through sheer determination that nothing is going to beat him. Lindy, on the other hand, was one of the few guys in the house who wasn't studying science or engineering. He was a telecommunicative arts major, and Don routinely referred to Lindy's courses as 'Cut and Paste 101, Cut and Paste 102' etc.

On any normal evening during the week, the scene in the room featured Lindy reclined in the easy chair listening to the stereo, which he either turned down to a soft level or silenced altogether by using the headphones out of deference to Don. Don would be hunched over his books, silently and savagely doing battle with the evil spirits of Engineering Mechanics. If Lindy wasn't wearing the headphones, the odds were very good that *I'd* be lounged back in my chair listening to tunes right along with him.

That was the situation one night when I had just gotten up to go off somewhere and screw around. Don looked up from his desk and snapped at me, "Don't you have a physics test tomorrow?" I did, but I hadn't told either of them that. I don't know how Don knew about it. I acknowledged it, and Don said, "Then don't you think you ought to be studying for it? How do you expect to get a decent grade if you don't study?"

I made the mistake of waving him off with a laconic, "Grades don't matter."

You'd have thought I'd insulted his mother. Don sprang out of his chair like a Jack in the Box, shoved his face right up in mine, and started reading me the riot act. I'm not that big, but Don was even shorter than I am and it gave the whole thing kind of a funny-but-serious air. I didn't get a word in edgewise. Don threw one question at me after another, answering each one himself before I could even open my mouth. *"What* are you studying? *Engineering! What* do engineers do? *They solve problems! What* do you think your grades are? *They're an indication of how well you solve problems!"* All the while he was doing this, he was waving his arms like Leo Durocher arguing with an umpire. If anybody else had yelled at me like that I'd have gotten madder than heck. But somehow, with Don, I didn't feel angry at all. The more I listened, the more sense it all made. I actually started grinning, and the more sense it made the more I had to grin. He was completely, totally right. It hadn't even occurred to me that when it came time to look for my first engineering job companies were going to go right to my GPA and look at it first thing. I hadn't had the first clue that low grades would block me from getting into graduate school. I was screwing up badly and, even worse, I hadn't even known I was screwing up.

Don turned me around completely that night. I began watching how he studied and started trying to copy how he did it. I wouldn't take a break unless Don took one. I also slowly figured out that, so far as those eight o'clock classes went – it was physics that quarter – I was going to have to find some way to stay awake in them or I was going to flunk out of this place. My solution to that problem turned out to be No Doz, the little caffeine pills they sell over-the-counter. I wouldn't use them to stay up at night; I used them to stay awake in lecture. Eventually I was able to condition myself to staying awake, regardless of how droning the professor's voice was, and didn't need them anymore. It was already too late to salvage much of my grades that quarter; I got a 2.73. But the third quarter I pulled in a 3.67 – which boosted my cumulative GPA all the way up to a 3.02 – and never got less than a 3.43 ever after that. When I graduated, my cumulative GPA was 3.53, high enough to graduate with distinction. I owe that to Don. □

The biggest event on television in the winter of 1972 – so far as eighteen year old males were concerned –was the draft lottery. I gathered along with my pledge brothers on February 2nd to discover what our fates were going to be. Only the other Rick, Rick Lyons, wasn't personally concerned how it came out. He was in Navy ROTC, intended to stay in ROTC, and go on to service in the Navy after he graduated. As an ROTC cadet, he had a student deferment from the draft. Although all of us were classified as 2S (college student), Nixon had canceled student deferments some time earlier for all college students except those in ROTC, and all the rest of us were eligible to be drafted.

Everybody knew the days of the draft were numbered. The end-the-draft movement was having an effect and in 1971 a senator, Mike Gravel, had filibustered against renewing the draft. What none of us knew yet was just exactly *when* it would end. It was widely expected that this draft lottery was going to be the very last one, and just as widely expected that meant my age group – those born in 1953 – would be the last group who would ever *be* drafted. After all, why would they hold a lottery if they didn't expect to use it? The most optimistic estimate was they would draft only about the first thirty-five numbers; the most pessimistic was that Nixon would find some way to keep the war and the draft going. Pretty much only the diehard radicals thought the latter, but *none* of us expected the draft to actually end as soon as it eventually did. We were all certain numbers one through thirty-five were goners for sure.

I had done a lot of agonized soul searching about what I was going to do personally if my number was called up. In the summer of '70, when I was sixteen and before I knew the extent of the army's My Lai cover-up, before I knew only one man would ever stand trial for it, before I knew even that man would be

pardoned by Nixon, I had found myself caught in between my conviction that the war was wrong and my equal conviction that it was my duty to serve my country in the armed forces. Bill, cousin Brent, and many of my cousins on Mom's side of the family had served, and it seemed right that I should too. I did a lot of soul searching and had tentatively decided that what I should do was enlist first and, if I lived all the way through my service, have the GI Bill help pay for college. But I still wasn't quite sure.

One afternoon while I was chauffeuring Dad from Maquoketa back to Bellevue – this was before I wrecked the car – I decided to discuss the problem with him. "Dad," I said to him out of the clear blue, "I think I'm going to enlist after I graduate."

That was as far as I got. I was surprised by the vehemence of his reaction. *"By God, you'll do no such thing!"* he thundered. You see, Dad was conflicted about the war too. He hated the war and thought America had no business fighting in Vietnam or anywhere else in the world. But at the same time he had nothing but hate and contempt for those people who were evading the draft or burning their draft cards. In his eyes, they were traitors to their country. That did *not* mean he wanted his youngest son to volunteer and be sent to Vietnam. If I was drafted, that was one thing. Jumping the gun, so to speak, by volunteering was something else altogether. He had already sweated through the worry that Bill would end up being shipped over there. He wasn't about to go through that a second time. He made me promise I would not voluntarily enlist. Dad was a veteran, had seen first-hand what war was like, and in this matter what he thought carried a lot of weight with me. I promised him I would not volunteer.

Now on February 2nd, 1972, I was waiting along with all the other guys to find out what was going to happen to us. I had made my decision about what I would do if I caught one of the unlucky first thirty-five numbers. If I was drafted, I would go. I would not flee to Canada, as many did. I would not try to hide and wait out the draft by enrolling in ROTC. I thought that would be the same as breaking my promise to Dad. I *couldn't* bring myself to use ROTC just to hide from the draft for up to two years, the amount of time you could belong to it without incurring a military obligation. If I joined, I'd have to go the full distance. And *that* would break my promise to Dad. At the same time, My Lai and the army's failure to punish anyone for that hideous crime and their attempt to cover it up had rendered its leaders, and Nixon, dishonorable and despicable in my eyes. So, I could not flee the draft; but I could also not keep my personal honor *and* participate in waging an immoral war. There was, as I saw it, only one way to keep my honor if I was drafted. I could not fight this war for my country, but I *could* go and die for her. For me Vietnam would be a death sentence. There was no other way out of my moral dilemma.

So I waited with dread and in torturous suspense for them to pull the numbers one by one. When I learned what my number was, I almost jumped out of my skin with relief. One hundred seventy-three. They would have to draft almost half the eighteen-year-olds in the United States before they got to this number, and *nobody* thought the draft could possibly go that high in its waning days. I made a silent prayer of thanks to God in my heart. It wasn't going to be necessary for me to die for my country.

None of my brothers got one of the goner numbers either, and so we were all pretty overjoyed for ourselves and for each other. My friend Norval, on the other hand, wasn't so lucky. Norval was going to school here, too, and living in Friley Hall, which at that time was reported to be the third largest dorm in the United States. His number, if I remember correctly, was seventeen. He and I were both certain he was a goner. Norval was on his way to Vietnam. It was just a matter of time now.

He was despondent over it, and I thought it was the cruelest of ironies. Here was this quiet, gentle soul, this not-quite-hippy who never talked about politics, never marched in protests, never smoked, never drank or did drugs, this peaceful young man who just wanted to live his life for himself and let others do the same, and he was the one who was going to be made to go.

"I don't know what to do, Rick," he told me sadly. He had a decision to make, and he was in misery over it. "Do you think I should go to Canada? I don't know what to do."

No one can impose a duty or an obligation on another person. It has to come from inside, from your

own heart, or it isn't a duty and it isn't an obligation. *You* have to take it on *of your own free will* or it isn't a moral choice. No preacher, no book, no parent, no person can force a moral choice on another person. Society can make certain actions crimes; society can punish its criminals. But society cannot dictate what morality is to any single person. If you don't know in your own heart something is right or wrong, if you don't *feel* the rightness or wrongness in that inner place where God will touch you if you let Him, nobody else can make it right or wrong for you. Norval was face to face with making the most awful decision of his life. I thought I knew exactly how he was feeling. I had had to make *my* choice and it had been terrible and painful and frightening. *I* wasn't going to judge his choice. I might agree it was the right thing, or I might disagree with his choice, but I wasn't going to pass moral judgment on his choice whatever it turned out to be. Something else John Stuart Mill had written came to my mind as we talked:

> *If all mankind minus one were of one opinion, and only one person were of the contrary opinion, mankind would be no more justified in silencing that one person than he, if he had the power, would be justified in silencing mankind.*

I could not make Norval's choice for him, but he had a right to know what his options might be. He was asking for my advice as a friend, and I knew something he did not. "You could get a draft deferment, Norval," I told him. He looked at me with a flicker of anger, thinking I was teasing him. "Very funny," he shot back. "Nixon canceled all the deferments."

"All but one," I said. "ROTC. If you're in ROTC, you're deferred and you don't have an obligation to go into the army for the first two years. By then the draft will probably be gone." He looked very thoughtful after I said this, and some of the hopelessness left his eyes.

A few days later I was walking along the main street on campus heading back to the frat house when I saw a diminutive Army ROTC cadet walking toward me. I didn't pay any attention to him, but just as we met up I heard a familiar voice say, "Hi, Rick."

I stopped in my tracks and stared at him. "Norval?" I couldn't recognize him at all. His long, shoulder-length hair was gone, replaced by a neat short crop. The mountain man's beard was gone; only a trim little mustache was left. I'd never seen Norval's face clean-shaven before. In his new uniform he looked just like one of those little British army majors you see in the movies. And he was smiling. The gloom, desperation and despair were gone. Over the next year when we'd see each other now and then, he'd often complain about all the 'Mickey Mouse' ROTC put him through, but he stayed in it until the draft ended in 1973. Then he went back to being Norval again. He graduated with distinction in electrical engineering the same year I did and ended up serving our country by working at China Lake as a civilian.

There are two other guys I want to mention in connection with the draft. I never actually knew their names. They were in several of the same classes I was, and I'd often see them together on campus. They must have been close friends because where I'd see one of them I'd also see the other. They always sat next to each other in class and I never heard either of them speak very much except to each other. I thought of them as 'Frick' and 'Frack' just to keep them straight in my own mind. On February 2nd, Frick's draft number came up one, Frack's came up two. They both disappeared from campus on the same day less than about a week later and I never saw or heard about them again. I assumed they'd fled to Canada, and I didn't judge them for that choice either. The draft ended in 1973 without calling up a single one of us born in 1953. It turned out all that worry and heartache had been for nothing. □

We didn't talk about the war inside the frat house, and the house took no active part either against it or supporting it. We couldn't. Some of the guys were in ROTC and planned on serving our country as officers after graduation. Others of us, like me, thought it was an immoral war and our country was in the wrong for being part of it. Still others had even more radical leanings, although no one actually went so far as to *be* a radical. Nobody among us had started the war, nobody among us could stop the war, nobody among us would have been anything but elated if the war did stop. Arguing about it among ourselves would serve no purpose whatsoever because there was no way whatsoever we could all be united under one opinion except for all of us wishing it would end.

There *was* a large and vocal anti-war movement on campus and some people in it did think of themselves as radicals and anti-establishment. Next to Berkeley, or even Iowa City, it was a pretty peaceful and tame anti-war movement. No sit-ins. No public draft card burnings. No riots. One day in the spring of ’72 I was coming out of the gym after PE and found the four lane road between the gym and the Navy ROTC building packed with hundreds and hundreds of protesters. I don’t remember exactly what Nixon had done to set us off; he did so many things that outraged us it would be impossible to remember what this one was all about. But Navy ROTC was the strongest and most visible ROTC program on campus and whenever Nixon stirred anything up, Navy ROTC was always the first to hear about it. People were shoulder to shoulder in the street, some were waving signs, others trying to get a chant going amidst the incomprehensible angry rumble of the crowd. I quietly found an available spot and joined the crowd, ready to do my part in whatever it was we were doing. I had a voice and intended to use it.

The Navy ROTC commander came out of his building. He was wearing his dress whites and carrying a box in one hand and a megaphone in the other. He set his box down and stood on it where we all could see him, a lone, unarmed figure facing a passionate multitude. He lifted the megaphone to his lips and his amplified voice carried across the campus: “What do you want?”

The angry crowd responded in a single primal roar: “STOP THE WAAAAAAAAR!”

He waited until the echoes died down, then raised his megaphone again. “Who? ME?”

The crowd went dead silent. People began looking at each other, and the next thing I knew the crowd just started melting away. It was the greatest example of leadership psychology I’ve ever seen. □

It took our pledge class what seemed to us to be an unusually long time to satisfy the actives enough for them to concede we could stay and be initiated into full-fledged membership in the fraternity. Our general assumption was initiation should take place some time during the winter quarter. The actives did not share this opinion. My own belief is there was a very large gulf between the traditional views and values of the seniors and the more, shall we say, wild west values of the pledge class. Perhaps we didn’t quite exhibit the same kind of freshman spirit classes in the past had exhibited, although it’s hard for me to envision the sophomores in the house as having been all that different from us.

In any case, winter quarter in Ames is a trying time for everyone. In the first place, it’s very cold and very snowy – or at least was in those days. After wearing contact lenses for about a year, I finally gave them up and returned to wearing glasses after I got tired of having my contacts fog over right in my eyes when I stepped out into the freezing winter blast on route to eight o’clock physics class. The physics building was about a mile and a half away from the house, and at times it was a regular Antarctic expedition just getting there. The journey was made a bit more challenging still by the ice polishers.

The university used these little gizmos that were basically riding lawn mowers with a big circular plate covered with bristles under it in place of lawn mower blades. Their purpose was to brush the thick snow off all the various campus sidewalks. Unfortunately, there was usually ice beneath the snow and those bristles would polish it to a fine slippery sheen. Hence their popular name: ice polishers. It was an unusual winter morning indeed when I wouldn’t see at least one person’s feet shoot out from under him and down he’d crash, books, pencils, and everything else flying in all directions. Students didn’t have back packs yet in those days and we carried everything under one arm.

They would also use the ice polishers to remove the snow from Lake Laverne, a little man-made lake that sat between Friley Hall and the Student Union Building. If anyone was inclined to doubt the ice polishers were well named, all they had to do was watch them preparing Lake Laverne so students could ice skate on it and no doubt at all would remain. In very early spring of ’72, one of the ice polishers was out there doing its thing when the ice broke, dropping half the ice polisher into the water. There was always a huge crowd of students coming and going from Friley, and when the ice polisher broke through there was a resounding cheer that probably could have been heard in downtown Ames.

The normal winter day in Ames was gray, cloudy and gloomy. In midwinter it would often get down to twenty degrees below zero and the brisk winds that swept over Ames would often contribute a wind chill factor that could take it down as far as seventy below. In short, winter in Ames was generally awful and everyone – pledges, actives, dormies (students who lived in the dorms), professors – spent a lot of the winter quarter in very bad moods. Most dropouts at ISU seemed to happen during winter quarter.

At one point that winter things degenerated to the point where tempers flared and the entire pledge class came within an inch of walking out *en masse* with the idea of forming our own living group. I would say there was plenty of blame to go around for the incident that sparked our near rebellion. It involved a bad old tradition called a 'pledge skip' that got out of control and culminated in the only incident of hazing that ever happened as long as I was living in the house. Al and Jerry were the leaders of our revolt – Al had been the victim of the hazing – and only some very skilled mediation by Don and a couple other guys stopped us from quitting the house. If I remember correctly, the 'pledge skip' tradition ended that winter, a long overdue casualty of changing times. Part of the reason for having the distinction between pledges and actives is that overcoming shared hardships promotes the development of strong bonds of friendship among the members of the pledge class. I think the actives were surprised that winter by how strong the bonds that developed in our pledge class had become in such a short period of time. As we looked at it, hazing one of us was the same as hazing all of us, and after all the high talk from the actives about hazing having no place in *our* chapter, just one incident of hypocrisy coming in the middle of the crummy winter was enough to ignite the fuse of insurrection in all of us.

It's a simple principle, really: Don't make promises casually and never break the ones you do make. Breach of faith is always the most deadly dissolver of the ties that bind any society together.

Whether the winter rebellion had anything to do with our not being initiated that quarter – and I think it did – we began the spring pledges still. There was some grumbling about that in our ranks, but all such grumbling ceased abruptly in the predawn hours of a Monday in early spring when we were all suddenly rousted out of our bunks and herded down into the basement, actives shouting orders at us from all sides. Hell Week had begun.

Hell Week is another old fraternity tradition. Unlike the 'pledge skip' though, I think it is one of the finest old traditions for reasons I'll try to make clear. We all knew what was happening immediately; we'd seen John go through it earlier. As they lined us up downstairs, all of us found it nearly impossible to keep big delighted grins from breaking out on our faces, even though every time one of us did grin there were three actives in his face yelling harshly to 'wipe off that grin!'

Hell Week is called that because its main characteristic is very, very little sleep. There is a purpose for this. By the time you get to the end of the week, you're in such a high state of exhaustion that the actual initiation rituals and ceremony penetrates right down to your soul. It's a transformation. You don't really join your fraternity; you *become* your fraternity and the men in it become as family to you. That's something no one can really understand until he actually goes through the experience. Combat veterans, it is said, come to feel the same way about the men in their unit and for a pretty similar psychological reason. Lao Tzu could have been describing this transformation process when he wrote,

> *Yield and overcome;*
> *Bend and be straight;*
> *Empty and be full;*
> *Wear out and be new.*

This is the gift the tradition gives you.

They ran us around until we had to go to class, and then off to class we went. Going to class was required, even though after a day or so very little of what went on there could penetrate our sleepy minds. Actives roamed the campus, armed with our class schedules, to make sure we didn't cut. They also roamed the library and other well-known spots to make sure we didn't sneak off to catch some sleep. Of

course, all of us did manage to sneak in little cat naps whenever and wherever we could.

After classes they ran us around again all night long. Most of that week is a thick fog to me, but not the rituals and ceremony at its conclusion. I will not describe them here; they are very, very special and, to put it bluntly, not for the uninitiated. They are to be lived and experienced, not described; they are to be felt, not explained. The closest I can come to sharing the experience is to quote Lao Tzu again:

Something mysteriously formed,
Born before heaven and earth.
In the silence and the void,
Standing alone and unchanging,
Ever present and in motion,
Perhaps it is the mother of ten thousand things.
I do not know its name.
Call it The Way.
For lack of a better word, I call it great.

At the end of the ceremony we were initiates, active members of the fraternity. They packed us off to get some sleep and each of us just face planted in our bunks. Several hours later, and greatly refreshed, we went to the celebration party our brothers threw for us, glorying in the day before again having to crash and get some more sleep. It was the highlight of our freshman year. □

Our new status as actives wasn't the only change that took place in spring '72. Spring is when the new house officers take office and the elections had ushered a primal force of nature into our house presidency (officially called the Eminent Commander or EC). His name is G. Alan "Large Al" Peterson.

Everything about Large Al is larger than life – that's why we nicknamed him Large. You've heard of the 'Big Man On Campus'? Forget about it. We had the Large Man On Campus. If you don't think leadership makes all the difference there is, you've just never met anyone like Large Al.

The previous officers had been relatively quiet, placid guys who were content to more or less let things take their course. If the number of unoccupied desks in the study rooms of the house is any indicator, the frat had been languishing on their watch. Quiet, placid, and laid back were unknown adjectives to Large. He was the volcano in a corn field, combining the won't-take-no-for-an-answer drive of the Lyndon Johnson of the pre-war Great Society days with the get-the-country-moving-again inspirational qualities of President Kennedy. He came into office determined to take us in a new direction, and was famous for meeting any hint or inclination by anyone to do anything less than their full part in making it happen with his watchword phrase, *Get with the program!* And everybody did. We all got with the program. When I severely sprained my ankle playing basketball that quarter, and was hobbling around on crutches so badly I had to have someone get copies of the lecture notes from my professors to keep from falling hopelessly far behind, Large helpfully pointed out many things even a one-legged man could do for his fraternity.

His presidency marked the decisive moment when the last traces of the sixties really ended at our frat and the seventies really began. He was a never-look-back kind of leader. His number one priority was Rush, which is the name given to the recruiting of new members, and his goal was nothing less than filling every single vacancy in the house. Part of making this happen was a top-to-bottom renovation of the house itself – carpets, furniture, new paint, you name it. He launched a massive fund raising drive reaching out to our alums to pay for the renovation, and Rush became a year-round activity rather than a once-a-year thing. The frat ceased to be a place to live and became instead a Way of Life.

When I say 'year-round' I mean year-round. Summer wasn't excluded. I had hoped to find some sort of a summer job to avoid returning to Bellevue, but economic times weren't so good under Nixon and I could only come up with an offer for a book-peddling job on commission. My lack of enthusiasm for it was matched only by Dad's lack of enthusiasm for it. When I told him about it over the phone, his reply was he needed me back there. I don't think he actually did, but it was a way to keep me from making a summer job blunder while letting me save face about being back in the bakery again. So when summer

came there I was back in eastern Iowa working in the bakery again.

My old Bellevue friends were graduated and gone now, although the younger kids who had hung around us were still around. It would have been pretty much a summer-to-forget except for one thing. Large Al had carved up the state of Iowa like Caesar Augustus dividing the empire into provinces, and there were three of us living in eastern Iowa: myself, Don, and Dennis "Cattail" Keitel from Delmar. Large Al's expectations for us weren't unreasonable. All we had to do was scour the eastern province for the best of ISU's next crop of incoming freshmen and bring them all back with us when school started. Our legions in the other provinces would do the same. It worked, and the pledge class of '72-73 was one of the best we ever had. We didn't quite make the goal of filling every vacancy, but the momentum Large Al built up carried over and the next year we did fill the house with another very fine and very large pledge class. Lao Tzu would have been proud of Large. □

Young Steve Thompson: future chess champion.

The summer of '72 was The Summer of Bobby Fisher. College hadn't left me with much time for playing chess, although I did manage to make it into the semi-finals at a chess tournament ISU had my freshman year. When I lived in Bellevue there was hardly another soul there who played chess. But the summer of '72 was altogether different. Bobby Fisher's brilliant victory over Boris Spassky to win the world chess championship touched off a chess craze all across the country, and I returned to find a Bellevue that had gone mad for chess. While I'd been away someone had opened a Youth Center on Riverview Street a block down from the bakery, and that summer they held an open chess tournament. The turnout was amazing.

Naturally, I entered it and I don't think anyone was too surprised when I won it. Being the local 'chess nut' had also been part of my reputation when I'd lived in Bellevue. The real tension and excitement for most folks was focused on the question of who my opponent would be in the finals. That was the person who would actually be the local reigning champion after I went back to college. I thought the best of the new crop of Bellevue chess players was a terrific kid named Steve Thompson, who had been a freshman the year I was a senior. It was clear to me that all he lacked was experience and if he kept it up the day would come when I wouldn't be able to beat him. That day turned out to be called '1973.' It was lucky for me Fisher won when he did. A year later Steve would have cleaned my clock.

My biggest thrill in that tournament was getting to meet *two* Grand Masters. They were the father and uncle of Karen Stachura, one of my classmates from the Class of '71. I sure wish Karen had mentioned her dad and uncle were Grand Masters when we were in high school. I'd have been over at her house all the time and she and I would probably have gotten to know each other much better. The Stachura brothers weren't competing in the tournament; there wasn't anybody in town who could have beaten either of them. What they did do was come down to the tournament and play side games with kids. Karen's dad would lose on purpose. You'd make a move, he'd look at it and a little smile would play across his face. Then he'd make exactly the move you'd have wanted him to make. I would have preferred it if he'd played me for real, but I'm sure the outcome would have been the same as when I played her uncle. Karen's uncle *was* playing for keeps. I'd been having a lot of success with a queen's pawn opening during the chess tournament up to that point. I played it against him and almost before I knew what was happening he had me so tied up in knots all was hopelessly lost. I stopped using that opening after I saw how effortlessly he had demolished it. Grand Masters are just absolutely amazing players. □

Another election was coming that year, and all through the summer it became more and more clear that Nixon was going to be re-elected. Earlier in the spring he had gone to China and Russia and even I had to admit those had been spectacular achievements. I deeply wanted the Nixon years to be over and for honor and leadership to return to the presidency, but I wasn't kidding myself. George McGovern, the Democratic candidate, was waging a campaign of incredible blundering and ineffectiveness. Dad thought

he was a pussy and, to be honest about it, so did I. American troops were being gradually pulled out of Vietnam – although we all knew that could be turned around in an instant by one order from Nixon – and there was a lot of talk about peace negotiations aimed at ending the war – at long, overdue last.

The liberals were being pounded by the issue of busing, which they deserved to be. I understood what they were trying to do in their 'we know better than you' ruler's fashion. They were trying to give kids stuck in bad schools a chance for a better education. I was all for that objective. But you don't do it by depriving other kids of that same better education, and the way I saw it that's what the liberals were doing. You give kids stuck in bad schools a better education by fixing bad schools, not inflicting them on other kids. Education, I felt then and I know now, really is the magic bullet. It is the *central public good* needed to achieve four out of the six fundamental tasks of government: establishing justice, ensuring domestic tranquility, promoting the general welfare, and securing the blessings of liberty. The liberals weren't helping education, as much as they might have thought they were. They were screwing it up.

The only good thing I had to say about them was that, bad as they were, they were better than the Republicans. The Republicans didn't want to improve education at all. They were the mortal enemies of the education programs of the Great Society and they thought of education as a *private* good – which is another way of saying 'if you can afford it, fine; otherwise shut up and keep that number 9 coal coming.' They had forgotten, if ever there was a time they even knew, the truth Goethe penned when he wrote,

Nothing is more terrible than ignorance in action.

The problem with liberals is their hearts are in the right place on the issues but they latch onto the first simple-minded, unworkable idea they come up, try to order everybody into going along with it instead of providing the leadership needed to find a way that does work, and end up making the problem worse instead of better. They're almost as bad as preachers in this respect. The busing issue had catapulted George Wallace back into the national race until another S.O.B. with a handgun named Arthur Bremer shot him down that previous May. There was nothing about Wallace I liked, but I felt only burning rage that assassinations and attempted assassinations were destroying the electoral process, the very foundation of our liberty. More than once I asked myself, *Where have our best men gone? Where are our leaders? These clowns surely aren't them.*

No, it was becoming more and more obvious that summer we were going to be stuck with Nixon – condoner of the Kent State murders and the My Lai massacre – for four more years. In early summer, on June 17th, a strange little story bobbed up briefly in the news. Six men had been caught burglarizing the Democratic National Committee Headquarters in some Washington, D.C. hotel called The Watergate. What? They wanted to steal the Democrats' mailing lists or something? Maybe they wanted to know who did George McGovern's hair? Idiots. What the heck was there in Larry O'Brien's office to steal? The Handbook of How to Blow Elections? The Moe, Larry, and Curly Guide for Developing Candidates? I remember just shaking my head in contempt when I heard the story. The story promptly sank out of sight again and I forgot about it. □

Fall quarter finally arrived and I returned to Ames. Rush went extremely well that August and we pledged a great class of fine young men, one of whom was Glen's younger brother Lorne. I'd gotten to know and love the Wazny family during our freshman year: Mr. and Mrs. Waz, Lorne, and Glen's darling little sister, Iris. Glen and I were roommates now, up on the third floor just at the head of the stairs. Also on the third floor at the far end of the hallway were Al and Rick, while Jerry and Scott had teamed up to room together on the second floor across the hall from Don and Lindy. Steve, our seventh brother, had ended up being the odd man out when we paired off into roommates, so he had the fun of helping to mentor a pair of pledges each quarter, rather than the one pledge roommate the rest of us had.

The new pledge class included five legacies – younger brothers of guys already in the house. There were a dozen more guys in addition, including a couple of second-year guys we had pledged the previous spring when Large Al's program got rolling. I really liked all these guys. One of the things I noticed about them within about the first week or so was, unlike my pledge brothers and I had, they formed a cohesive –

and very clever – team almost right away. How did I find out? Chess.

There were almost always guys coming through Rush who liked to play chess, and we were ready for them. We'd have two guys designated to be available to play chess with any prospective pledge who happened to mention he liked a good game. One of our guys was designated to take it easy on them, let them win if possible without making it obvious. The other guy – me – had the job of beating them at chess. *Throw down a challenge,* Andrew Carnegie had said. I was there to give them that challenge, a temptation to seek out after they pledged.

About a week or so after Rush ended, there came a knock on our door one evening. It opened and through it came one of our new pledges, a bottle of beer in each hand. Iowa had turned into an eighteen state for drinking, so it was perfectly okay for our pledges to drink in the house now. "How 'bout a game of chess?" he asked.

No one ever had to ask me that question twice. He handed me one of the beers, we set up the board, and had a game. Just one. I won, he thanked me politely for a good game and left. A second one came in, a bottle of beer in each hand. "Feel like a game of chess?" he asked.

It was a setup. Every time I beat one of them, another one would come in, carrying two more bottles of beer. Long before I worked through the entire pledge class, I was getting pretty sloshed. It was a mighty clever plan on their part, but they made one mistake: They sent in all their best players to face me first while I was still sober. By the time all those beers were taking effect, they were down to the guys who barely knew how to move the pieces. I beat the entire pledge class and none of them would ever play me again. If they'd juggled their lineup a little, it would have been a real different story. □

Glen and I were in complete agreement that our room was going to be a serious study room. Both of us were coming into the courses in our majors, civil engineering for Glen and electrical engineering for me, and we both wanted to do well in them. We set up a room rule that six o'clock onward every evening from Sunday through Thursday was quiet time in our room when the first and only order of business was going to be studying. My own 'work hard' routine on those days would usually go something like this: dinner from five to five-thirty; a little basketball or volleyball in the small court in the back yard of the house from five-thirty to six; hit the books from six to midnight; hit the bunk at midnight with a wakeup call on the call sheet. About the only variation in this routine happened once a week when both of us went to the house's weekly chapter meetings, which were held right after dinner and usually didn't last more than about an hour unless something out of the ordinary was up. After chapter, it was straight to the books.

Once in awhile this routine was disrupted by outside events. The evening of November 7th, 1972, was one of these. It was election day, the first election where I was old enough to vote. Like many other students, I was registered in Ames and earlier that day I had been down to the polling place and cast my first-ever ballot. It had been twelve years since that night in 1960 when Dad had let me pull the levers to vote for the best men. Voting isn't a privilege; it is the most fundamental duty an American citizen has. Everything else in our country, all our checks and balances, turns on what happens in those thousands of voting booths all across the country on the first Tuesday after the first Monday in November in even-numbered years. I felt that way in 1972; I feel that way today. 1972 was the first time I ever got to stand up and be counted; I've never missed or skipped a first Tuesday after a first Monday in November since that day. Too much depends on it. Just one time in my life I was out of the country on election day, and that year I cast an absentee ballot before leaving on my trip.

The excitement of that first time, the satisfaction of this affirming act that at last said for all the world to hear, *I am an American*, was tempered by my certainty that the presidential election was a foregone conclusion. George McGovern certainly wasn't a best man; surely in all of America there still had to be far better *leaders* somewhere. But Nixon was a *wrong* man. The fact that he was good when it came to international affairs – I admitted that in 1972 and I admit that today – didn't make up for the war he

waged against Americans protesting Vietnam, for the murders at Kent State, for his pardoning of the only man they ever tried for the My Lai abomination. He was a *tyrant;* that's what I thought of him in 1972, and that's what I think of him today. The choice we had that November day sucked, but the *ethical* choice couldn't have been more clear in my mind. I voted for the pussy, George McGovern.

Don, who was an enthusiastic Democrat, had managed to convince himself that McGovern actually had a chance to win. This was about the only bad judgment call I've ever seen him make, although this one was a lulu. He and I had talked about the politics of that year more than once, and I had said every time that McGovern had *no* chance of beating Nixon. The only thing his campaign had managed to do with consistency all year was convince almost everyone he was a feckless moron. Don accused me of being a Republican.

Now that evening a group of us were gathered together around the TV to watch the election results come in. Don began to look more and more shocked as state after state after state went to Nixon. The only thing about those results that surprised me was that Nixon didn't win *every* state. He only won forty-nine of them. It was one of the biggest landslides in the history of American politics. For every two of us who voted for McGovern there had been three who voted for Nixon. Don looked at me, his face a study in bewilderment. "Geez," he said (actually, a word to that effect), "I never thought it would be this bad."

The only bright spot in that dark night for America was that the Nixon landslide was only that, a *Nixon* landslide. Congress remained firmly in the hands of the Democrats. True, those hands were liberal hands, which I didn't particularly like. But better to suffer honest fools than outright enemies of the principles I believe in. My judgment about these Republicans, harsh as it may sound, was confirmed just a couple of months later. In his inaugural address, Nixon announced he was cutting the Great Society programs right down to the bone and that is exactly what he did do to the fullest extent he could get away with. The Office of Economic Opportunity was dismantled and other programs in education, public television, consumer protection, and environmental protection have been under siege by the Republicans ever since.

Three other things Nixon did were also to soon come together and set off an economic catastrophe, although nobody saw it coming at the time. Nixon had earlier devalued the dollar to an unprecedented degree, and had controlled the inflation brought on by the Vietnam war through wage and price controls. I had had misgivings about wage and price controls; I didn't really see how the federal government, in particular the executive branch all by itself, was empowered to do this. Dad, on the other hand, was convinced that wage and price controls were absolutely necessary in the emergencies of the times to head off conditions like those he had seen during the Great Depression. I knew I didn't know enough about it to trust my own opinions, and the wage and price controls must have done some good because the economy just wasn't an issue in the 1972 elections.

Now Nixon announced that peace was at hand in Vietnam, and not too long after that, in 1973, it really happened. The war in Vietnam was over and *everyone,* no one more so than me, was glad of that. But Nixon also abolished his wage and price controls immediately after his second term began and the aftermath was a huge recession *with* out of control inflation that would hit double digits within three years. These conditions would last for another decade. But no hint of what was to come was seen as 1973 began. □

On the personal level, fall quarter of 1972 was my best quarter yet for academics. I was on my way to acing my courses in math, physics, and economics. A big part of this was due to Don setting me straight on things the year before, and the rest of it was due to Dr. Stan Williams, my physics professor from my freshman year. His contribution, interestingly enough, came less from the physics I learned from him and more from the fact he was a dynamo on wheels. Professor Williams was a short, intense guy. His field was astronomy and when he talked about 'astronomical distances' he meant it literally. But he also had the amazing ability to write on the blackboard just as fast as he could talk, and he talked *fast*. The first time I ever saw him, he lit off filling the blackboard with equations so fast it was amazing sonic booms didn't come flying out of the chalk. It was eight o'clock in the morning and I was slouched sleepily in

about the third row of the lecture auditorium. As the chalk began to fly I jerked straight up in my seat, *Whoa!* and tried desperately to keep up in taking down what he was writing. I never did succeed in keeping up with his pace, and it didn't take more than a few seconds for me to start missing what he was saying *now* just from the sheer effort of trying to take notes on what he'd already said. I couldn't have kept up with him even if I'd known shorthand, which I didn't.

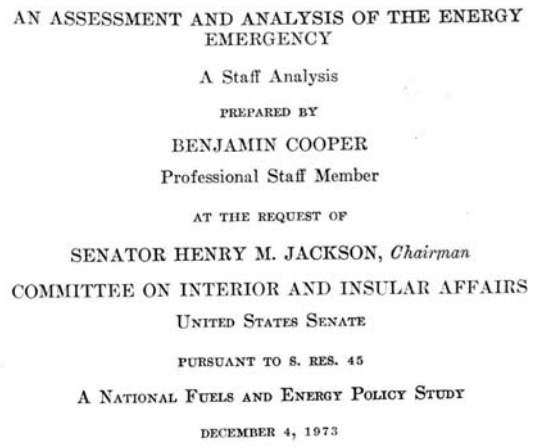
However, I *did* learn how to write fast with enough legibility that I could still make out what I'd written if I didn't wait until the next day to go back over my notes and clean them up. After two quarters of lectures from Professor Williams, every other professor's lectures in the university were a piece of cake. I could take down everything they said word for word, sometimes anticipate where they were going and get there first, and even make on-the-fly comments, questions, and notes in the margins of my notebooks. I might not have learned as much physics from my man Stan as I would have liked, but he certainly equipped me with turbo-charged fingers, ears, and mind. Now as a sophomore I was putting them to good use. My physics professor that quarter, for example, was a normal human being – well, as physicists go anyway – and for the first time in my life I was soaking up the ideas and principles of physics like I was a sponge. At the final exam in that course I ripped through all sixteen physics problems in about twenty minutes, looked them over one last time to check for mistakes, and then – having nothing else to do there – walked up to the front of the auditorium, where he was standing, and handed in my exam. He couldn't have been more surprised. He thought I was coming up to ask him a question. He looked at me quizzically, I smiled and shrugged, turned around and left. My score: 100%. Bless you, Stan, and thanks.

Ironically, the one course I was having a tough time with was my one and only EE (electrical engineering) course: Basic electric circuit analysis I. And for the life of me, I couldn't figure out *why* I was having a tough time with it. There was no one in the frat house who could help Scott and me with this course. We were the only EE students there; all the older guys who were in engineering were in its other disciplines, particularly civil engineering and mechanical engineering. Scott and I were on our own, and he was having just as much trouble with it as I was.

It really and truly isn't very difficult material. Honest. But for some strange reason a lot of EE students find that first circuits course very tough and I was one of them. One thing I can say about it now, with the benefit of hindsight, is that it is the first course an EE student takes that has for its *real* objective the development of pure problem-solving *technique*. All of us thought the course was about figuring out what a circuit is going to do, but that isn't really the central important thing. *Practical* technique is the central important thing. You can write down the entire theory for that topic on one side of one sheet of standard notebook paper; it takes an entire year to master the techniques and the technical definitions that accompany them. I guess I was just unprepared for the idea of a college course being practical. And since it wasn't really a theory course, it was the one course where 'the Stan effect' couldn't really help me. I wasn't having any problem with the theory, but I was missing the main point and note taking never helps solve *that*. It was like having a batting coach who just says, "Here, watch how *I* do it." Hmm. . . Nice hit, coach. How'd you do that?

There was another thing that was bothering me about that course. I'd expected to be meeting up with my first real EE professor in that course. In fact, the guy I'd expected to have for an instructor was none other than my own academic advisor, Dr. C.J. Triska. Instead, the instructor turned out to be a young professor from the physics department, Dr. Benjamin Cooper. The EE department and the physics department had decided it would be good experience for physicists to try teaching EE students and for EE professors to try their hand at teaching physics students. The result was this unexpected swap in instructors. I was irritated by that. I didn't appreciate being a practice student for some kind of professor exchange program. What I didn't know at the time was that I was meeting the guy who would end up being the most important teacher I would have at Iowa State. He would turn out to be, for me, the greatest teacher I'd had since Mr. Bittner in eighth grade six years before.

The unanimous consensus of my classmates was that Ben was a "tough teacher." The reason we thought so was because he gave us quizzes where we couldn't just parrot back solutions we'd worked in doing homework problems. There was always some little twist, something that made the problem just a tiny bit different, so that no rote homework answer was right. In other words, his quizzes were designed to make us think, and that's never popular with undergraduate students. His exams were the same, only even more so. But, you see, that's *exactly* what we needed to learn to do – to see different problems in the light of *common methods for deducing answers*. It turns out that developing this skill is what makes all of science and all of engineering work. Parrots don't make good scientists or engineers. At the time I didn't know this; I didn't even suspect it. Like the rest of my classmates, I thought I supposed to be a parrot, pretty blue feathers and all. But it is the practical skill that underlies everything else.



AN ASSESSMENT AND ANALYSIS OF THE ENERGY EMERGENCY

A Staff Analysis

PREPARED BY

BENJAMIN COOPER

Professional Staff Member

AT THE REQUEST OF

SENATOR HENRY M. JACKSON, *Chairman*

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

UNITED STATES SENATE

PURSUANT TO S. RES. 45

A NATIONAL FUELS AND ENERGY POLICY STUDY

DECEMBER 4, 1973

Cover page of the report Dr. Cooper wrote on the energy crisis for Senator Jackson in 1973

Ben was my teacher in EE courses throughout my entire sophomore year, and by the end of that time he had managed to teach me, by means as painful as they were relentless, this most important of all lessons. That is why he stands side by side with Mr. Bittner tied for the best and most influential teacher I've ever had. Mr. Bittner taught me to love science; Ben taught me how to *do* science. When he left Iowa State on a leave of absence at the end of my sophomore year to work as a Congressional Scientist Fellow of the American Physical Society, I felt both like I was losing a friend and like an apprentice losing his Master. It turned out that Ben wrote the staff analysis on the effects of the Arab oil embargo for Senator Henry Jackson that was used by the government to respond to the energy crisis the embargo had caused. He sent me a copy of it later, with a brief handwritten personal note to me in blue ink, and I still have it. It is my only memento from this man whose teaching profoundly changed my life.

But it took him awhile to change this nineteen year old parrot with pretty blue feathers into a scientist. I got a B in his course and blew my first real shot at getting a 4.00 at ISU. His final was my last one during finals week that quarter, and when it was done I knew I hadn't done well enough to make an A. When I got back to the house, my brothers looked at me expectantly, wanting to know how I'd done. When I shook my head, 'no, I didn't pull it off,' they all gave a rousing cheer. I did really resent that. But they did console me with plenty of beer at our end-of-finals decompression party, so I forgave them. They didn't know how much making that 4.00 meant to me after all the horrible humiliations of my first year.

I had a moment of profound satisfaction that quarter when advising time came around. You see, they had written somewhere – I think it was probably in the university's general catalog – that just before registration time for the next quarter's classes every student was supposed to go and make an appointment to see his academic advisor, Dr. Triska in my case. For lower-division students (freshmen and sophomores) in the College of Engineering this always seemed to me like a pretty pointless exercise unless you were actually flunking courses. Every single course we were supposed to take and exactly when we were supposed to take them was already spelled out in the engineering curricula for the different departments. All you had to do was follow the plan and not flunk anything. I didn't see what there was for Dr. Triska to give me advice about.

But rules are rules, so I'd signed up for an advising appointment and showed up at his door at the appointed time. Triska hadn't seen me since spring quarter advising the year before, and he hadn't been impressed with me very much the two times I had seen him before. A 2.61 and a 2.73 doesn't exactly make a professor start scheming how to recruit you into his research program. So when he said, "Come in," and I walked into his office, he greeted me with, "Well, what do you want?"

I didn't think his tone was very friendly. "Well," I responded, "they said I had to come see my advisor so I'm here."

"Okay," he said. "What's your question?"

"I don't have any," I replied.

"Then why are you here?"

"Because they said I had to come see you." Geez! If this guy doesn't know why we have to do this, why are we doing it at all?

A look came over his face that as plain as day said, 'Why do I get all the dumb ones?' But here I was and I was here for advising so I guess he felt he owed me some. He opened one of his desk drawers and pulled out my file. At least he knew who I was. "Well," he said in a resigned voice, "let's see how you're doing." He opened my file and took a look at it. His eyes fell on my spring '72 grades and he did a double take. He looked at my face, then looked back at the file again, then looked at me again. Now he was wearing a look of amazement on his face. He cleared his throat and managed to say, "Well, it looks like you had a pretty good quarter last time."

"Yeah, I guess so," I said. "This one should be better, though."

He looked in my file again, thumbing through it to find out what courses I was taking. He looked up at me again, and now he was starting to actually look friendly. He invited me to sit down. He hadn't done that either time before. He started asking me stuff like how things were going, was I enjoying my classes, was I having any problems, and so on. Things were fine; yes, I was; circuits was a little tough but I thought I was starting to get on top of it. We ended up having a pleasant conversation for a change and after that day he always seemed happy to see me and interested in how I was doing whenever we'd run into each other.

I always feel good, in a vindictive kind of way, when I show somebody he was wrong to write me off too soon. There's an old song – I think Bertolt Brecht, the guy who wrote *Mack the Knife,* wrote it – that goes,

> Alas we
> Who wished to lay the foundations of kindness,
> Could not ourselves be kind.
> But you, when at last it comes to pass
> That man can help his fellow man,
> Do not judge us
> Too harshly.

Uh-huh. I'll think about it, Buckwheat. □

At the White Rose Formal (1973)

I didn't date very much in college. Part of the reason, of course, was that between studies and house activities I was always so busy. One purpose of house functions – 'function' being what we called parties at which the girls from one of the sororities were guests – was, naturally, to meet girls. These functions were in most ways the collegiate counterpart to the cocktail party, the main difference being the age of the party-goers and the fact that no one was married. The girls would drink wine coolers and most of the guys would drink beer.

Despite the much acclaimed 'sexual revolution' of the sixties, these functions very rarely led to any hanky panky. Neither I nor any of my brothers would have objected if they had, but somehow I don't think there

was anything 'revolutionary' in our attitude about this. If anything was different it was the casual attitude young men and women adopted toward sex, and this attitude more or less was that if two people you knew did end up sleeping together it was no big deal and no social stigma attached to it. It did *not* mean parties were places where everyone was on the deliberate prowl for a sex partner for that evening.

A better description of house functions was that they were intended to provide the opportunity for young men and women to meet and possibly get to know each other well enough to decide to get to know each other better through the more traditional avenue of dating. I always thought there was something kind of stiff, ritualistic, unnatural, and often not all that different from the 'meat market' bar scene about these functions. I've never been comfortable in big crowds of strangers and tend to make friends with people with whom I share some common interest or experience. That's why I liked organizations like the Thespians when I was in high school. I always knew of at least one common interest I could count on the girls in that club sharing with me. It gave us something natural to talk about right from the start.

If you've ever roamed the bar scene, you know how inane conversations are there compared to just about any other kind of conversation. Look at the kind of pathetic icebreakers people use there. "What's your sign?" Puleeeease. I was born under the sign of Daffy the Duck. Conversations at house functions tended to be like this too. My freshman year 'American Pie' was a hit song and talking about what the lyrics meant was always a good icebreaker. But more generally, what was an engineering student going to use to break the ice with a home economics major? "Hey, baby, what's cooking?"? In my graduating class there were exactly seven women graduating from the College of Engineering and all but one of them were architects. The remaining woman was in metallurgical engineering. After my freshman year I could have counted the women in all of my classes put together on the fingers of one hand. "What did you think of what Professor so-and-so did today?" would have been a good icebreaker if only there were any girls in Professor so-and-so's class.

It didn't escape my notice that most of my brothers who had more or less steady girlfriends knew them from their hometowns already. Norval and I were the only two people from Bellevue who went to ISU. This didn't mean there weren't guys who were good at picking up girls. We had a few guys in the house who attracted young women like magnets. We called them 'the face men.' I wasn't a face man. Kip knew a lot of girls – how and from where was never that clear to me – and every once in awhile he'd try to set me up with one of their friends. They were nice girls, but none of them ever shared any kind of common interest with me. Before too long I got to hate the very concept of the blind date. For me the most important part of the word 'girlfriend' is 'friend,' and if that part wasn't in the picture somewhere I didn't much care about the other part no matter how nice looking she might be. I think the carnal pleasures are pleasurable, of course, and I've rarely been known to turn them down if offered. Well, not very often anyway; I *do* have *some* standards. But the fact is sex by itself isn't enough to anchor a friendship if there isn't anything else there to nourish it. I've always held friendship to be one of the most important things in life and building a lasting friendship takes a lot of time and effort. When the foundations for friendship and love are there between a man and a woman, sex makes it even more wonderful. But I never confused sex with love. The two aren't the same and only one of them is important. I never had enough time in college to squander it on unimportant things. □

A family tragedy struck unexpectedly in April of '73. I learned of it from a phone call. My brother-in-law, Gary, had been killed. Sherri and Gary, apart from the TV and appliance store, had started buying up and fixing up old houses in Maquoketa starting in the middle sixties. They had jumped into the real estate bonanza before most people even knew there was going to be one. Gary was a first-rate carpenter, Sherri has always been able to do anything she put her mind to, and they had been very successful in their real estate and rental ventures. So much so that they bought ten acres of land just south of Maquoketa in a place called Reynerville and were building their dream house on it.

There was a rotting old farmhouse on their land that they wanted to get rid of. It was too far gone to be fixed up. Gary had asked the Maquoketa fire department if they wanted to come out and burn down that

house for practice, but the firemen had declined. So he had set about to burn it down himself. From what I was told, he had poured gasoline around inside the house and tossed a burning rag or something in to set it off. He and my two nephews, Bryon and Scotty, had stood off at a safe distance waiting for the house to catch fire.

Many, many minutes passed and nothing happened. Gary wasn't a reckless guy. He waited and waited and waited, and then he finally decided something had gone wrong and the fire hadn't caught. He walked back up to that house to see what had happened and just as he walked through the doorway the entire house exploded. I was a pallbearer at his funeral, and it was one of the saddest days of my life. □

Winter quarter of 1973 was just as crummy and miserable as winter '72 had been. I pulled an A from Ben that quarter and another one from an engineering mechanics course, but my other three courses all came in with B grades. Except for my freshman year, it was my poorest academic quarter. It was hard to concentrate because my mood pretty much matched the weather. I suspect the weather was a factor for my other brothers as well because the house politics leading up to new officer elections for the spring turned a bit nasty and that just added to the overall winter doldrums. If I remember correctly, that was the quarter when Scott switched from EE over to architecture, and I came within a hair of changing majors myself. There seemed to be a high level of attrition among my classmates that quarter, which reflected a common observation that if someone was going to abandon engineering studies, winter quarter sophomore year was the most likely time for it to happen. The common folklore was if you made it through that quarter, you were going to sail on to graduation. I made it through, but it was a very, very near thing. In the end it was Bill who convinced me to hang in there.

Even the longest winter ends eventually and spring brought better times. Money was a problem for me that quarter. I hadn't been able to make enough to last the entire school year the summer before and for awhile the financial situation looked pretty desperate. But Bill saved the day there, too, by loaning me five hundred dollars. That's five hundred *1973* dollars. It took me a long time before I could pay him back, but in all those years he never once mentioned it.

I was determined to not have to work in the bakery again when summer came and so I was thrilled when I learned there was something called a co-op program, officially sanctioned by the college, where a student could actually work for a company doing pre-engineering or engineering work. You would work for them for one quarter in the school year plus the summer. It added a year to the time required to graduate, but money would no longer be a problem. I would have junior standing after spring quarter, I had a respectable GPA (3.25 at the end of winter quarter), and all I had to do to be eligible was take some aptitude tests the psychologists at the placement office administered. I didn't lose any time getting over there and signing up for them.

I don't remember any specific details about those tests. All I remember was the written test took about an hour or so and was followed by an interview with one of their staff psychologists. I'd never *really* talked to a psychologist before, so I was a little nervous about that, but he was a pleasant man and we ended up having a nice conversation. There wasn't any weird stuff about my mother or anything like that – which I'd heard somewhere was something shrinks liked to ask people.

When I got my test results back a week or so later I thought they were pretty interesting. One of the things they gave me was a list of careers they said my aptitude and other stuff closely matched compared to people who worked in those fields. They also provided a list of careers for which I was least like the people who worked in them. Bottom of the list, job I was most unsuited for: Bricklayer. Next up: Truck driver. No surprise there as far as I was concerned. But the other list was surprising and very interesting. Number 1 best match: Professor of psychology (!). Number 2: Psychiatrist (!). Number 3: Psychologist (!). I began to wonder if the placement office was running some sort of clandestine recruiting drive. Electrical engineer showed up tenth on the list. As I thought about it some more, it kind of made sense. I was an EE because I wanted to work on electronic brains. If I wanted to work on electronic brains, it made sense I ought to have something in common with psychologists.

But the professor of psychology thing made me start to think. It had never entered my mind to become a professor some day. But I was starting to understand that professors were more than teachers. Teaching is a big part of what a professor does, but the other big part is research. Hmm. I thought about my new buddy, Dr. Triska. It didn't look to me like anything he did was all that strenuous or required some ability I wouldn't be able to acquire in time. Become a professor? Hmm. So I strolled over to his office after my last class one day and happened to catch him while he was in there. He smiled warmly.

"What does it take to become a college professor?" I asked him without any warm up. The question must have taken him off guard because a bewildered look passed over his face. He kind of tugged on his chin for a minute and then said, "Well, it's pretty much established that you have to have a Ph.D."

"Is that all?" I chimed right back. Another look passed over his face, kind of a *What do you mean, 'Is that all?'* look. "Yes," he said finally. "That's all."

"Okay, thanks!" I said perkily. I gave him a friendly wave and off I went. I had a refinement on my mission now. Yes, electronic brains, of course. But now I wanted Triska's job someday too.

But, of course, that goal was far away into the future. In the meantime there was the more urgent task of landing a co-op job. The placement office had a sign up sheet for students interested in going co-op. I put my name on it and not longer afterwards I found myself sitting in a little room with a representative of the Collins Radio Company in Cedar Rapids. We had a nice conversation, the interview went well, and at the end of it he said he was going to recommend me for one of their positions starting that summer. It would take a little over a month for them to do all the paperwork and send me the actual offer letter, but that was all just a formality. The money was good, the job sounded great, and I said I was looking forward to working for them. We shook on it. There! Mission accomplished. No more bakery.

What I hadn't counted on was Nixonomics. The economy was just then sliding into a deep hole, with raging inflation to keep it company, and it turned out Collins was to be one of its victims. Just before the end of the quarter, the long-awaited letter from Collins arrived at the frat house. I eagerly tore open the envelope and started to read. 'We regret to inform you . . .' it started out. Collins was cutting costs and my co-op job had been axed. I was furious. *We shook hands on it! We had a deal! How could they do this now?* I'd stopped interviewing as soon as the Collins interview was over, and now I was stuck high and dry with no time to find any other job. I was on my way back to the bakery again. I'm sure Mr. Collins' mother was really a much nicer and more respectable lady than the way I described her to Glen that afternoon. But I never forgave the Collins Radio Company for breaking our deal. □

As spring quarter unrolled, it was time to start thinking about elective courses in the humanities and the social sciences. The first two years of the EE curriculum were carved in stone, as I mentioned earlier. My junior year would be almost as rigidly structured, but it would also be the first year in which I got to choose at least some of the parts of my education. My senior year would have even more choices. I knew the science and engineering parts of my training were on solid ground; the College of Engineering saw to that. But the grander part, the *core* of what it means to be educated, was about to start. I had been reading little snippets of the great ideas of western civilization since I was a kid. We got a tiny bit of it in junior high and high school. I had gotten more of it through the CAP moral leadership course. Nothing in any depth, you understand. Just soul-stirring synopses of it and exposure to the names of the great thinkers whose works were often quoted. I was eager to know these great works in detail, to really know and understand all the ideas and principles the Founding Fathers had leaned on during the original Constitutional Convention. I wanted to be part of The Great Conversation of Western Civilization.

And so I cracked open the university's catalog of courses and began looking for the ones that would bring this so-central knowledge to me. Then I looked some more. Then some more. Where were they? Why couldn't I find them? What course did I take to learn about John Stuart Mill? About Rousseau and the social contract? About *The Federalist* and the reasoning that went into our Constitution? About the great philosophers and the great statesmen? Why weren't they in here? I was only nineteen, but that was

old enough to know something was basically wrong if I could learn these ideas existed when I was in the CAP but could not learn what these ideas really were when I was in college.

But they weren't there. Not anywhere. Where had they gone? I was disappointed, and I felt cheated.

What I didn't know then was just how badly the troubles in the sixties had gutted the soul of liberal education. Not just at Iowa State; the damage was everywhere. The riots and then the war had radicalized so many of the professors, in the humanities especially, that the most important core pieces of a liberal education had been tossed aside and replaced by radical and rad-lib theses that owed more to the spleen than the brain. What did I care about Marshall McLuhan and 'the medium is the message'? It's cheap hogwash. When the student radicals had challenged their professors to say how nineteenth and eighteenth and seventeenth century ideas were relevant to our times, the professors had failed to answer. When the crucial time came to *apply* the subjects they were supposed to be the masters of, they hadn't known how.

The men and women entrusted to pass this precious knowledge down to the next generation failed in their trust, and they failed so completely there is *no* liberal education in American universities today. The ideas that built our country are not taught anymore. Today if you want to learn these things, if you want to be educated and not merely trained, you're on your own. The professors of the sixties failed us and left the generations to come unarmed and vulnerable against the demagogues, the tyrants, and the robber barons to come. When they retired or died, they left a vacuum because they did not teach the future teachers about these things. When education is smashed and broken, it isn't for a year or the span of a degree. The damage lasts for generations. It took me a great many years to replace what the radicals had stolen from me when they threw out the accumulated wisdom of Western civilization and replaced it with their own glandular pulp. What an irony it was that liberals joined hands and marched with the deadly enemies of liberty and justice! I spit on them for that and do not forgive it. □

Brothers: Me, Al, Jerry, and Rick (1973)

House elections put a young slate of officers-elect in charge of running the frat during the coming year. The top three offices went to my pledge brothers, Jerry (Commander), Rick (Lt. Commander), and Al (Treasurer). Considering we would only be juniors next year, and that guys who would be seniors had been losing candidates for the positions, this was nothing short of amazing. I could hardly believe it myself, especially when I remembered how close all of us had come to walking out of the house in '72. But our local politics, strange as they seemed to me at the time, had nothing on what was about to explode onto the national scene.

In the latter half of March, headlines and TV news told an astonished country that one of the Watergate burglars, James McCord, had written a letter to Judge John J. Sirica – 'Maximum John' as the press had dubbed him – saying White House officials had been involved in the Watergate break-in and had ever since been covering up the White House role in it. Three days later, Nixon's nominee to head the FBI, L. Patrick Gray, told a Senate committee that White House counsel John W. Dean – Nixon's own lawyer in the White House – had 'probably lied' during the FBI's Watergate investigation. The Watergate scandal – later the Watergate crisis, later the biggest Constitutional crisis America had ever faced – had begun. And once the flood of revelations began, it didn't stop. They kept coming and coming and coming. Jeb Stuart Magruder, the number two guy in Nixon's Committee to Re-Elect the President; John Mitchell, the former Attorney General of the United States; H.R. Haldeman, Nixon's Chief of Staff; John D. Ehrlichman, Nixon's top White House domestic policy guy: It looked like every single one of Nixon's top men in the White House were involved. If they were involved, I had no doubt in my mind at all Nixon

himself must also be involved. Now I knew who the idiot had been; I was certain of it.

Just before I got back to Bellevue that summer, the Senate Select Committee on Presidential Campaign Activities was gaveled into daily sessions by its chairman, Senator Sam Ervin. The hearings began on May 17th and lasted through the first week of August. As soon as I'd get off work in the bakery I'd go straight upstairs, turn on the TV, and watch the hearings.

At first I could hardly believe the things I was hearing people testify about. As the stream of witnesses continued, my anger and outrage built up, every day of the hearings notching it up to ever higher levels. Watergate wasn't primarily about that clownish break-in at DNC headquarters. The Watergate burglary itself became almost nothing but a sideshow. The White House cover-up wasn't even really about the break-in; the cover up was to protect a host of other unbelievable and systematic illegal activities.

Today there are a lot of younger people who either weren't born yet or simply weren't old enough to understand what Watergate was really about. There are plenty of books around that can lay down the sordid details of who did what to whom and when, but when all is said and done it can all be summed up by one thing: Nixon had tried to seize for himself powers the Constitution delegates to Congress and to the Supreme Court. He had broken his oath to preserve, protect, and defend the Constitution of the United States and had, in effect, tried to overthrow our system of government. I've never seen anybody just come out and say it this way, but that's what he had tried to do. He was a traitor to his country and he betrayed every single one of us. He was the Benedict Arnold of our times. If his burglars hadn't been caught in that stupid, moronic break-in at the DNC, who knows if we would have found out about it before it was too late? I never forgot for a second that the President is commander in chief of the armed forces. Once separation of powers and checks and balances break down, dictatorship becomes possible. That's why Watergate is important, kids. We almost lost the United States of America to what was nothing less than an attempted coup d'etat. *That's* what Watergate was about. It *can* happen here. It almost did in 1972. □

Bill, Sherri, and me in Bellevue (spring break '74). The other guy is a failed suitor who had been courting Sherri. I'm laughing because she blocked him out of the picture.

I spent time with Sherri and my nephews, Bryon and Scotty, when I could that summer. Bryon was twelve years old then – he would turn thirteen in August – and Scotty turned ten in late July. Sherri had gone ahead and completed the building of their house on the acreage and, to everyone's surprise, had decided to go into the business of being an income tax preparer. The TV and appliance store had been sold, and Sherri had taught herself tax law by a combination of self-study and attending a tax school somebody puts on once a year. She really knew her stuff, too, as she proved by taking and passing the examination to become an Enrolled Agent. That means she is licensed to represent people in tax court. You see, if the IRS decides to take you to court, the court is a special court run by the IRS itself and it's one where regular constitutional guarantees, like that pesky right to be represented by an attorney, don't exist. An EA is the tax court equivalent of an attorney. Sherri was now one of those. The IRS soon learned not to mess with her or with her clients. Sherri believes you should pay every penny you owe the tax man – and not one penny more. If the IRS slips up and gives her a chance to re-open a client's back taxes, she'll go after getting back every penny that client might have ever overpaid in taxes over his entire life. Sherri wages a kind of holy war against the IRS fought with tax records and adding machines. □

One of my fraternity brothers got married that summer over in Delmar, a town about thirty miles from Bellevue. Along with all the other brothers in the area, I attended a pre-wedding celebration being thrown in Delmar for him one evening. Because I had to make a long drive back to Bellevue afterwards to go to work at three o'clock, I was careful not to drink very much at the festivities and gave myself a good, long

time for what little alcohol effects there were to wear off before heading back to Bellevue. Unfortunately, I gave myself *too* long a good long time and it was after two in the morning before I set off on the drive back. What I hadn't thought about was what the combination of not getting any sleep and the hypnotic highway driving conditions of the nighttime would be like. Most of that drive was over monotonous stretches of two lane highway with nothing but darkness beyond the headlights. There weren't even any other cars on the road at that time of night. By the time I reached the little town of Andrew, still thirteen miles from Bellevue, I was fighting to stay awake, and at the east edge of town I lost that fight.

At the east edge of Andrew the highway curves gently to the left in a thirty-five mile per hour zone. When I started that turn I was awake; by the end of it, I wasn't. I'd fallen asleep at the wheel and when the highway straightened out I just kept turning. The gentle *thud* of my front wheels running off the pavement onto the grass brought me right back to full wakefulness. I immediately knew what had happened. I'd driven all the way across the other lane and off the road.

Fortunately, I was moving pretty slowly and was able to assess the situation in a flash. There were no oncoming headlights up ahead, and all I had to do was let a telephone pole go by on my right and I could just drive right back onto the road, no harm done.

What I didn't know about was the under-the-highway cattle crossing and its concrete culvert set flush at ground level just on the other side of the telephone pole. In the dark it was completely invisible.

It became *real* visible as soon as I passed the telephone pole and the ground dropped out from under the car. The steering doesn't work too good when the car is airborne. I experienced again that eerie feeling of time slowing down to a crawl. There was a wooden fence with great big wooden posts coming up at me, and the concrete retaining wall of the culvert just beyond it. My immediate and only thought was, *Oh, no. Not again!* The car hurtled right in between two of those huge fence posts and the headlights shattered against the fence with a musical little *tinkle*. Their light faded to black with what seemed like unbelievable slowness. In the next moment there was a great metallic *boom* as the car hit the concrete.

Then time sped up again. I was wearing my seatbelt, but the Buick didn't come equipped with a shoulder harness. The car stopped immediately but I didn't. The seatbelt around my waist made my body pivot around it, my head flew back, and my chin smashed right into the steering wheel, cushioned only by my left thumb.

I don't know how long I was unconscious. To me it was a case of 'bash into the steering wheel then sit up.' But I knew I had been knocked out as soon as I looked at the front of my shirt. I was wearing a yellow shirt only now it wasn't yellow any more. It was dyed red. I'd sliced open the bottom of my chin and my shirt was soaking in my own blood.

Still, except for the fact that I was bleeding, my jaw was so swollen I could barely move it, and my thumb was broken, I was in good shape. I couldn't get either door open because they were pinned by those big fence posts on either side. I'd have to climb out a window. There wasn't much room to do that on the driver's side, so I undid my seatbelt and slid over to the passenger side. It was a hot night and I'd had the windows rolled down, so all I had to do was crawl through and then pull myself out of the ditch. I stood there for a moment or two, sadly looking back down into the ditch at my poor car. The car's front end was kind of crumpled in, so it was obvious she was a total loss. *Well, Wells,* I scolded myself, *when you wreck a car you sure don't screw around.* I was pretty ticked off at myself.

Well, now wasn't the time to stand around moaning about it. I'd have to find some place with a phone so I could let Dad know what had happened. There was a farmhouse right there nearby; I was practically in their front yard. Their dog was going crazy, but he was on a leash and nothing for me to worry about. I walked up to their door and rang the doorbell.

The farmer's wife answered it. Her hair was all up in curlers and her eyes got as big as saucers when she saw this apparition standing at her doorway in his blood-soaked shirt. By this time the blood was

running down my pant legs pretty good too. "Can I use your phone?" I asked. I had trouble getting the words out clearly because my jaw was so swollen. She hesitated just for a second then opened the door and let me in. They had a phone in the kitchen and as I was dialing she handed me a big roll of paper towels. I thanked her and pressed a big wad of them hard underneath my chin. That stopped me from bleeding all over her floor. I noticed she wasn't much of a talker and she sort of kept her distance from me after handing me the paper towels. I can't say I blamed her. I must have been some sight.

Dad answered the phone at the bakery on the second ring. "Dad," I said, "I've had an accident."

"I knew it! I knew it!" he shouted.

"Don't get bent out of shape," I said irritably. I wasn't in much of a mood to get yelled at. "I'm all right. But I need you to come get me." I told him where I was and about twenty minutes later he arrived with the bakery truck. While I was waiting, I wrote down my name and address for the farmer's wife, told her I appreciated her help, that I'd wait outside so I wouldn't mess up her floor any worse, and apologized for getting blood on it. She just kind of nodded. Not much of a talker, I guess.

Legally you're not supposed to leave the scene of an accident before the police arrive. But I was less concerned about that than I was about getting something done to take care of my chin. The paper towels I had pressed into the wound were doing the job of slowing down the bleeding, and by the time we got back to Bellevue the bleeding had actually stopped. But I thought it might be nice to have the doctor sew my skin back over my jawbone again as soon as possible. While Dad was calling Doc Michaelson I went into the bakery's head to look at the wound in the mirror. It didn't look too great, but to my surprise I didn't find it too gross looking either. It was actually kind of fascinating. Turns out there's all kinds of strange looking stuff between the outer skin and the jawbone. Butchers are probably used to looking at stuff like this, but I'd never seen it before. I'm not so sure I could have looked at a wound like this on anyone else's face without feeling sick, but somehow because I was looking at *my* face it didn't seem to bother me very much. After all, appearances notwithstanding, it really didn't hurt too bad, and if it didn't hurt too bad then it wasn't all that bad.

Doc sent word to meet him at his office, which wasn't very far from the bakery. While I walked over there to meet him, Dad got in touch with Eldon, the night cop, and reported the accident. I knew Doc fairly well. He'd been my doctor since we'd moved to Bellevue. I'd gone to high school with his older son and knew his younger one casually. His younger son, Jim, was in Melody's class. Doc arrived very quickly and we went into his office. As I sat on one of those examining tables, he had me tilt my head back and injected some stuff into the wound to anesthetize it while he stitched me up. I don't remember how many stitches he had to use; it probably wasn't more than about a half dozen or so. He'd just finished up when Eldon arrived.

Eldon said he needed to ask me some questions, so I sat there in Doc's office and told him the whole story of what had happened. When I finished, Eldon said he wanted to give me a sobriety test, but Doc said he'd be wasting his time. The drug he'd injected me with would have the same symptoms as alcohol and the test would be worthless. Eldon wrote that down and said I could go home. I thanked Doc, said good night to Eldon, and went back to the bakery. Dad told me to hit the sack, and that's what I did.

When I got up again a few hours later I found, as I'd expected, that I'd been charged with failure to have my vehicle under control. It seemed the highway patrol had insisted. I had to go see the same judge in the same little room, again by myself. This time, though, I knew better. I pleaded not guilty. The way I saw it, I'd had everything under control right up until the second the earth fell out from under me. The judge asked me when I was going back to school. I told him, and he said they'd set the trial for sometime after I got back on the next school break. He said they'd let me know when that would be.

The surprise was they also charged *Dad,* not *me,* with leaving the scene of an accident. That was a considerably more serious charge and Dad really blew up. He ended up getting a lawyer, fighting it, and was acquitted. Somehow in all that uproar they forgot all about me and I never did have to stand trial. □

My ’66 Buick was, of course, a total loss and I had to get another car. It took some looking, but I finally found a ’64 Buick I could buy for only three hundred dollars. Still, this was a lot of money and with Nixon’s inflation surging ahead I was coming up well short on money for the next year of college. Sherri’s father-in-law, Darrell (the same Darrell I went with on that fishing trip to Red Lake years before), was now working in the Maquoketa State Bank and he told me he could fix me up with a 7% student loan. The student loan program was one of the things that had survived out of the Great Society programs, and the sweet part of it was that I wouldn’t have to pay it back or accrue interest on the loan until after I graduated. I hated borrowing money – I still do – but sometimes there just isn’t any other option. With Darrell’s help I got a loan for fifteen hundred dollars. That plus my summer earnings would get me through school for another year.

I did get to see a few old friends and younger acquaintances before the summer of ’73 ended. One of them was Steve Thompson, the kid who had impressed me with his chess playing the year before. I don’t remember exactly where I bumped into him. It was probably the pizza place or maybe the basketball court. He’d shot up in height since the last time I’d seen him. We chatted for a bit, then he asked me if I’d be interested in a game of chess.

Naturally.

We played three tough games. Tough on me, that is. Steve had mastered what is known as the ‘hyper-modern’ game, a style of chess that, so far as I know, wasn’t even around back when I’d learned how to play. When I’d learned how to play, the accepted wisdom was that you controlled the center of the board. That gave you maximum flexibility to attack. The hypermodern is very different. Its strategy is that you *give up* control of the center in order to attack it later. I’d never played against the hypermodern before and it just overwhelmed me. First I lost the first game. Then I lost the second game. Then I lost the third game. I wasn’t used to losing at all, much less three times in a row.

After the third game I looked at Steve with kind of a bittersweet smile. “You’ve gotten pretty good, kid,” I said – grudgingly, I admit. “You’re not *too* bad yourself, *man*,” he replied. Then he gave me an elfish grin and I found myself grinning right back at him. We both knew who the new amateur chess champion of Bellevue was. The torch had just been passed, and to a great kid.

I also ran into a couple old classmates and found out people were still talking about my adventures with the owner of the Hotel. I say ‘adventures’ because the incident I related earlier wasn’t the end of the story. I mentioned before that this guy – we’ll call him R.N., understanding this doesn’t stand for Richard Nixon – became a state representative. Our senior year of high school a bunch of us had gotten to go on a field trip to Des Moines to see the Iowa legislature in action. Two of us, myself and Chris, had wangled an invitation to go down to the house floor and join R.N. during the session. There are some extra seats down there where pages and so on can sit behind the elected official to run errands for him. R.N. was explaining to us how the house worked and waved us an invitation to sit down in those seats.

I sat down in his.

He was a bit taken aback by this, but what was he going to do about it right there on the house floor in the middle of a session? *He* sat down in the other page seat. Butter would have melted in my mouth.

I’d forgotten all about that incident but, after being reminded of it by my friends, I dug out my old yearbook and, sure enough, found a couple of mentions of it:

> Rick, To the only guy I know who can cut down R.N. and still get to sit at his desk in Des Moines.
> Best of luck – Chris ‘71
>
> Some day I hope you get N.’s job. Rick, don’t argue so much – Candy

That first summer of Watergate finally drew to a close and it was time for school again. By and large, it turned out to be an excellent year for the house and for me academically. I had to admire Jerry for taking on the responsibilities of house president when he still had vet school to get into. Jerry turned out

to be the kind of leader who listened to advice and wasn't afraid to take it if it was sound. With Large Al still in the house, I'm sure he must have gotten plenty of advice. During Rush that year we filled the house to capacity for the first time since I'd been there. We did well on the athletics front – intramural athletics, that is; we weren't a jock house – and on the social front as well. One of our guys was even going steady with the daughter of the president of the university. As for me, I was about to turn in the three best quarters I ever had at ISU, including back-to-back four points in winter and spring. I ended that year with a 3.50 GPA and just had to hold that to graduate with distinction the next year. □

My nephews Bryon (left) and Scotty (right) with Chris Taylor (fall, 1973).

Sherri drove out to Ames with the boys for a visit one Saturday that September. Bryon was thirteen and in eighth grade, Scotty was ten and in fifth grade. I would have liked to have taken the boys to the football game – the Cyclones were playing at home that day – but they wouldn't be arriving in time to make the start of the game. So I did the next best thing. I picked up the phone and called Chris Taylor.

Chris was a casual pal of mine, which isn't really saying much because Chris had a legion of casual pals. He stood six feet five inches and weighed in at just over four hundred pounds. He was the 1972 NCAA heavyweight wrestling champion and had won the super heavyweight bronze medal in freestyle wrestling at the '72 Summer Olympics in Munich.

Chris was more than happy to come over and give the boys the thrill of their lives. There isn't an Iowa boy alive who isn't interested in wrestling, and Chris Taylor pretty much stood at the right hand of God in Iowa. When Bryon and Scotty found out they were actually going to have their picture taken with *Chris Taylor!* they were so excited I worried a little about whether we might be looking at an embarrassing plumbing accident or two. But the boys were little troopers and no spare clothing was required.

If you live to be two hundred, you will never meet a nicer guy than Chris Taylor. He was so big he was the only man I know who could walk around outside in Ames in the winter in a short-sleeved shirt without a coat and not get cold. Chris worked part time as a bouncer in a downtown club called the Peanut Tree. One night I was down there and, shall we say, in my cups and for some reason I started giving Chris a ration of B.S. about something. I have no idea why. I won't say I don't know what I was thinking because obviously I wasn't thinking at all. Any other bouncer would have dribbled me out of there like a basketball. Chris could have picked me up with one hand and thrown me so far I'd have been making a landing on the north-south runway at the Des Moines airport.

What he did instead was pick me up, set me back down on my feet with my face to the wall, then he turned around and just leaned on me. Well, I wasn't going anywhere for awhile. I also wasn't giving him or anyone else any more B.S. I had my hands full just trying to breathe and not turn into wall paper. Chris kept me pinned against that wall until he was satisfied I was going to be a good boy from now on, then he let me out. Okay, Chris. No problem, buddy. Buy you a beer? I thought the world of Chris, and when he died six years later of a heart attack at age 29 it was a very, very sad day. □

Nothing much had been in the news since the close of the Ervin Committee hearings at the end of the first week of August. The committee and the special prosecutor, Archibald Cox, had both subpoenaed Nixon's tapes and he had refused, claiming 'executive privilege' made the subpoenas illegal. That fight was making its way through the courts and in the meantime August and September had passed just as if nothing in the world was going on.

All that tranquility ended in an eruption of Halloween madness with the coming of October. First came the sudden eruption of the October War – also called the Yom Kippur War – on October 6th when Egypt and Syria made a surprise attack on Israel in the Sinai and the Golan Heights. The first two days looked pretty bad for Israel but then the tide began to shift the other way. We were following the war on the nightly news broadcasts with mixed feelings. On the one hand, none of us wanted to see Israel destroyed by the Arabs. On the other hand, we weren't without sympathy for the Arabs as well. The last time the two sides had fought had been in 1967, the famous Six Day War, when Israel had been the first to strike. The land being fought over now had been Arab land prior to that war. After the second day, it looked to us like Israel was going to win this one too, which was something Jerry wasn't too pleased about. His family came from Syrian ancestry. "Stupid," he said, referring to the Arabs' decision to attack Israel. "All they've got are camels." What he meant was the Arab armies were too badly outmatched by Israel's. We all expected the Arabs to get their behinds kicked in this war and Jerry didn't like it. No one in the public knew at that time how close the Israelis had come to being routed and defeated, nor that Nixon ordered an airlift of military supplies be sent to help Israel, nor that the conflict was threatening to bring us face to face with the Soviet Union in the most dangerous nuclear confrontation since the Cuban Missile Crisis.

None of the sympathy we did feel toward the Arabs extended to Yasser Arafat and his Palestinian terrorist group. We all still remembered very well the outrage and tragedy of the Munich Summer Olympics when Black September terrorists had invaded the Olympic Village and taken members of Israel's Olympic team hostage. The Olympic Games are the one thing on earth that is supposed to be free of politics, free of conflicts, and free of the deadly grudges nations hold against one another. *Anyone* who violated the sanctity of the Olympic Games we held an enemy of all mankind. We hadn't forgotten, either, that eleven athletes and coaches had been murdered. The hostages had been murdered on my nineteenth birthday. No, Arafat and his thugs were hated by us and that fact more than anything kept us mostly on Israel's side in 1973. Mostly.

Then right in the midst of all this, on October 10th, came the electrifying news that Agnew, Nixon's Vice President, had resigned his office and pleaded no contest to criminal charges of tax evasion and money laundering stemming from bribes he had received while governor of Maryland and had, it seemed, continued to receive while he was Vice President. None of us were sorry to see him go; in the increasingly likely event Nixon himself would be impeached, the prospect of 'President Agnew' lacked any sort of appeal as far as we were concerned. But the news still came as a shock because up until then none of the Watergate horrors had touched Agnew. On October 12, Nixon nominated Congressman Jerry Ford to replace Agnew under the twenty-fifth amendment. That had never been done before. That very same evening, the Court of Appeals handed down a decision supporting an earlier order by Judge Sirica that Nixon had to turn over the subpoenaed White House tapes to Archibald Cox. He had until October 19th to do it.

Then on October 19th came the Arab oil embargo. Until then none of us had ever paid much attention to OPEC. It was an acronym that floated across the news every once in awhile, but now it was suddenly a lot more than that. Saudi Arabia and the other OPEC countries had slapped the embargo on the United States as a direct response to our active support of Israel in the October War. The energy crisis had begun. The move took us – and I think most Americans – by surprise. We weren't combatants and we, like most Americans, knew nothing about the U.S. airlift of emergency military supplies to Israel that had begun on October 13th. The immediate effect of the embargo on us was anger at the Arabs. The longer term effects were going to linger into the following March. In all the uproar over the embargo, hardly anyone noticed that Nixon's deadline had come and gone and he still hadn't turned over the tapes.

The next night, October 20th, Al, Jerry, Glen and I were out gallivanting on the freeway. If I remember correctly, we were on our way back to Ames after some sort of lark in Jerry's home town of Omaha. Why we were even there I no longer remember, but I do remember the stunning news that all of a sudden was coming over the radio. Attorney General Richardson and Deputy Attorney General

Ruckelshaus had been forced to resign by Nixon, Solicitor General Robert Bork had assumed the duties of Attorney General temporarily, and, under Nixon's orders, had just fired Archibald Cox, the Watergate special prosecutor. This would come to be known as The Saturday Night Massacre. It set off a national firestorm and for the first time there were nationwide protests demanding the impeachment of Nixon. Finally. It was the beginning of the end for Richard Nixon.

In the heat and passion that followed The Saturday Night Massacre, anything short of all-out war with the Russians was bound to be anticlimactic. And that was the way it was on October 26th when a U.N. ceasefire went into effect, ending the October War. We noted it in passing. Like most of the country, we were caught up in the raging inferno of Watergate. The shooting war ended; the oil embargo continued.

That was the October Madness of 1973. How any of us got through exams that month is a mystery.

For me and my fraternity brothers, the most visible impact of the oil embargo was the gasoline shortage. My freshman year one of the things I could count on was the gas war that always broke out among the gas stations in Ames whenever quarter breaks rolled around. Pump prices would drop from about thirty cents a gallon down to ten cents a gallon. My sophomore year the local gas stations stopped doing this, to my disappointment, but there was still plenty of gasoline to be had at the stations. After the embargo, there were raging gas shortages everywhere. Gas stations frequently ran out of gas and at those stations where they hadn't run out yet long lines of cars would queue up, hoping the station wouldn't run out before their turn came. At the time there were government price controls on gasoline that required 'old oil' to be sold at prices reflecting what it had cost the oil companies to obtain their oil. When the embargo happened, the oil companies simply withheld their 'old oil' and the result was an immediate gas shortage. In a time of national crisis, the oil companies had seen a chance to make money and they took it.

All this didn't have much of an immediate effect on me personally. ISU was a pedestrian and bicycle campus and my Buick spent most of its time sitting in the house parking lot anyway. It cut back on going to the bars in downtown Ames a little, but the Cave Inn in Dogtown was still within easy walking distance and our house keggers were held at the house anyway. The guy most adversely affected by the gas shortage was Large Al. He had bought a brand new car and since Des Moines was his home town he went down there fairly often. Not long after he got his new car, he filled it up at a gas station where they had mixed water with the gasoline and this really screwed up his car. Large was, to put it mildly, largely upset about that.

There were a few things that did affect everybody. Nixon ordered that the national speed limit on all federal highways be reduced to fifty-five miles an hour. I hated that. The Buick cruised very nicely at eighty miles per hour and the new speed limit added over an hour to the time it took me to drive from Ames to Bellevue or vice versa on breaks. I responded to that by not going home on breaks as often. I also soon learned to get in behind the big semi trucks and follow them on the interstate. The truckers used their CB radios to warn each other where the highway patrol cars and speed traps were, so when I saw a truck zooming along at warp speed I knew it was safe to crank it up and stay with him.

They also tried going to year-round Daylight Savings Time, which they started in January '74. *That* I liked. It meant we had a little more sunlight in the afternoons during winter. If it was up to me, we'd be on DST forever. Unfortunately, a great number of people complained about little kids having to go to school in the morning while it was still dark out. Well boo hoo hoo. I never minded delivering papers in the dark; I minded having to get up so early to do it. They killed year-round DST the following October and winter went back to being the usual crummy dark-all-the-time season it had always been.

The war and the embargo put the Arabs in the spotlight like never before, and this led to an interesting conversational innovation. I'm not sure if Jerry started it or if Al did, but all of us soon developed the habit of pointing out beautiful co-eds – previously called 'goddesses' – with the phrase, "Oh, man! I'd sell my mother to the Arabs for that girl!" It turned out this led me to accidentally commit a small international *faux pas* one afternoon.

One of my out-of-the-house friends was my lab partner in our machines classes, Ahmad "call me Al" Al-Sarraf. Al was from Kuwait, although most of the guys mistakenly thought he was from Saudi Arabia and, equally mistakenly, thought he was part of the Saudi royal family. Al was a great guy and he was a young man with a Mission in Life. After he graduated and went home, his Mission was to help electrify his country, much as the Tennessee Valley Authority had once brought electricity to that part of the U.S. The reason people thought Al was in the Saudi royal family was because he rather frequently bought himself new cars – there wasn't much doubt that Al's family had to be well-heeled. We used to accuse him of buying a new car whenever the old one ran out of gas. "Al, we have these things called 'gas stations' in this country," we'd tell him. But Al had a good sense of humor and took this all in stride. He spoke perfect English except for the fact that he pronounced my name "Reeeck" instead of "Rick."

Our labs ran from 3:00 to 6:00 and that meant they got out too late for me to eat at the house. Instead I'd usually stop by the Burger and Brew on the way home and grab a burger for supper. They made the best burgers in the world there, excepting only the burgers Mom made. One evening Al and I were walking down to the Burger and Brew when he nudged my arm and said, "Hey, Reeeck, look over there." I looked, and across the street was one of the most beautiful co-eds I'd ever seen. She was art perfected in the flesh. Automatically, I said it: "Oh, man! I'd sell my mother to the Arabs for that girl!"

Then I remembered who I was with. My face turned all red with embarrassment and I turned to Al to apologize. Al was looking at me a little funny. Then he said, "We don't want your mother. How about your sister?" That made me laugh and Al gave me a grin.

He was a great guy. One of the best. □

My junior year was the year when my mission to work on and contribute to electronic brains hit a major snag. I was finally getting to study and learn how computers are built, what they do, and how they work. This was what I had come to college for! This was what I had majored in EE for! Now I was finally starting to learn all the things I hadn't been able to figure out as a kid. Now I finally knew . . .

That computers were not electronic brains at all.

It had all been a lie. What the newspapers had said. What the magazines had said. What the sign at the Museum of Science and Industry had said. What Walter Cronkite had said. It had all been poetry. It had all been romantic science fiction. Everything I had believed about computers since junior high was false.

Have you ever had your entire life disintegrate into fairy dust around you?

The realization didn't come all in a flash. It built up slowly as a mounting series of inconsistencies that finally added up to the undeniable truth during the spring quarter. That was the quarter when my courses were really diving into the guts of what the machine did, into how computer professionals looked at the machines. Along with this, I was also now getting to study introductory psychology, which *is* about brains and minds – regardless of how much psychologists in the 1970s tiptoed around this description. My junior year was also when I was a subscriber to magazines like *Science* and *The Smithsonian.* By the time of the first round of exams that spring I *knew*. Everything I had been pursuing since I was a kid was only a poem, a dream. It had never really existed at all.

Spiritualists sometimes speak of a 'dark night of the soul.' What I was feeling wasn't exactly what they mean by this, but the phrase still comes mighty close to describing it. What was I going to do now? My Holy Grail, the compass that had directed so much of my life, the purpose in what I was doing was suddenly and irretrievably gone and I felt very empty. What was I going to do now?

I spent some long hours for four nights in a row pacing the long walkways of central campus. I went to that so special place to search inside myself, to find some light, some inspiration, some definition. I needed to sort things out, to sort myself out. And for this I needed my special place. And, as always, slowly, slowly, slowly I began to find it.

'Ask not what your country can do for you; ask what you can do for your country.'

This was the heart of the matter. This was the Promise I had made. Everything I had pursued for half my life, and that had brought me to where I now stood, was for the sake of honoring this pledge. Santayana had written, *Fanaticism consists of redoubling your efforts when you have forgotten your aim.* I remembered my aim. My aim was not wrong. Only what I thought I was aiming at had been wrong.

But what, then? There were so many ways I could conceivably try to fulfill my Promise. Should I throw away all that I had done up to now and start all over? That couldn't be practical. I was too far along now in my studies and too bare in the pocketbook to just throw it all away. If I had been mediocre in my studies, in my learning, that would have been one thing. But I *wasn't*. I had worked hard to *make* myself good at this stuff, and I *was* good now, and I knew it. Not just from my grades. I *liked* the theory; I *liked* the design process I was learning. You can't *like* something that took this much work to acquire and *not* be good at it. I can't, anyway. There had to be some way I could use it if I was to *do* and not just to *ask*.

For two more nights this was all the further I got. Thinking practically was taking me no further. On the fourth night I sat under the stars on a little bench near the walkway, just within the shadows beyond the walkway lamp, and I tried to clear my mind and just feel. I let myself just drift with an open heart. The night deepened, the silence thickened. After I had sat there for perhaps an hour peace and calm slowly mastered me. And when it had, it quietly and gently came to my mind: the words of George Bernard Shaw that Ted Kennedy paraphrased in Bobby's eulogy,

> *You see things; and you say, "Why?" But I dream things that never were; and I say, "Why not?"*

Then I knew. Electronic brains weren't a lie; they were a dream. The fact they were a dream did not negate all the reasons I had had in the beginning – all the potential for good I had seen in them when I did not know they were only a dream. *Could* they be real some day? *Why not?*

But was this wisdom or only stubbornness? There might be a 'why not' waiting for me, a fundamental barrier of some kind that commanded *this dream will stay a dream.* I didn't know. I didn't think anyone knew. The laser was a dream when it was nothing more than Wells' Martian heat ray. Now they were real. And the electronic brain was a dream less fanciful because *real brains existed*. But it seemed a risky thing. Who was I to think *I* might find a secret wiser and more experienced men had not? Who was I, a twenty year old kid, to have the arrogance to even try such a thing? But then I remembered Robert Frost,

> I shall be telling this with a sigh
> Somewhere ages and ages hence:
> Two roads diverged in a wood, and I –
> I took the one less traveled by,
> And that has made all the difference.

A road less traveled by. Maybe electronic brains would always be a fantasy. What if they were? I had a useful skill – or would have in another year's time – that I could put to use. It said in the ISU catalog in the section on the College of Engineering that engineers produced goods and services for the benefit of mankind. I could still do that. I could still do *something* that in however small a way would be doing something for my country. And when I wasn't busy with that I could be learning whatever I had to learn to discover if the big dream could be more than a dream. And if it could be *more* than a dream . . .

I understood. My life had not disintegrated. It had coalesced. No matter which way it happened to turn out in the end *I could not fail.* The only question was *how much* I could do, not what I *might or might not* do. And if the great dream should be realizable, could this be without at the same time helping us to understand *our own* brains and *our own* minds better? I couldn't see how the one was possible without the other hand in hand.

Everything I had thought was my aim since boyhood had been founded on naivety, but it had turned out to lead me anyway to a new and better beginning for what I might do as a man. I felt something

sublime in this, and I thought that for the first time I *really* understood something St. Thomas Aquinas had written seven hundred years earlier: *Three things are necessary for the salvation of man: to know what he ought to believe; to know what he ought to desire; and to know what he ought to do.*

I walked back to the house that night in peace. I knew what I believed, desired, and ought to do. □

The house elections that year returned a more traditional mix of officers. My brother Rick became house president and Glen was elected to the office of treasurer. A likeable junior, Bryan Martin, was Lt. Commander and one of my own pledge sons was elected as recorder, which is an office like that of secretary (the official, not the administrative assistant). Jerry had applied for admission to vet school, which you could do after three years, but had not been accepted. We felt bad for him, but he had always said it was a long shot because he was from out of state and the number of admissions for students from Nebraska fell under a severe quota. Jerry decided to finish out his fourth year and get a degree in zoology. He would apply again then, and if that didn't succeed he would live in Ames for a year after his graduation, become an Iowa resident, and apply again. The Vet College might not have known it, but I was pretty sure eventually Jerry was going to get in. Smart *and* tenacious is a tough combination to beat.

The upcoming year did have one thing in store that wasn't the way I would have liked. It looked to all of us like Rush for next year was going to easily bring in enough new pledges to overfill the capacity of the house. We had a rule for that eventuality. The younger guys are the blood of the house; they are its future. The seniors, on the other hand, usually have a lot of calls they have to answer, such as finding a job after graduation, that takes them out of a lot of the mainstream activities that go into making a fraternity house work. Seniors, in other words, are expendable. The "age" of a senior is determined by his house number – a number you receive when you are initiated that counts how many men the chapter has initiated in its history. The guy with the lowest house number is, by definition, the "oldest" guy in the house. When Rush brings in more pledges than we have room to house, the rule says the oldest guys who are not elected officers have to live somewhere else. If nobody volunteers, the lowest house number goes first. Next year I would be the lowest house number. I would still be an active member. I would still be going to all the house functions. I would still take my place in chapter meetings. Indeed, by virtue of my low house number I automatically held the office of Sentinel, a purely ceremonial office for which otherwise the only duty was to keep the pledges from sneaking downstairs and eavesdropping on the chapter meetings. But I would not be able to live with my brothers. I would not be able to really get to know the new pledges very well. It would be a long, lonely year.

On a brighter note, I had a summer job – an *engineering* job – with Northwestern Bell Telephone Company in the Des Moines office. The job was part of the phone company's 'Management Development Program' – MDP, pronounced "M-dip." I was an "M-dipper." The job only paid six hundred dollars a month before taxes, which was less than I could have made at the bakery. But it would be enough, along with a second $1500 student loan Darrell helped me get, to get me through one last year of school. Just barely. And *this* time I had the offer letter in my hand. There would be no last minute yanking of the rug out from under my feet.

Bill Miller, my fraternity brother with whom I stayed in Des Moines in the summer of '74 while working for the phone company.

My older (blood) brother Bill no longer lived in Des Moines. He had been promoted again and he and Maryann had moved to IBM's office in Austin, Texas, so I couldn't stay with him that summer. But one of my younger brothers, Bill Miller, invited me to stay with him at his parents' house in Des Moines, and Mr. and Mrs. Miller were kind enough to put me up and wouldn't take any room or board money from me. It's something I'm grateful to all of them for to this day.

The Millers were a great family. Mr. Miller was a mechanical engineer. You know how some people whistle or hum when they're thinking? Mr. Miller would make motor noises instead. Mrs. Miller was vibrant and just terrific. They also had

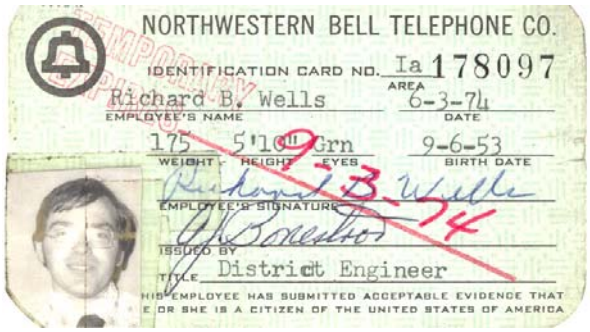
a ten year old son who was serious, hardworking, and in some ways reminded me of me.

Bill had been a swimmer in high school and it showed. He wasn't a very big guy, but he was fit and very active, although from time to time he tended to get the blues pretty bad. This was the era of disco music, and most evenings Bill would head down to one of the Des Moines discos to do some dancing and otherwise have fun. Once in awhile I'd go down with him, but not a lot because I intensely disliked disco music. My tastes over my years of high school and college ran more to Simon & Garfunkel, Credence Clearwater Revival, Elton John, John Denver, Crosby, Stills & Nash, The Mammas and the Pappas, Jefferson Airplane, Jim Croce, occasionally some Motown, and, just for variety, Black Sabbath and Steppenwolf. Glen introduced me to the music of The Moody Blues, which I also liked a lot. There wasn't a lot of new folk music around during those years but I continued to love Peter, Paul & Mary as well as The Kingston Trio. It goes without saying that I liked the Beatles. Disco music with its incessant *thumpa, thumpa, thumpa* and meat market lyrics was just plain irritating. It's possible I might have been the first person in America to say, "I'd rather eat barbed wire than listen to disco."

One night down at the disco I happened to see my pledge brother Scott there with a date. She was a short and a bit heavyset young gal. I didn't recognize her from campus, so I assumed she must have been a friend from Scott's high school days. Scott was the kind of person who tended to oscillate between being fun-loving and a good companion to being overly serious and a little bit self-righteous. This particular night I noticed that he'd seen Bill and me but was pretending he hadn't. I guess he didn't want to introduce his date to his brothers. Well, we can't let that pass now, can we?

Discos employed a disk jockey who played the records – ask your grandparents what records were, kids – and I kind of drifted over to the DJ and requested, "Can you play *Tiny Dancer* for Scott Morrison, please?" He was happy to, so a couple of songs later he announced over the PA, *This song goes out to Scott Morrison!* The Elton John song followed immediately. Well, Scott's date loved it and gave him a big hug. She thought he'd requested it for them; it was 'their song.' While she was hugging him, Scott looked over the top of her head to where I was sitting at one of the little tables. I grinned and raised my beer glass in salute; yep, it was me. Scott gave me a dirty look and I laughed. I never did meet his date.

The Miller's TV set went on the fritz while I was staying with them that summer and Mrs. Miller asked me if I could fix it. If you're an EE you get asked that a lot. I said I'd give it a shot, but secretly I didn't have much confidence I could do it. To my relief, when I opened up the back of the set I found it was one of the old vacuum tube TVs that were still around in pretty decent numbers. Now, my junior year had been the first year they stopped teaching about vacuum tubes in electronics. My freshman year had been the first year EE students weren't required to take a course in glass blowing. But they still had vacuum tube testers around in some hardware stores, right next to replacement vacuum tubes, so I did what Gary used to do in the TV and appliance store. I took my best guesses at which tubes might be bad from the symptoms the TV had been displaying. I marked each one with a piece of masking tape and also marked where it went in the set, removed them, and took them down to one of the stores where they had a tube tester. Sure enough, one of the tubes was bad. I replaced it with a new tube, went back to their house, and next thing we knew the TV was working just fine again. The ISU Electrical Engineering Department's reputation was saved. □


NORTHWESTERN BELL TELEPHONE CO.
IDENTIFICATION CARD NO. Ia 178097
AREA
Richard B. Wells 6-3-74
EMPLOYEE'S NAME DATE
175 5'10½ Grn 9-6-53
WEIGHT HEIGHT EYES BIRTH DATE
EMPLOYEE'S SIGNATURE
ISSUED BY
TITLE District Engineer
THIS EMPLOYEE HAS SUBMITTED ACCEPTABLE EVIDENCE THAT
HE OR SHE IS A CITIZEN OF THE UNITED STATES OF AMERICA

My phone company ID card.

I really enjoyed working for the phone company that summer. They had three fairly big, interconnected skyscrapers in the middle of downtown Des Moines, and the Outside Plant Engineering department was on the twelfth floor – the top floor – of one of these. Outside plant engineering takes care of – you guessed it – telephone gear located outside of buildings. This includes aerial

as well as buried and underground telephone cables and also those little green telephone boxes you see along the roadside. They gave me a phone company employee ID card, which let me pass the security guard in the lobby, showed me where my desk was, and put me to work.

Except for the boss, the guys who worked in Outside Plant Engineering weren't actually degreed engineers. Without exception, they had risen through the ranks of the union to become top craftsmen and then had been promoted into 'management' as what was known as a 'level 1'. This way their wages and working hours no longer fell under the protection of the union contract. Among other things, this meant the company didn't have to pay them overtime, and I noticed all these guys were pretty punctual so far as coming to work and going home was concerned. They did design work using a library of thick three ring binders called The Bell System Practices (the BSP) that had been written at Bell Telephone Laboratories. Their immediate supervisor was a level 2 named Ron, who had been promoted to his position from their ranks. The boss of it all, the district engineer or level 3, was an electrical engineer named Al Bonestro. Someplace higher up still in the phone company's hierarchy was Scott's dad, but I wasn't too clear on what he did and I only saw him once that summer. If you're wondering, no, he didn't have anything to do with me getting that job. He didn't even know I was working there until the summer was fairly far along. In the grand scheme of things I was a 'level one-half' which was about as low as you could go and not be in the union.

The job they had in mind for me was a study of the cable pressure monitoring system for Des Moines' downtown telephone loop. Before I could do much more than learn what a cable pressure monitoring system was, the job was preempted by one of those little corporate emergencies that pop up fairly often in a big company. If you take a close look at those little green telephone boxes along the roadside, you'll notice they all have some kind of alphanumeric code stenciled on them. You are supposed to be able to tell from this code how far away and in what direction the nearest phone company central office is. The CO is the building where all the telephone cables come together and are integrated into the overall phone network. A vice president from Omaha had come out to the Altoona rural section – named after the nearby town of Altoona – and had gotten himself lost. He tried to find his way back to the CO by following the codes on the green boxes, but it turned out that for some reason nobody had bothered to make sure the right codes were stenciled on the boxes. As a result, he had just gotten more and more lost and finally had to plug into one of those boxes with his hand set, call Des Moines, and have somebody come get him and lead him back to civilization. Now, Altoona isn't exactly darkest Africa. The gravel roads are laid out in neat one mile square grids and all you have to do is look at the sun to figure out which direction is which. It's hard to see how anybody could get lost out there; the VP must have been a city boy. Needless to say, he found the episode to be embarrassing. Next thing we knew, there was a top priority order from headquarters to renumber all the green boxes in the Altoona rural section *right now*.

Al handed the 'emergency' to me. I spent about half a morning consulting the BSP to learn what the code was and how to use it. Then I spent roughly the rest of the week going over all the plat drawings for the Altoona rural section and assigning new numbers to all the little green boxes. It wasn't up to me to actually go out and renumber them; one of the union guys would do that. All I had to do was supply the information for the work order.

When I told Al the job was done, he said I should take a car, go out there, and verify by sight that all the little green boxes really were where the plat drawing said they were. The project engineer, a level one-and-a-half, overheard this and said to me, "As long as you're out there, you can make me a dot map."

"What's a dot map?" I asked. He explained that whenever I saw a house I should put a dot on the map of the Altoona area. He would use this for calculating how much telephone cable was needed to supply service to the Altoona area. The rule he used was one-and-a-half pairs of cable for every house. This ensured that if the population grew out there, there would be plenty of cable to supply phone service. It cost the phone company about twenty thousand dollars per mile to lay telephone cable, so this was something they didn't like to do more often than they had to.

Before I could take a company car out to Altoona, I first had to obtain a phone company driver's license. The phone company self-insured their auto fleet and because of this they required anyone who would be driving a company vehicle to pass a driver's test. There was nothing to this, though, and soon I was spending my days cruising around rural Altoona looking at little green boxes and putting dots on a map. The car was a brand new compact car, so new they hadn't even had time to stencil 'Northwestern Bell Telephone' on its doors yet. It was pretty sporty, had a nice air conditioner – which was something my Buick didn't have – and sported a little orange flashing light dome on top. Whenever I had to pull over and get out of the car to schlep through the weeds and look at the number on a green box, I had to make sure this light was on and flashing to warn other vehicles my car was parked on the road. The car radio had a really good sound system and since what I was doing wasn't rocket science I'd listen to music while I was going about the job. At noon I'd drive over to this little diner in Bondurant where they served great home-cooked pork tenderloins with mashed potatoes and gravy. Two dollars a plate. *I can't believe they're actually paying me to do this,* I thought to myself more than once. It sure didn't feel like work.

I had been told that if I ran into any problems I should use my handset and call the engineer who was responsible for Altoona back in Des Moines. One day some kind of problem did crop up – what it was I don't remember anymore – so I got out of the car, opened up a green box, tapped in with my handset and called it in. While I was doing this a tractor came driving by. The farmer was looking at me curiously and it was easy to see why. Here was this guy dressed in a sport jacket and tie, standing up to his knees in weeds, and tapping into the green box with a handset. It probably looked like I was bugging somebody's phone line. He drove by, then drove by again a minute or so later, then came back a third time. The third time he stopped and I just couldn't resist. I flashed my phone company ID in my wallet at him and said, "FBI. Move along, please." He took off like the commies were right on his tail. Or Nixon. Same difference. I was chuckling over that for about the next hour.

A couple days later I was driving along slowly looking for my next green box when a lady came charging out of a farmhouse, waving at me to stop. I did and rolled down the window. "Are you the county engineer?" she asked.

"No, ma'am," I said. "I'm with the phone company."

"You're the one!" she snarled with angry heat. I'm the one? The one what? It turned out her basement had flooded and because there was some phone cable work going on nearby she assumed we were the ones who had caused her basement to flood.

I had no idea if that was the case or not, but the problem was easy enough to fix. "Let me get a crew out here, ma'am," I said. I got out of the car with my handset, tapped into the nearest green box, and called the work crew number in Altoona. A guy came out there inside of ten minutes. He took over from there and I went on about my business of visiting little green boxes. The lady had calmed down as soon as I'd said I'd get some help, and she was practically cooing as I left. □

It would have been a pretty idyllic summer if I could have spent the whole time doing the Altoona rural section renumber, but soon enough I'd run out of green boxes to look at and houses to dot on my map. Then it was back to the Des Moines office to get started on that cable pressure monitoring system study again. But before I could really get going on that, the union went out on strike.

Phone service doesn't stop when the union goes out on strike. Instead, the phone company uses 'management' personnel to fill vital jobs needed to keep the phones working. In summer of '74 this included me. The day before the strike was set to happen we were all sent to a training room in one of the other skyscrapers to learn how to be operators. When the union went out, I was going to be a switchboard operator. You know, "Number, please?" and all that. Our trainer was a stern-faced, bad-tempered operator supervisor. You could tell she was less than thrilled at the prospect of having the bunch of us try to fill in for the skilled personnel. Anyway, she taught us how to do all the various things an operator is expected to be able to do. The next morning we'd get our specific assignments about where we were supposed to

go to play operator.

The union went out just as predicted, and when I came in the next day the picket lines were already all around the buildings. I had to cross them to enter the building, which I felt bad about doing. But I was even more uncomfortable seeing the silent, hostile glares the union guys were giving me. I wanted to say, *Hey, guys, don't blame me!* But I knew how they felt. To them, I was a scab. Of course, while all of us were playing operator or messing up other vital jobs, the ones we normally did weren't being done by anyone. So it wasn't as if the phone company could just cruise through a strike with no ill effects.

But, as it turned out, by the time I got to where I supposed to go the word came the strike had been settled. The union guys and gals promptly came back in and I never did have a chance to mess up somebody's long distance phone call. □

Finally, then, I could get to work on the project they'd planned to have me do that summer. The phone cables that run through conduits under the street are called 'underground' cables, to distinguish them from the ones that are just dumped in a trench and covered with dirt (which are called 'buried' cables). The wires in high capacity underground cables are insulated by paper insulation and then the whole bundle is surrounded by an outer plastic sheath. Paper is used in order to pack more pairs of wires in the cable bundle. But if a crack develops in the outer sheath, water can get in and destroy the paper insulation, which results in short circuits in the phone lines. To prevent this, the phone company pumps dry air under a lot of pressure into the cable sheath. The air is supposed to blow out and keep the water from coming in. The air is supplied by pressure pipes with regularly spaced manifolds. That's the cable pressure system.

The cable pressure monitoring system consists of – or is supposed to consist of – regularly spaced sensors that monitor the air pressure in the cable. When the sheath cracks someplace, the air pressure drops and it's possible to calculate from two or three separate sensor readings where the break has occurred. A crew is then dispatched to repair it.

That works in theory, but it does depend on the sensors being placed in the right places and in sufficient numbers. The downtown loop was a mess. Most of it didn't have any sensors at all, too few pressure pipes were being used to pressurize the cables, and so much dry air was having to be pumped into the overloaded pressure pipes that the pressure alarms down in the basement – actually the third sub-basement, a very spooky place – were constantly tripped. The purpose of these alarms was to alert people to a break in the pressure pipe itself. The union guys had finally just turned the alarm off altogether to escape the non-stop blaring. I ended up submitting a full-scale design proposal for completely re-doing the downtown loop's system since it was completely inoperable the way it was. I did manage to get this done and turn it in by the end of the summer. It was my first real professional design. Whether or not they actually ever implemented it I never found out. □

The weather that summer was typical Iowa weather: one hundred and five degrees by afternoon and ninety-nine percent relative humidity. One evening after work, shortly after I got back to the Miller's house, the temperature began to drop like a rock. In something like twenty minutes it fell from over a hundred degrees to about sixty-five degrees. It chilled so fast my teeth were actually chattering and I had to put a jacket on. Racing in from the south was this perfectly smooth line of clouds, tinted with that very peculiar greenish tint that in Iowa means, 'Uh-oh. Look out!" Leading this eerily smooth line of clouds was a little finger-shaped funnel that I could easily imagine was pointing the way and saying to the rest of the clouds *this way, boys!*

The clouds went sailing overhead and once past Des Moines that funnel turned and came diving down on the bedroom community of Ankeny. Two more arrived at the same time from two other directions. It was probably the worst tornado storm in the town's history.

The next day I was up there with another guy taking a survey of the damage so repair crews could be dispatched to start restoring phone service. Large chunks of Ankeny had just been flattened. One sight I'll never forget was this house that had been completely blown up by the tornado. There was absolutely

nothing left of it but the floor and one little table sitting dead center in the middle of what had been the house. A telephone was sitting on this table and it was ringing. The owners were nowhere to be seen.

On July 24th the Supreme Court ruled in a unanimous vote that Nixon must turn over sixty-four subpoenaed tapes, utterly rejecting the executive privilege claims he had been hiding behind for months. On Saturday evening, in front of live TV cameras, the House Judiciary Committee voted 27-to-11 for the first article of impeachment. On Monday the 29th the second article of impeachment was passed 28-to-10. On Tuesday the 30th it passed the third and last article of impeachment 21-to-17. At long last – far too long in my opinion – Richard Nixon was being impeached for high crimes and misdemeanors. All three articles charged him with violating his Constitutional oath to faithfully execute the office of President of the United States and to preserve, protect, and defend the Constitution.

Article I dealt with the Watergate break-in itself and the cover-up that followed. There were nine counts of impeachable offenses in this article.

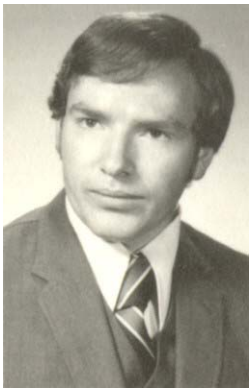
Article II contained five counts of abuse of power, including misusing the IRS 'for purposes not authorized by law,' misusing the FBI to conduct illegal surveillances of U.S. citizens, of creating a secret 'investigative unit' for the purposes of prejudicing 'the constitutional right of an accused to a fair trial,' of failing to act 'when he knew or had reason to know' that his subordinates were engaged in obstruction of justice, illegal wiretaps, illegal break-ins in the office of Daniel Ellsberg's psychiatrist, violations of campaign finance laws (money laundering), and, finally, of personally acting to obstruct justice.

Article III was a single count of failing to produce 'papers and things' lawfully subpoenaed by the House Judiciary Committee itself.

On August 5th the evening news erupted with the story that Nixon's tape of his oval office conversation of June 23rd, 1972, recorded him personally ordering the CIA to halt the FBI investigation of the Watergate break-in. The 'smoking gun' had been found. Nixon himself had been criminally involved a mere six days after the Watergate break-in. He stood convicted by his own words. The story enraged the entire country and our foot-dragging Congress. On August 9th the tyrant Richard Nixon appeared on television and resigned the Office of President in disgrace before the entire country.

The long, dark Nixon years were finally over.

VI. The Years of Ford and Carter



The college senior (fall 1974, age 21).

When I returned to Ames in fall '74 America had a new President and I had a new place to live. I rented a dingy little one bedroom apartment near the stadium in an old wooden complex called the Lincoln Apartments because it was located on Lincoln Way, the main road passing by the university. Because I was no longer paying for board at the frat house, I was on my own so far as cooking was concerned. My apartment was on the top floor and consisted of the one bedroom, a small living room I used as a study room, a tiny little kitchen and a bathroom with a shower. I was not then nor have I ever been much of a cook, and I would spend that last year eating frozen TV dinners until I was sick of them. For a treat I'd occasionally trot down to the Burger and Brew for a burger or a pizza.

I still paid a small amount of money to the house so I could attend house functions. I also got a pleasant surprise from the university. It seemed that my GPA combined with the fact I was now three thousand dollars in debt from student loans had made me the recipient of a full year scholarship. The scholarship covered my tuition for the year, which added up to six hundred dollars. It turned out I needed every penny that scholarship saved me because the Buick decided it was time to go through a series of expensive breakdowns that started draining off my savings for auto repair bills. The scholarship was a surprise because I hadn't applied for one. Somebody Up There somewhere over at the university must

have been keeping an eye on me. Why? Who knows. I wasn't about to question this gift. No, sir.

Lincoln Apartments approximated being fairly clean and was free of rodents. The heating system left a little to be desired – namely heat – during the winter. As for cooling, well that's what windows are for. At night I could listen to the rumble of endless traffic roaring by on Lincoln Way. I couldn't make up my mind which my landlord more closely resembled: a gray-haired hippy or a drug dealer. All in all, my apartment had everything your typical Russian immigrant could ask for. At least it was furnished. Technically speaking. I had a bed, a desk, a chair, a couch, a table, and a pile of cinder blocks with a plank to put my books on. Most of the windows had thin little curtains on them. It turned out not to be necessary to be armed when I went down to use the laundry room, but I still didn't want to leave my clothes unattended down there. Somehow the Cyclone cheerleader squad managed to resist the temptation of dropping by my place to party. Except for occasional dates, I didn't have any guests.

Still, even with all this, I was looking forward to a good year. All my courses were electives. I had decided to focus on electronics, electromagnetics, and communication systems theory within my major. Since there were zero humanities courses worth taking, my other electives were mostly made up of psychology and economics courses. I ended up taking seventeen credits both fall and spring quarters and eighteen credits during winter quarter. One of my fall courses was a three-credit special topics course, practice in teaching, where I *taught* the introductory sophomore circuit analysis course under supervision of a faculty member, Professor Fouad. One thing I didn't know was my choice to take the full sequence in communication system theory would end up introducing me to the bigger world of general system theory, which would turn out to be essential in the years to come for pursuing the dream of electronic brains and for giving me the background I would need to eventually enter the field of neuroscience and become a neuroscientist. At the time I had no idea that decision would be opening up the whole world for me. □

My brother Rick Lyons (fall, 1974).

The year did indeed get off to a very good start despite my Russian immigrant's abode. Then one day my phone rang. It was Scott on the other end of the line. I was surprised and delighted to hear him call, but then he said, "I've got some bad news, and I don't know how to say it except to just say it." Rick Lyons, our brother since we were freshmen, my brother in every way but blood, was dead. There had been a one-car accident in Illinois the night before. Rick was the driver and sole occupant of the car. Now he was gone.

I felt that old, familiar feeling rising up, that awful, icy crushing feeling of grief and hollowness. All I could say to Scott was, "Oh, no. Oh, no," over and over. I couldn't even bring myself to ask how it happened. I knew there was no asking why it had happened. There is no why. There never is. After Scott hung up, I waited only long enough to compose myself and then I went straight to the fraternity house.

The house was in a somber state of shock. Little by little we learned a few details, the most important one being that the funeral would be in Rick's hometown of Libertyville, just outside Chicago. Even before we knew when it would be and where, we began preparing to go to Libertyville. I don't remember how many carloads of us there were. I drove the Buick with four of my brothers riding with me. We stopped just once, briefly in Davenport, on the trip from Ames to Libertyville. Rick's pledge brothers would be his pallbearers at the funeral. His comrades in Navy ROTC came to the funeral too.

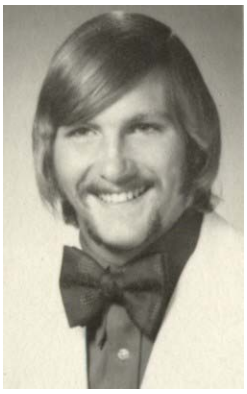
The little funeral cards paraphrased Donne:

> *No man is an island unto himself alone.*
> *Every man's death diminishes me.*
> *Never send to ask for whom the bell tolls.*
> *It tolls for thee.*

It's only partly true, you know. Not every man's death diminishes me. But Rick's did. And when the bell

did toll its slow and somber note it sounded in my ears like *doom; doom; doom.* We sang the beautiful but oh, so sad Navy Hymn for Rick: *Eternal Father strong to save, whose arm has bound the restless wave . . . Oh, hear us when we cry to Thee for those in peril on the sea.*

From the time Scott telephoned me until after we were all back in Ames and I was alone again in my apartment, sleep could not touch me. How long was it? Two days? More? I honestly do not know. I could not tell you what the weather was like at the funeral. To me the world in all that time was gray and dark and not to be remembered. I put Rick into the sacred place in my heart, but for a long time he would not stay there. A sight, a sound, a sudden memory and the gate would open up again and the crushing sadness would return. He was too young to be in that place. □



My brother Greg Garvey (fall, 1974).

The mind has strange ways of coping with grief. The shock of losing Rick had not yet worn off when we lost another brother to another car accident. Greg Garvey was one of our younger brothers who had pledged during my junior year. He was a walk-on on the ISU football team, which means he was a non-scholarship athlete. I remember him coming home from practice covered in bruises because the scholarship players tend to be a bit extra rough on walk-ons. I remember Al asking him one time, "Garve, why do you do this to yourself?" He had answered, "Well, I kind of like pain." We teased him a lot about that answer. Greg's death came, if I remember correctly, during one of the breaks. He was driving on the highway and another car had pulled out onto the road right in front of him. My mind was just not ready to accept another loss of a brother coming so soon after Rick's death, and almost everything about Greg's death and funeral is blank to me. The only detail I remember is Al saying to me during all this, "Another sad day." You want to hear something strange? After losing two of us like that, there was probably a vacancy somewhere in the house and I could have probably moved out of that detestable apartment and back in with my brothers. But that thought never even occurred to me. In my mind there were no vacancies; in my mind, my two brothers were still in the house. □

President Ford did two things almost right away after he took office. Both of them caused an uproar. Of the two, I was happy about the one and angry about the other. He did them both on the same day, two days after my twenty-first birthday.

One of them was the amnesty program for the people who had fled the draft during the Vietnam war. It was a conditional amnesty, but it was still an amnesty. I thought about Frick and Frack, the two boys who had disappeared from campus after pulling numbers one and two in the draft lottery. Had they gone to Canada? Had they come home after the draft ended without any of us being called or were they still there? If they were still there, would they be coming home and trying to put their lives back together? Or had they already built new lives for themselves somewhere? I never knew the answers to any of these questions, but I hoped things had worked out for them somehow.

The other thing he did was pardon Nixon.

I was rabid about that. After all the foul, evil things Nixon had done, after the way he'd trampled on our system of government, I wanted his butt in jail and I wanted it there for as long as humanly possible. Pardon Nixon? It smacked of a new conspiracy. But you know something? In time I felt less passionate about it. I still think Nixon belonged in jail. But I came later to understand two things I didn't understand the day President Ford did that. The first was how much the aftermath of Watergate was still bogging down the running of the government. We had serious, serious problems that only the government could do something about – if anybody could. The country had slid into a crushing recession while inflation was going wild at the same time. Probably the *only* reason there had been a job for me with the phone company that past summer was because the phone company was a regulated monopoly and because even in the hardest times people needed telephones. People's lives were being destroyed by the economic disaster Nixon had left us with.

The second thing I came to understand I didn't think of myself. Somebody else – who I don't remember anymore – pointed out something I hadn't known. It was *Burdick v. United States,* a case that had been decided by the Supreme Court in 1915. The Supreme Court had ruled that a pardon indicated a presumption of guilt and *accepting* a pardon was the same thing as a confession of guilt. Nixon never owned up to being guilty of anything. Not in his resignation speech, not later. But by accepting the pardon President Ford offered him, he had admitted guilt. That, at least, was better than nothing. Not much. But a little. Furthermore, President Ford went before Congress that October and gave them sworn testimony on the matter of the pardon. No President had ever done that before while he was still in office. No President has done it since. It took me awhile, but sometime before the 1976 election I had reconciled one thing at least: Whatever else his politics might be, President Ford himself was a good and honorable man. □

Because I was teaching a class that fall, the EE department had provided me with space and a desk in a graduate students' office so I could hold office hours and be available to my students when they had questions. Strictly speaking, I was only entitled to that space during the fall quarter while I was actually teaching. But somehow or other the department managed to overlook that fact and I kept using that space all during the year. It made a good place to study away from my apartment and since I was spending most of the daytime on campus, including the intervals between classes, it was very convenient.

I was sharing that office with three graduate students, one of whom was studying biomedical engineering while the other two were studying more traditional specialist areas of electrical engineering. They were a fun bunch and I had a good opportunity to learn a few things I wouldn't have been exposed to otherwise just by being around them. I especially found some of the things that Woody, the biomedical engineering student, was doing to be very interesting. Another thing I was exposed to by associating with them was the revolution in very small scale electronics – known as microelectronics and also called the integrated circuit revolution. For the past few years, electronics companies known as 'semiconductor houses' had been finding ways to put more and more transistors on a single tiny piece of silicon. The era of the discrete transistor was rapidly drawing to a close, swept away by advances in manufacturing technology. The era of the 'microcomputer chip' had not quite arrived yet but it was beginning. Even though I knew now that computers were not electronic brains, I was certain that if there were ever to be such a thing, it would require vast numbers of transistors to build, so the IC (integrated circuit) revolution that was just then gathering steam was very exciting and swollen with possibilities. One sign of things to come was the publication by a company named Texas Instruments of a little book, *The TTL Data Book,* that was basically a catalog of many different kinds of integrated circuit 'chips' that could be purchased off the shelf and used to design and build almost anything you could imagine. Like the name implied, the book contained all the information you needed for every one of the parts it cataloged. The grad students led a quick fundraising campaign to pull together enough people so that we could buy copies of this book from Texas Instruments. I got in on it and soon owned a first edition of *The TTL Data Book.*

My teaching was being done for college credit – what was known as a 'special problems' class – and my supervisor and mentor for it was Dr. Fouad. Professor Fouad was from Egypt originally and, although I didn't know it, was already an internationally recognized scholar in the field of electric power systems. The big machines lab in the building where my lab partner Al and I had spent so many hours the year before was Fouad's lab. Now, as it happened none of my three office mates were pursuing power systems as their area of specialization. However, this did not prevent them from playing philosopher about it, and one night it got them into some very hot water with my boss, Dr. Fouad.

I would go 'home' at the end of the school day, either back to my apartment or over to the frat house. My officemates, on the other hand, often hung around in the office until late into the evening. Usually this was to study or to work on their research projects, but sometimes it was just to shoot the bull. It was a bull shooting session that got them into trouble. You see, Fouad's power lab was equipped with about a dozen motor-generator sets. These consist of an electric motor mechanically bolted to an electric generator. The motor would draw electric power from a long panel like the ones you saw in the Jane Fonda movie a few years later, *The China Syndrome.* The power would turn the motor, which would then turn the generator,

which would then generate electric power. The setup was used to teach us about electric motors and generators.

Well, the three Aristotles in our office got to talking one night about how silly it was to draw electric power from the power lines outside the building, transformer it down to 110 volts or 220 volts, bring it into the lab, transform it back up to the higher voltage used by the motors, then use the motors to turn a generator that produced yet another voltage level at its output. Apparently they carried their bull session into the realm of what is called the *reductio ad absurdum*, 'reduction to the absurd.' Carried away by the grandeur of their discourse, they went into Fouad's laboratory and proceeded to hook six motor-generator sets up in series: first generator used to power second motor, second motor used to run second generator, second generator used to power third motor, etc. They really should have known this was a bad idea if any of them had remembered what he should have learned in junior year electric machinery class. If they'd told me what they were planning, I would have warned them off. But they didn't.

You see, motors are basically just coils of wire wrapped around a rotating magnetic core. You already know what would happen if you just stuck a piece of wire between the two slots of an electric wall outlet. One of my pledge sons at the house used to use the large amount of electric current from doing this to cook hot dogs. The only reason this doesn't happen to motors is because when a motor rotates at high speed it produces what is known as a 'back electromagnetic force' or 'back emf' which then limits the amount of current it draws. But the more mechanical energy you draw from an electric motor, the slower it turns and the less back emf it produces. My officemates apparently didn't realize how badly their little experiment was going to overload the motors in Fouad's lab.

So they went merrily ahead with their hookups and threw the switch. The big motors – each one was about five feet long, two and a half feet high, and bolted into the concrete floor with huge steel bolts – began turning ever-so-slowly, much slower than was safe. The guys were standing around watching this and giggling until *kaboom!* a huge section of the control panel exploded from all the excessive current flowing through it.

The next morning I stopped at Professor Fouad's office to make my weekly report on how my class was going. When I stuck my head in, my three officemates were standing at attention in a line in front of Fouad's desk, looking for all the world like condemned prisoners. Fouad in the best of moods was a pretty ferocious-looking man and that morning he was definitely not in the best of moods. He was frowning at these guys and, believe me, he was one guy who *really* knew how to frown. Father Schmidt could have taken frowning lessons from him. Compared to him that morning, I'd say medieval torturers had sunnier dispositions. As I stuck my head in, he glared at me and snapped, *"WHAT!?"*

"It can wait!" I yelped and got the heck out of there as fast as I could. I never asked the guys what penalty they had to suffer for wrecking Fouad's lab, but they were lucky not to be expelled. □

A pretty fair amount of my time that fall went into interviewing for jobs. One thing I wanted was a job that would let me go to grad school while I was working. At that time I knew nothing about the existence of these things called 'graduate assistantships.' I'd never heard of them, and nobody had ever told me about them. I naturally assumed grad school was like undergraduate college, something you had to pay for out of your own pocket. I knew I was going to finish the year pretty much flat broke, so obviously I needed a job and just as naturally it had to be an engineering job. That was what I had been trained to do.

I also wanted the kind of job where I would be doing design work and which would complement my extracurricular pursuit of what I needed to learn to chase my dream of electronic brains. Most kinds of engineering jobs fell short of that requirement. What I wanted most was a job at Bell Telephone Labs or, failing that, IBM's Watson Labs. But with the economy on the rocks, neither place was interviewing or hiring that year. In fact, *any* available jobs that year seemed to fall short of what I was looking for. To improve my chances if and when I *did* find a suitable opportunity, I decided I would front load the job interviewing process with a few 'practice interviews' – interviews with companies I didn't plan to work

for but would give me enough interviewing experience to improve my chances with companies I would like to work for. Companies always interview people they don't plan to hire but whom they don't tell they aren't planning to hire, so I didn't see any ethical conflict in me interviewing companies I didn't think I'd want to work for. Turnabout was fair play as I saw it. Collins Radio had taught me that.

I don't remember Collins Radio being on the list of interviewing companies, but even if they had been I wouldn't have signed up for an interview with *them*. I did interview both Kodak and Honeywell, although nothing came out of either interview. One of my practice interviews was with a consulting firm named Black & Veatch in Kansas City. I did have some curiosity at least as to what a consulting firm did, plus both Don and Dennis had gone to work for them when they had graduated. When that interview later resulted in an invitation to visit B&V in Kansas City – all expenses paid – I took them up on it. Mostly this was for the opportunity to pay a visit to Don and Dennis, but also to verify my impression from the campus interview that the work would not in fact be what I wanted to do. The visit to Kansas City was successful both socially and financially inasmuch as my first job offer that year was from B&V. They offered one thousand and forty dollars per month salary, which turned out to be the lowest offer I was to receive. The job itself, in addition, looked like it would be very unfulfilling.

Another practice interview was with Youngstown Sheet & Tube, a steel mill in East Chicago. I was pretty sure I didn't want to work for a steel company, but I'd never seen a steel mill and was very curious. Again there was also a social motivation for going on that plant interview. It would give me the chance to see and have dinner with Mr. and Mrs. Lyons, Rick's parents. I doubted very much that I would ever see them again after graduation, and I wanted to see them one last time before then. The steel mill did turn out to be a very interesting place, and very enormous. I saw a lot of fascinating things there, but I also saw the dirty, sooty city of East Chicago. I never really appreciated what the word 'slum' meant before that trip. The job they had in mind was also very unattractive and not really an engineering job at all. It was a management job. They did make me an offer, eleven hundred twenty dollars a month, but I turned that one down without much hesitation. My dinner with Mr. and Mrs. Lyons was a comfort for me and, I think, for them as well. The conversation was in many ways very melancholy, as should be expected, but it was also part of the healing process for them and for me, and it helped us remember and celebrate Rick's life instead of only mourning his death. And, as I had sadly predicted, it was indeed the last time I ever saw them. But I was happy at least that this last time wasn't at a funeral.

One interview that started out as a practice interview but turned into a serious one was with Dupont. The on-campus interview resulted in an interview trip to the Sabine River Works, a plastics manufacturing plant in Orange, Texas. Orange is near Beaumont and Port Arthur, which was where the final leg of the flight landed, and everything about that trip was memorable from the second I hit Texas.

The flight from Des Moines to Texas landed first in Dallas, and from there I had to make a connecting flight to Houston. From Houston it was on to Beaumont-Port Arthur via puddle hopper, and that's where things really started to get interesting. The Houston Metro puddle hopper was an old World War II vintage twin engine prop plane used by parachute jumpers. The 'seats' were straps of canvass strung along both sides of the fuselage. Luggage went in a back compartment and passengers boarded through a wide doorway where the paratroopers used to make their jumps.

Everyone boarded the plane and the pilots started the starboard engine. However, they didn't close the door and the port engine didn't start. We waited there for about five minutes just like that. Then through the open hatchway, I saw a mob of people coming out of the terminal. Everyone in that mob save one person was a handsome muscle beach type carrying assorted luggage. Two of these muscle beach guys were helping a little old lady walk to the plane, one supporting each arm, although it was clear to me this was a spry old gal who didn't need any help walking from anyone. To my twenty-one-year-old eyes she looked like she was about two hundred years old, and she was decked out in gold, diamond, and pearl jewelry without end. Her gold bracelets alone must have weighed ten pounds each. She was wearing an expensive fur coat and it was obvious to anybody that here was somebody who was rich beyond belief.

They seated the little old lady next to me, the two muscle beach types hopped out of the plane, they slammed the hatch closed, the port side engine started, and off we zoomed into the night. The little old lady chatted with the guy to her left for the first part of the flight. Then she turned to me.

"And whut pa't of Po't Ah-thu' are you f'om?" she asked me. I explained I wasn't from Port Arthur, and that I was from Iowa flying down to interview Dupont. I admitted it was my first time in Texas.

"Oh!" she cried, delighted. She twisted around and began pointing out the plane's window. "Well, you see those lights o'vah they-er?" she said. "Tha's Standa'd All." ("That's Standard Oil"). She proceeded to name one by one all the oil fields and refineries whose lights were twinkling on the ground in the darkness. She named every single patch of lights all the way to Beaumont-Port Arthur.

As the plane began to descend she asked me, "Whey you stayin' in Po't Ah-thu'?" I replied I wasn't staying there, that somebody from Dupont was meeting me and we were going on to Orange. "Oh, tha's too bad!" she said. "If you was stayin' in Po't Ah-thu' ah'd inta'duce you to mah neighbo's dauttah. He's a millionaire!" ("I'd introduce you to my neighbor's daughter. He's a millionaire"). It was all I could do to stammer I was sorry, too. Just then the wheels touched down, and as we rolled to a stop she reached down, squeezed my knee, and stroked the inside of my thigh with her fingers. Conspiratorially, she whispered in a stage whisper, "You know, if you wazn't so young, ah'd give you mah numbah." *Now* I was speechless. As I sat there with my mouth open, the hatch flew open and two new muscle beach guys bounded in and escorted the little old lady off into the night. Outside, another mob was carting off her luggage. I just sat there dumbfounded for a minute or more.

I had just met my first Texan.

A young man and his wife were waiting for me inside the terminal. He was an electrical engineer at the Dupont plant, and he was maybe three years or so older than me. We exchanged the usual pleasantries and then off we went for dinner. He drove us across the state line into Louisiana and we ate at a fancy Cajun restaurant. They brought course after course after course of food in an endless stream. One of the best dinners I've ever had in my life. *Really* beat eating frozen TV dinners. We chatted some more as we ate and after dinner they dropped me off at a hotel. The plant interview started the next day.

The Sabine River Works was huge and sprawling. Tanks, towers, pipes and plumbing stretched out as far as I could see across the Texas prairie. They showed me so much stuff that after awhile my head was buzzing trying to keep track of it all. As the day went on, I was passed to successively higher managers, my young host escorting me to each new stop. Each time the guy's office was a little bigger and a little more elaborately furnished than the last guy's office had been. My young host's office was a two-man office he shared with another guy as young as himself. His boss' office was the same except only the boss occupied it. From there the grandeur just grew in stages. The Plant Manager's office, the top of the food chain, was a palace Nero would have envied.

I was being interviewed for a job as a control systems designer. The control system of a processing plant like that is the system that makes sure everything operates just the way it's supposed to so that the end product – plastics in this case – comes out just the way it should. I noticed that most of their control equipment was pneumatic – used pressurized air, valves, and so on – rather than electronic. I asked one of the guys I was interviewed by why this was so. He leaned back, took a great big puff on his cigar and said, "Son, 'round heah we don' think too hahly of spa'ks" ("Son, around here we don't think too highly of sparks"). Looking out his window at all those endless miles of chemical reactors and pipelines, I could appreciate that.

They ended up giving me a job offer for eleven hundred eighty dollars a month, and allowed me a generous amount of time to think about it before I had to give them an answer. It was very tempting. The work sounded interesting, the money was the best so far, and I liked the Texans. I thought they were wildly exotic. There were two big problems though. The first was there wasn't any support they mentioned by which I could get any graduate school education. That was a big strike against the job. The

other was that it was pretty clear the chemical engineers were the varsity here and the role of electrical engineers was subordinate to them. Belonging to the second string wasn't at all appealing.

Even though IBM wasn't hiring that year at all, Bill wanted me to come to work for them very badly. So much so that he pulled a few strings and got me invited for an interview down in Austin. I seriously doubted any job offer would come out of this; my guess was the guy in charge of engineering down there was just doing him a favor or humoring him by letting his brother come down. But, still, it was a chance to see Bill and Maryann and my new nephew, Nick, who had been born in February. IBM, like all the other companies, had a stack of forms I had to fill out prior to the trip. I'd been filling out a lot of these kinds of forms, and every single one of them was different. I commented on this lack of efficiency to Bill over the phone. "Why don't you industry guys get together and standardize these forms?" I complained. "That way a guy could fill them out once and then just Xerox them."

There was a pause. Then Bill said, "Xerox, eh, turkey?" IBM made copiers too.

Anyway, I flew down to Austin and had both a nice visit with family and a good interview experience with IBM. Unlike the other companies so far, the engineers at IBM gave me technical interviews. This means they posed engineering analysis and design problems and told me to work them right then and there. The problems weren't particularly hard; they were the sort of things a guy in my position ought to be able to work if he'd mastered his lessons. I was able to handle all of them and the IBM guys were impressed. Bill told me later the guy in charge of engineering down there said I'd done better on their interviews than anybody they'd seen in a long time. Of course, I suspect he might have just been stroking Bill when he said that. Like I said, anybody who'd mastered his lessons should have been able to do those problems. Still, I'm not immune to flattery. Good interview performance or not, though, the simple fact was that IBM wasn't hiring *anybody* that year, and that included the brothers of IBM employees. No job offer came out of it.

Nepotism didn't work with Bell Labs either. My cousin Corky, who was a lawyer by training, was at that time a high placed executive with AT&T in New York. I'd mentioned to him that I really wanted to work at Bell Labs, and he got in touch with some people he knew back there. No dice, though. Bell Labs didn't hire anyone that year either. I didn't get so much as a shot at an interview with them.

Northwestern Bell, on the other hand, did have a job available and they invited me back down to Des Moines for an interview. I guess they must have liked my work that past summer. The interview down there was the antithesis of the IBM interview so far as technical questions went. The most strenuous written answer I had to give anyone there was to spell my name. They really gave me more of a sales pitch – come work for us – than an interview. They capped it off with a nice salary offer, twelve hundred dollars a month, which was the largest salary offer I would receive from anyone. I liked the phone company, I liked the people there, including the union guys. But the job was really a segue into management and not actually an engineering job. And no support for graduate school. So, in the balance, it was the phone company vs. Dupont at that point. Twenty bucks a month isn't what you'd call a very significant salary difference. At that point, it looked like I could get a job. But not one that met the key things I was looking for in a job.

Then Hewlett Packard came to campus.

Hewlett Packard Company – HP as it is more widely known – was famous among us students for being the inventor of the pocket scientific calculator. Texas Instruments later became more successful in this particular market, but HP invented it and by doing so made obsolete the slide rules engineers had always been known for using. I had a slide rule, of course, but I'd also scrimped and used an income tax refund to buy an HP-35 calculator, the first model they came out with. But HP was also well known as a manufacturer of electronic test and measurement equipment *and* as a maker of minicomputers. Among the high tech companies of the day, they had a reputation for being the very best.

However, it was well known that HP wasn't hiring that year either. So what were they doing here

holding interviews? There was only one way to find out and that was to sign up for one.

The man from HP had the unlikely sounding name Del Bothoff (pronounced 'butt off') and he was from one of HP's tiniest divisions, called the Delcon Division, in Mountain View, California. They made test and measurement instruments used by the telephone company. And they had received permission from HP's headquarters to hire *two* engineers. Del and I had a nice conversation, and he was especially happy when he learned I had experience working for the telephone company. That turned out to be a key edge I had over all the guys who had flocked down to the placement office to try to get on at HP. Like I said, HP was regarded as the top of the mountain, *the* place for an EE to work.

I received an invitation for a plant visit to Delcon for a series of technical interviews. The day I flew out of Des Moines there was a raging blizzard – par for the course during an Iowa winter in those days. I was barely able to get to the Des Moines airport. When I arrived in San Francisco and was met at the airport by an HP guy – whose name, by coincidence, was Al Peterson – there was a light drizzle falling and it continued to fall the next day. Everybody I met apologized over and over again, saying how sorry they were I had to suffer through such bad weather during my first trip to California. Bad weather? You could walk through this stuff and not even get wet. If this was their idea of bad weather, what must the good weather be like?

The job was a design engineer's job in their Research and Development ("R&D") laboratory at Delcon. Furthermore, they were right then engaged in designing some of the first electronic products that would incorporate that new revolutionary invention, the microcomputer. Just then companies could buy these chips in sample quantities for four hundred dollars apiece. The semiconductor houses that produced them weren't yet able to make them in very large quantities. But everybody knew they soon would be able to mass produce them, and when they did the price tag would plummet. (Within a year, they would be selling for ten dollars apiece). *This* was the kind of work I'd been looking for.

On top of this, they would not only support my getting a graduate degree, they pretty much insisted that I get one. I'd get paid time off during the day to attend classes and HP would pick up half the tab for my graduate education. I could take my pick of which university to attend – subject to getting admitted by the university, of course – but they suggested Stanford University would be the preferred school they'd like me to attend. Stanford was only the best graduate school in the country – just ask anybody at Stanford. (MIT? Oh, you mean that little job shop in Massachusetts?).

This really was my dream job if I could land it. The technical interviews they put me through were brutal. By comparison IBM had been a piece of cake. If I answered a question, they'd ask me a harder one. If I answered that one, they'd ask me an even harder one. They kept it up until they found one I couldn't answer. They wanted to find out what I *knew* and I guess they did. I learned that I didn't know everything yet. By the end of the day I felt like the tackling dummy at a Chicago Bears training camp.

At the very end of the day they had me meet and talk to the R&D manager, a tall red-headed guy named Bob Allen. Bob talked about the company, about the employee benefits it offered, about the products they built, about what an R&D engineer did, what opportunities for advancement there were. *Then he said they wanted me!* The salary offer was eleven hundred dollars a month.

I asked him if I could have a little time to think about it. He seemed surprised but said that would be okay. It was a big decision. The reason I hesitated was the salary offer. It was the lowest offer I'd gotten except for the one from B&V. Even the steel mill had offered a little more money than that. I thought about the job and the offer all the way back to Des Moines on the plane. I thought about it all through the drive from Des Moines back to Ames. When I got to my apartment, I picked up the phone and called Bob back in California. The conversation was brief. "Hi, Bob. This is Rick Wells. I accept." I was an HP-er. □

Universities, colleges, and sometimes even departments have chapters of national organizations known as 'honor societies.' These honor societies frequently have Greek letter names, similar to fraternities and sororities, and their stated purpose is, like the name implies, to honor the scholastic

achievements of students. By the time graduation arrived I was a member of three such societies: Eta Kappa Nu (HKN) for electrical engineering, Tau Beta Pi (ΤΒΠ) for engineering, and Phi Kappa Phi (ΦΚΦ) for higher education in general. I had been inducted into HKN in the fall of my junior year, ΤΒΠ in the spring of that year, and would be inducted into ΦΚΦ in April of my senior year.

In addition to bearing Greek letter names, some of these societies also have a kind of initiation week for new inductees that bears a facile resemblance to fraternity initiation, although it comes nowhere near the intensity of Hell Week and at most usually requires nothing more than a bit of arts and crafts and maybe a little costume party dress-up. Those that do have no real purpose for it other than tradition and their initiation week amounts to nothing more than a bit of mild, harmless hazing. In addition to recognizing a student's scholarship, some also claim their members have shown exemplary character, although in fact they have no way to know if a student is a saint or a sinner. Most of them charge a modest fee for membership, which goes to supporting the local chapter's expenses, and many students decline the invitation for membership in part because of this fee or because the student doesn't see the point of being made a member of the society. Many who do accept the invitation do so because it will look good on their resumes at job-hunting time.

In point of fact these societies do recognize a student's hard work scholastically. You can't just stroll down to an office somewhere and say, 'Hey, I'd like to join.' Membership is by invitation only and the GPA required to receive such an invitation takes a lot of hard work to achieve and maintain. But after being made a member of three such honor societies, I found it a bit hard to see why these organizations were called 'societies.' The word 'society' comes from the Latin word *societas,* which is in turn derived from the word *socius,* which means 'a companion.' My dictionary listed nine definitions for 'society' and the one that applied to these organizations was "any organized group of people joined together because of some interest in common." I found it hard to see what interest there was in common among the members of the honor societies I belonged to other than belonging to the same college or having an 'interest' in getting good grades. It's a pretty vague definition anyway. Under it Little League or a chess club or even Rusty's abortive chemistry club – up to our third meeting anyway – would qualify as being a 'society.'

Certainly there wasn't any common social interest manifested by any of them. Of the three I belonged to, only HKN had occasional chapter meetings and engaged in a few extracurricular activities. It was the most 'social' of the three and even in HKN most members never attended a chapter meeting or took part in its activities other than the obligatory one at which they were made members. I did attend meetings and take part after being inducted in October of '73. It wasn't a big drain on my time and I've always thought that if you join an organization you accept an obligation to take part in it. It was probably this attitude that led to my being nominated and then elected to serve as our HKN chapter president in the spring of my junior year. It wasn't an office I sought, nor did I campaign for it. In fact, it all happened very suddenly at one chapter meeting. One of the officers nominated me, another member seconded, and when the vote came around I found myself elected. I didn't even make a speech. I didn't want the responsibility, but if you belong to a society you accept an obligation to take part in it. It's called 'being a republic.'

A fraternity is a society under anybody's definition of the word. We lived together, we worked together, we engaged in activities together. Except for the voluntary nature of our association, we were a kind of family. I didn't see anything like this in any of the honor societies I belonged to. Of course, by the early years of the seventies so many of the finest traditional college and university social structures had collapsed from the tumult of the sixties and the Nixon years it is possible the honor societies were really in a state of decline from some more significant and glorious past. Whether or not this is the case I don't know. None of the 'societies' offered any lessons in the society's history or traditions. In contrast we were taught a great deal about the fraternity's history and traditions as pledges. If the honor societies were in decline from some better past, they have never recovered from it. Those societies still function today in exactly the same way they did when I was a student. Any high school in the country has more 'spirit' than the Greek letter honor societies. When you consider the people these societies induct as members, this is a real shame and a lost opportunity. On the collapse of societies, historian Arnold Toynbee wrote,

> We have found that the successive stages of the disintegration-phase [of a society] are marked by repeated presentations of an identical challenge which continues to recur because the disintegrating society continues to fail to meet it; and we have also found that, in all past cases of social disintegration that we have mustered, the same successive stages inevitably occur in the same order . . . so that the disintegration-phase, as a whole, presents the picture of a uniform process with a uniform duration in each case. . .
>
> This striking contrast between the regularity and uniformity of the phenomenon of social disintegration and the irregularity and diversity of the phenomenon of social growth has been frequently noted in this Study as a matter of historical fact. . . The distinctive power conferred in the gift of consciousness is a freedom to make choices; and, considering that a relative freedom is one of the characteristics of the growth-phase [of societies], it is only to be expected that, in so far as human beings are free in these circumstances to determine their own future, the course which they follow should be in truth as it appears to be, a wayward one in the sense of being recalcitrant to the rules of 'laws of Nature'. The reign of Freedom, which thus keeps the 'laws of Nature' at bay, is, however, precarious inasmuch as it depends on the fulfillment of two exacting conditions. The first condition is that the conscious personality must keep the subconscious underworld of the Psyche under the will's reason and control. The second condition is that it must also strive to 'dwell together in unity' with the other conscious personalities with which it has to dwell together on some terms or other . . . These two necessary conditions for the exercise of Freedom are actually inseparable from one another; for, if it is true that 'when knaves fall out honest men come by their own', it is no less true that, when persons fall out, the Subconscious Psyche escapes from the control of each and all of them.

I would not be surprised if Toynbee's assessment of the collapse of societies in general was equally a dead-on assessment of the honor societies I knew in college. Certainly the members of the honor societies I belonged to did not 'dwell together in unity' in any way. If ever there was a time they served some greater purpose, by the time I knew them they were merely flickering candles in the wind. □

Although I may have left the impression I was having a lot of fun fall and winter quarters gallivanting around on job interviews, in fact the winter quarter of '74-75 was the most depressing time I experienced in college. Part of this was, of course, due to grief over the appalling tragedies that struck that year. Part of it was due to the usual crummy and depressing weather. But there also seemed to be a widespread melancholy blanketing everything. The music that quarter, for example, tended to be gloomy and sad. Many of the hits were written in minor keys – which almost always are inimical to 'feel good' music – and a great many of these hits were about disappointment and loss. It's hard to see how they would have become hits if they didn't strike a chord with what a lot of people were feeling at that time.

I was alright when I was around other people. But every night I eventually ended up back in my apartment and then the blues would really hit me. My studies certainly fell off during that quarter. My grades ended up being okay – 3.50 – but that was due only to the strength and discipline of thinking Dr. Cooper had taught me as a sophomore and the fact I had learned the general principles and techniques of my field in prior years and under much happier circumstances. It was sheer scholastic momentum that got me through the winter of '74-75. Aside from getting a job with HP for after I graduated, the only bright moment that quarter was the birth of my nephew Nick down in Texas.

By the time spring quarter finally arrived, I was ready to be done with college. Of the members of my pledge class, three of us were graduating at the end of that quarter: Steve in landscape architecture, Jerry in zoology, and me in electrical engineering. Al had just a bit more to do yet, and he was going to be doing it as a married man. He had found a wonderful girl, Kathy, and his freewheeling bachelor days were coming to an end. Scott had changed majors and so he wasn't done yet either. He would eventually get his degree in architecture and go on to get a master's degree in civil engineering. Glen was going to take a little longer too. He had thrown himself into serving the house with great dedication during our years together even though the price he paid personally for this service was delaying his own graduation. But he would graduate in civil engineering and go on to enjoy a happy career of service in the public

sector of his field. He is still serving the public today. After getting his zoology degree, Al went on to study pharmacy at the University of Iowa. He became a pharmacist and he and Kathy live in Wisconsin now. I lost touch with Steve after graduation, but I believe he returned to Eden Prairie, MN and took up putting his degree in landscape architecture to work. Jerry stayed in Ames for a year after graduation supporting himself by painting houses and taking graduate courses in microbiology. After a year for establishing his Iowa residence, he got into vet school, married, and today has his own veterinary practice down in Las Vegas.


Commencement Day, May 24, 1975. Left: Sherri, Dad, me, Melody, and Melody's first husband, Kenny, outside Hilton Coliseum after the ceremony. Right: Post-graduation family picnic in the park. From left to right, Melody, Kenny, Sherri, Lorne Wazny, Glen Wazny, me. Glen and Lorne are part of my family, too, in everything but blood.

Commencement day came on May 24. Mom, Dad, Sherri, Melody, and Melody's new husband Kenny all came out to Ames for the ceremony. Melody and Kenny had gotten married in January. I was happy Melody came out to Ames for my big day, but I never liked Kenny very much and would have preferred it if he hadn't inserted himself into the graduation day pictures that were being taken. But, for the time being, he was family so . . .

The fraternity house served as a kind of central gathering place that day, both before and after the commencement ceremony. Sherri knew where it was so she was able to guide my family to it without any problems. I wanted to be around my brothers that day as much as possible because we all knew a special time in our lives together was coming to an end and afterwards we wouldn't often see each other again all together in one place. The house, not that crummy apartment, was my home in Ames. Commencement is a day of festivity and happiness, but it does mingle a little bitter with the sweet. It did for me anyway.

At the house before it was time to go over to Hilton Coliseum for the ceremony, Dad started talking to me about my future. He had heard that the occupation 'safety engineer' was an up and coming thing. I sort of cut him off before he got going by telling him I already had a good job lined up in California. Seems it somehow failed to occur to me before to tell him about that. I admit to feeling offended that Dad still automatically assumed I couldn't take care of myself. But he'd been doing that since the day I first came home wearing glasses and by now I'd come to expect nothing else.

Still, it came out a little colder than I wanted it to, especially on that day, so to mend fences a little I told him about a term project I had done in one of my econ courses. I'd done an economic analysis of our bakery business in Bellevue. My thinking at the time was I might be able to give Dad some pointers on how to make more money out of his business. To my surprise, though, after all my analysis it turned out that Dad was already doing everything an economist would say he should be doing. When I'd completed the project, I remember thinking to myself, *Well, I'll be darned.* The old man was smarter than I'd

thought he was. Now I told him about that project and summarized it with, "And you know what? It turns out you've been doing everything right all along."

"I knew that," Dad snorted. Now it was his turn to be a little offended.

Commencement ceremonies began at nine-thirty. I don't remember how many people graduated that day, but it had to be at least two or three thousand. The graduating class of 1975 filled the whole center floor of the Coliseum and we were packed in like sardines. I sat there with my classmates and sort of drifted through the ceremony. There were so many undergraduates that they didn't have us individually go up and cross the stage to receive our diplomas. In point of fact, they didn't actually hand out our sheepskins that day; they wanted to verify we'd passed our final exams and had really graduated first. The only time I got out of my chair during the whole thing was when President Parks had everybody who was graduating with distinction stand up and be recognized. This followed the commencement address, which was given by the Honorable Harold E. Hughes, Iowa's former Governor and a former U.S. Senator. The graduate students, however, did get to walk across the stage and be individually presented. There weren't nearly as many of them as there were of the rest of us. Large Al received his master's degree in sanitary engineering that day, and it looked to me like he enjoyed every second of it. Two more of my older brothers, Craig Stanley and Ron Hammond, also received their M.S. degrees that day.

One other fellow, Bob Brown, received his master of engineering degree that day. I had met Bob that spring when he looked me up in my office. It turned out he was the second of HP's two hires and we would be working together at Delcon Division. Bob and I had seen each other only twice before commencement day. The first time, of course, was when he hunted me down in my office. The second time had been in one of Ames' more, shall we say, spirited downtown bars when Al, Jerry, Glen, and I were standing on top of one of the tables waving our shirts in circles over our heads. I'm pretty sure Bob expected our association out in California might turn out to be an interesting one after that night.

After commencement Glen and Lorne joined the rest of my family and we went to one of the parks for a post-graduation picnic. It was a good way to both celebrate and to come down gradually from the rush of graduation. I don't remember much of what we did there because I was in kind of a daze, not quite yet fully internalizing that after four years college was finally over for me – well, at least until grad school started anyway. I guess I felt emotionally as grainy as some of the commencement day pictures we took turned out. As a boy in junior high school I hadn't thought I'd get to go to college at all. As a college student, there were times I didn't think I'd make it through. Now I finally had and it was all behind me. Ahead was the unknown future. And that's why they call it 'commencement.' □

I didn't leave Ames right away after commencement. My rent was paid through the end of the month and there were details to be attended to and some goodbyes yet to be said. The day after commencement – or to be more precise, the evening of the day after – Jerry, Glen, Lorne, and I gathered at one of the little bars in Dogtown to have a few last beers together and swap remembrances of our college days one last time. It wasn't intended to be a long night, but it turned out we had a lot of remembering to do and it took a lot of beer to fuel the storytelling. By the time we'd all had enough it was very late and all that beer had pretty well taken care of all our inhibitions. When we finally did call it a night everybody was in a pretty emotional state and we did something we *never* did in all our college days: we hugged each other. Men just didn't do that in those days – unless they were Italians – but that night we did. And we weren't embarrassed. Glen, Jerry, and I had just been through four years – three of them with Lorne – of highs and lows, joys and sorrows, triumphs and tragedies, comedies and dramas, uncertainties and accomplishments. We had begun four years before as complete strangers, ages seventeen and eighteen, and in the time since had truly become brothers and family, the bonds between us forged in the fires of shared experience, shared adversity, and shared comradeship. Those days were a unique and precious time in the passage through life that really only happens with that kind of intensity no more than once. I think all of us knew instinctively we would never pass this way again.

The movers came later in the week to take my worldly possessions, except for those clothes I was

taking with me for the trip, to California. HP was paying all the costs of my relocation. They didn't have too much to move: a few clothes, my books, a cheap stereo, some knives, forks, spoons and plates, a few pots and pans, and the odd knickknacks I'd accumulated during my college years. On Friday I went to a bank and cashed a check to myself to empty out my bank account back in Maquoketa. There wasn't much left in it by then; I found out later I'd made an error in balancing my checkbook and I actually overdrew my account by twelve dollars. The bank in Maquoketa told Mom and Dad and they covered it for me. I didn't find out until several months later.

On Saturday morning, May 31, my landlord came to inspect the apartment and take my key. I had a fifty dollar damage deposit I wanted back. He looked the place over then asked me, "How do *you* think it looks?"

"I think it looks just like it did when I moved in here," I replied. That wasn't saying much, but it was true. He asked me how much of my damage deposit I thought I was entitled to get back. "All of it," I said. Fifty bucks isn't much unless you're broke. I needed every cent I had just to get to my new home-to-be. Reluctantly, he returned my money. Then I walked out of the Lincoln Apartments one last time, got in my car, and headed south toward Interstate 80. I was twenty-one and on my way to California and my future.

I figured I could make it from Ames to the San Francisco Bay area in three days. My goal for the first day was Cheyenne, Wyoming. It's not really a one day drive at fifty-five miles per hour, but I didn't plan on spending much time going fifty-five. I drove non-stop except when I had to stop for gas. For the Buick, that was about every two hundred ten to two hundred thirty miles, depending on where towns and gas stations were. When I stopped for gas I'd stretch my legs awhile, refill my water bottle and, if it was around noon and there was a MacDonald's anywhere nearby, I'd have a one dollar hamburger for lunch.

I made only one sightseeing stop the whole trip. That was in Paxton, Nebraska, just off I-80. Jerry had told me I *had* to stop there and see Ollie's Big Game Bar. Ollie had been a big game hunter and his bar was packed with hunting trophies. When I opened the door to the place and walked in, the first thing I saw was a snarling ten-foot-tall polar bear reared up on its hind legs with its front paws raised and ready to strike. It was hidden just perfectly so I couldn't see it until I almost walked into it. I almost jumped out of my skin when I saw the thing towering over me. The rest of Ollie's was just as amazing. Jerry had been right. It was worth the detour. I bought a twenty-five cent draft and a small sandwich, mostly to be polite, looked the place over, then got back on the road. I made Cheyenne after dark and stayed the night in a Motel 6.

The next morning I got back on the road early. My goal for the day was Elko, Nevada. As I headed west, the mountains came into sight in the distance. It was purple mountain's majesty all over again, although Wyoming had nothing resembling fruited plains. That day's trip ended up taking more time than expected because in western Wyoming I ran into a brief blizzard and had to pull over and wait it out. I didn't have snow tires with me, nor chains. *What kind of place has a blizzard on the first of June?* I kept asking myself while I waited. It stopped after about an hour, give or take, and I was able to be on my way again. From western Wyoming I-80 curls southward to Salt Lake City. I stopped to gas up at the western edge of the city because the next leg was a ninety mile, straight as an arrow shot across nothing. This particular nothing is called the Great Salt Lake Desert, and it's one of the most forsaken places you can imagine. It's a bad place to run out of gas in. The gas station attendant came over to me and said, "Did you know you're missing a gas cap?" The gas station attendant at my previous fueling stop hadn't put my gas cap back on.

I let out a impolite phrase, unintentionally offending the attendant. I'd forgotten for a second where I was and that this guy was most likely a Mormon. Maybe not. After all, he *was* working on a Sunday. I apologized for my language. He didn't entirely forgive me for my moral lapse, but he did grudgingly sell me a new gas cap. Then I was off to the Great Salt Lake Desert. It's well named. About the best thing I can say about it is it's a great place to see from your rear view mirror. But, to be fair about it, there's really no such thing as a speed limit on I-80 during that stretch. There's nothing out there except a lone

gas station about halfway across. It's flat as a pancake, straight as an arrow, and there's absolutely no place along it to hide a speed trap. The semi trucks I did see out there all had their afterburners lit. It ends at the little town of Wendover, where I arrived as the sun was setting behind the mountains.

I topped off the gas tank there because night was falling fast and I wasn't sure I'd be able to find another open gas station in the sparsely scattered little towns of Nevada on a Sunday night. I probably still had enough gas to make Elko even without topping off, but I didn't want to take the chance. There's nowhere I've ever seen that's darker at night than eastern Nevada. Towns are few and far between and I traveled through some very rugged terrain, often with sheer cliffs rising up on either side of I-80. It was so deserted out there, so far as I could see from my car, that I thought to myself, *They used to test atom bombs in places like this.*

It was very late by the time I reached Elko. I found a city – I use the term loosely – lit up and alive with activity. It was Sunday night in Elko and every living being in eastern and central Nevada must have been whooping it up at the casinos. I started looking for a motel but everywhere the story was the same: No Vacancy. If you're ever planning to overnight in Elko, don't pick a weekend. I was starting to think I was going to have to spend the night sleeping in my car when I finally found a room I could rent overnight above one of the rattier downtown casinos. From the look and smell of the place, I figured its usual occupants were probably what New Yorkers call 'gentlemen of the Bowery.' Either that or it was a working girl's office. The bathroom was at the end of the hallway. But it was a room and it beat sleeping in the car. I figured I could survive driving dirty for one day, although I was going to need a shower pretty badly once I reached Mountain View. Before hitting the sack for the night, I did go back downstairs and go tourist gawking at the casino. I'd never seen one before. I wouldn't have minded trying out some of the games of chance, but I didn't have a nickel to waste so I had to let that experience wait for another day.

When I set off again the next morning I was planning on a nice, easy drive to the Bay Area and arriving in Mountain View probably by the early afternoon. Around noon I came to Reno and got off the interstate to gas up and stuff myself on a one dollar MacDonald's hamburger. That done, I headed back to I-80. There was an intersection with a stop light just before the on ramp and the light turned red as I rolled up. I stopped at the light, a line of cars forming up behind me.

And my engine died.

The car wouldn't start again and a couple of nice people helped me push it off the street and into a gas station that just happened to be right at that intersection. These were the days before convenience stores so 'gas station' meant you could not only buy gas there but you could have your car serviced too. The mechanic at the gas station took a look under the hood. "Your alternator's frozen up," he said.

"How much to fix it?" I asked.

He did some figuring and mumbling then said, "Seventy dollars."

I didn't have that much.

Okay, this was a problem. I thought about it for a minute then decided the best thing to do was come clean with the man. "Look," I said, "I don't have that much. But I'm on my way to start a new job in California. How about if I call my boss and see if I can get some money wired out here?" He shrugged. Fine. "Can I use your phone?"

"Local?" he asked. "Collect," I replied.

I put in a collect call to Del Bothoff at HP and, to my relief, he accepted the charges. He knew it was me calling because the operator had told him when she asked if he'd accept the charges. He asked me how I was doing.

"Well, Del," I explained, "I'm on my way out there but I've had a problem. My car's broken down and

I don't have enough money to get it fixed. I was wondering if there's any chance I could get a salary advance to pay for it?"

"Where are you?" he asked. "Reno." Del started to laugh.

I could feel my face turning red. I knew perfectly well how all this sounded. *Hi, Del. I'm in Reno where all the casinos are and I need money.* I started thinking I was in trouble. But Del's laughter faded to a chuckle and he asked, "Would two hundred dollars be enough?" *Plenty!* That was more than I'd started the trip with. He asked me what the address of the gas station was and said the money would be coming by Western Union in a little while. I thanked him, profusely, and said I'd see him tomorrow.

After I hung up I told the gas station man the money was on its way via Western Union. "Any chance you could fix it now and I'll pay you when the money gets here?" He sort of shrugged and smiled. "Sure," he said. "After all, I've got your car." Good point. I wasn't going anywhere and the Buick as collateral was worth more than seventy dollars. Not a lot more, but more.

It took him a lot less time to fix the car than it took the money to get there. I sat around that gas station for another couple of hours until the Western Union guy finally arrived with the money. Then I was able to pay the man and be on my way with an extra one hundred thirty dollars in my pocket. Soon I was crossing over the mountains and into the Golden State.

It turns out you have to go through customs to enter California. They call it an agricultural inspection station, but it looked for all the world like the customs stop on the Canadian border I'd been through so many years before. The only difference was they didn't care if you were leaving the state, only if you were coming in. Since I wasn't carrying any fruits, animals, or other contraband, they let me in. I was now in California!

From the customs station I-80 bends south and runs through Sacramento and on down to the Bay Area. The further south I traveled, the heavier the traffic got. Pretty soon I was traveling in heavier traffic than I'd ever seen in my life. Dad would have had a conniption if he'd been driving. I figured the best thing was to just blend in with the herd and do what everybody else was doing. I'd always heard California drivers were very courteous and it was true. When a car turned on its blinker to signal it wanted to change lanes, the other drivers would make a hole, just a little bigger than one car length, and the car that wanted to change lanes would just merge into that hole. Try that in Iowa and the car behind speeds up to make sure you don't pull in front of him. Soon I was loving driving in California. I did notice, though, that when the other drivers got a look at my beat-up old Buick with its Iowa license plates they'd make a *three* car length hole for me.

I had a very pleasant drive all the way down to San Francisco. It didn't take long to see why they called California 'the Golden State.' The grass in the foothills was bleached so yellow it looked like wheat. I crossed over the Golden Gate Bridge into San Francisco, where I-80 came to an end and turned into I-101, the Bayshore Freeway. This took me straight down to Mountain View, where I arrived just as dusk was settling in. It took a bit of driving around once I got there, but I finally found a motel I could afford and checked in. It was Monday night, June 2nd, 1975 and I was now a Californian. □

My report-for-work date at HP was June 3rd and I showed up promptly at eight o'clock to report in. Delcon Division was located in a small complex of buildings on Middlefield Road near the Mountain View-Alviso Road. The specific building it was in was called Building 30. I had no trouble finding it at all. One thing that was totally brand new to my experience, though, was the morning traffic. By sheer accident, the street was deserted in the direction I was going, but the other side of the street was a bumper-to-bumper parking lot as far as the eye could see. I had to turn left across that traffic line to get to Building 30, and I was having visions of sitting there in my lane for about fifty years waiting for a chance to turn. But California courtesy came to the rescue again. As soon as I put my left turn signal on, the on-coming cars waited, a hole opened up, and they let me turn. As soon as I was across, the hole vanished like it had never even been there.

The entry to the building was a small lobby with a receptionist sitting at the desk. I told her who I was and who I wanted to see and she called Del on the phone. In less than a minute he came out, greeted me warmly, and took me inside. The R&D lab was just off the inside doorway. It consisted of a single hallway with work benches and desks with bookcases rising to five feet constituting the walls. The entire lab, including Lab Manager Bob Allen, consisted of twenty-four engineers, counting me. When Bob Brown reported in a couple weeks or so later, there were twenty-five.

Bob Allen (standing) and Erhard Ketelsen (sitting). Bob was the R&D Lab Manager at HP's Delcon Division, and Erhard was my Project Leader, first boss, and mentor when I first came to work there.

That first morning was a whirlwind of orientations and introductions. Del wasn't my immediate boss. He was our Group Leader and had a pair of Project Leaders working under him. Or should have. In fact, he was short one Project Leader and so was wearing two hats by managing one of our two projects, the main one, himself. I was being assigned to a new project just starting up and was the first guy reporting to its Project Leader, a jovial, warm and lovable German named Erhard Ketelsen. Erhard was to be my boss, mentor, and Father Confessor for the next two years and my friend for all the days after that.

An awful lot of that first day was nothing but a blur. I was introduced to so many different people that inside of about ten minutes names were dripping out my left ear just as fast as they were flooding into my right, the newest names replacing the older ones. Fortunately, everybody was wearing name tags.

One thing I do remember was that the first stop on the tour was to show me where the bathrooms were. The second stop was Personnel. I thought that was an interesting ordering. I met a very nice woman in Personnel – whose name, unfortunately, was flooded out a bit later by other names – who re-explained the employee benefits, told me that HP had flexible work hours – meaning I could come in any time I wanted between 6:30 and 8:30 in the morning and go home anytime after putting in eight hours – bragged about how everybody at HP was on a first-name basis, and after taking a significant if amused look at my sport jacket and tie, made it a point to let me know suits and ties weren't required at HP. I'd kind of figured that out already; I was the only jacket and tie I'd seen in the whole building. I didn't listen very closely when she explained the retirement and life insurance benefits – after all, I was twenty-one and flush with the immortality of the summertime of my life – but I did listen when she explained the medical and dental benefits. I was immortal but not invulnerable. My ears really picked up when she explained the Employee Stock Purchase Plan. I wouldn't be eligible for that until after six months – December of '75 – but the basic deal was it was a payroll withholding plan in which for every three dollars I contributed HP would toss in another dollar on top. I could invest up to ten percent of my salary in this when I became eligible. It was an automatic thirty-three percent return on investment, give or take stock market moves. Another benefit I would be eligible for after six months was Profit Sharing. HP kicked back part of their profits to the employees. She told me that historically this added up to just about the equivalent of one extra month's salary per year.

Hmm. . . If Bob had told me that on my interview day I'd have accepted on the spot.

Nobody needed to tell me what the 'six months' clause meant. For the first sixth months, I'd be on probation and if it turned out I couldn't do the job they'd fire me and find someone else who could. They didn't wave that particular stick around, but I didn't go to school just to eat my lunch.

There were also sick leave and vacation benefits. The vacation benefits began at two weeks a year and

then became longer as you put in more time with the company. And there was no pre-set or prescribed time of year when I had to take vacation. I could do it whenever I wanted subject only to letting Erhard know when I planned to want it.

Then came the forms. A mountain of forms. Almost all of them I just signed after she told me what they were for. These were, after all, benefits forms and the benefits package was the benefits package. There was nothing to negotiate and no fine print. One form I did take notice of, though, was the one where I signed over everything I might invent to HP. If I figured out how to build a better mousetrap, it would be the company's mousetrap. I thought about that one for a second and then decided it was reasonable and totally fair. After all, if I never did come up with a better mousetrap the company would still feed me *my* cheese in the form of two steady paychecks a month. I had been *hired* to invent things for them. That was my job. I understood very, very well the concept of *team*.

Then there was the credit union. The HP Employees Federal Credit Union wasn't legally a part of HP, but I could direct any portion of my salary I wanted – including none – to go into direct deposit in a savings account at the CU in my name. Bill had a book in his personal library I had read one time. It was called *The Richest Man in Babylon* and it was about how to become wealthy. Its central precept had been 'ten percent of all you make is yours to keep.' I signed up to have ten percent of my salary go straight into the CU. It was the start of what would be a lifetime habit for me. Ten percent – at least – of all I make is mine to keep. I started that in June 1975 and have never deviated from it. It works, too. This habit would eventually help make me a millionaire, dependent on no one. Not bad for the baker's boy from Bellevue.

After finishing in Personnel, Erhard took me on the whirlwind tour of the division: the marketing department, the admin department (where the accountants worked), the lab (again), and production. That was when the names avalanche really got going. He introduced me to the Production Manager as, "the crack new analog designer we hired." The word 'analog' is a technical term that refers to the parts of EE that go beyond the zeroes and ones of computer hardware. I was a little nervous about getting such a big buildup from my boss right away on the first day. After all, hardly more than a week ago I'd been a student and I didn't feel any different on June 3rd than I had on May 23rd. These guys thought I was an engineer instead of an engineering student. I silently hoped they wouldn't find out any different. So when the Production Manager shook my hand, I said, "Well, I'm new anyway." He thought I was just being modest. I'm actually not known for my modesty by anybody who really knows me. Arrogant maybe, at least sometimes. But modest? *Ooh, no.* Erhard introduced me to the Division Manager, a guy named Brian Moore, the same way. I was 'modest' with him, too.

After the tour I was back with Del again, who started explaining to me HP's style of 'management by objectives.' Today pretty much all the business world knows about MBO, but in '75 the word hadn't really gotten around all that much and HP was *the* company that started it. The way it works is that each level in the organization has a set of objectives to meet. The higher you go, the broader and more abstract these become, the lower you go the more detailed and specific they become. What makes it work is that at every level the objectives directly support the achievement of the objectives at the next rung up. At the top of the heap were the HP Corporate Objectives. There were seven of them:

1. **Profit.** To recognize that profit is the best single measure of our contribution to society and the ultimate source of our corporate strength. We should attempt to achieve the maximum possible profit consistent with our other objectives.
2. **Customers.** To strive for continual improvement in the quality, usefulness, and value of the products and services we offer our customers.
3. **Field of Interest.** To concentrate our efforts, continually seeking new opportunities for growth but limiting our involvement to fields in which we have capability and can make a contribution.
4. **Growth.** To emphasize growth as a measure of strength and a requirement for survival.
5. **Employees.** To provide employment opportunities for HP people that include the opportunity to share in

the company's success, which they help make possible. To provide for them job security based on performance, and to provide the opportunity for personal satisfaction that comes from a sense of accomplishment in their work.

6. **Organization.** To maintain an organizational environment that fosters individual motivation, initiative and creativity, and a wide latitude of freedom in working toward established objectives and goals.
7. **Citizenship.** To meet the obligations of good citizenship by making contributions to the community and to the institutions in our society which generate the environment in which we operate.

I was starting to get the idea I had come to work for a very special company. In time I would have direct proof that the seven objectives weren't just mom-and-apple-pie lip service. The company really meant it. And it was run accordingly for almost all the years I worked there. *This* corporation *had a soul.*

Del asked me where I was staying and I told him about the motel. "You can use the rest of this week to find a place to live," he said. "When you get settled in somewhere then we'll get you started on your project." I really, really appreciated that. He told me where I could find some information about places to live. It turned out that Mountain View had more apartment complexes in it than it did houses. That's what I was going to be looking for. I knew a house was out of the question for awhile. I had nothing to make any down payments on one with. I figured a couple of years of apartment dwelling and I could start looking for a more permanent place to live.

Then Del said the division was having a celebration about something. It wasn't clear to me what it was exactly they – no, *we* – were celebrating, but he said I should come along and join in. This was my first day of work and I was being invited to a party nearly first thing? It was mind blowing. I hadn't realized HP stood for 'Have Parties.' This wasn't California; I was living in Shangri La.

The celebration itself took place in a small little park. By fraternity standards it was a tame little affair, happy but not especially boisterous. Of course, most of the people there were considerably older than me and the pace of the party suited the age of the group. Since I knew almost no one there, I had a few polite conversations with some of my new coworkers but in fact I still felt pretty much like an outsider. I think Erhard might have noticed this because he introduced me to the three other bachelors who worked in the lab (no women worked in the lab at that time, which was a pity). I've always suspected he might have asked them to make me feel at home in my new setting. Certainly he knew I'd take to people closer to my own age more than to, say, the middle aged members of Delcon. Their names were Dick Fowles, Rich Page, and Al Howard.

Dick was the oldest of the three, about twenty-six or seven at the time. Strictly speaking, he was single but not a bachelor since he had been married and divorced. Dick stood a little over six feet tall, had an inclination to often be a bit overly serious, and had the kind of quality of character you find in men who younger men naturally take to as leaders. He was kind of the 'big brother' figure among the four of us. He was originally from Wisconsin. Rich was a year, perhaps two, older than me and had been with HP about a year at that time. He was about my height, fairly skinny, and tended to be intense and, I thought, not as self-assured inside as he projected on the outside. He came from southern California in the LA area and had gotten his degree at Cal Poly Pomona. Both Dick and Rich were electrical engineers and both had specialized in the 'digital' – that is, the computer – aspects of EE. Al was also a native Californian, although I'm not sure from precisely which part of California, and he was a 'mechanical' engineer, which is to say he designed the non-electrical parts of our products such as the package, the panel displays, and so on. If I remember correctly, his degree was in industrial engineering rather than mechanical engineering proper, but I'm not entirely sure I'm remembering this correctly. He was two, maybe three, years older than me and was the most social of the three guys.

The celebration had kind of the feeling of being pretty much an outdoor cocktail party. After awhile Al and Rich suggested we all adjourn to a bar for a few beers and some real conversation. That was fine with me, so I followed them in my car to some place they had picked out, the name of which I don't remember. They were curious to find out more about who I was, what my background was, and so on. We had hardly

sat down at the table with our beer glasses when Al asked me, "So, where are you from?"

I didn't figure any of the three of them would have ever heard of Maquoketa, so I replied I was from the Midwest. Judging from the sardonic smile Al gave me at hearing this answer, that wasn't specific enough. "*Where* in the Midwest?" he persisted. Iowa, I replied.

"Iowa?" He sounded puzzled. "I don't think of *Iowa* as being in the Midwest."

Oh? Where did he think of it as being?

"I think of Iowa as part of the East," he said. It was my turn to be puzzled. The East? "Yes," he continued. "When I think of the Midwest I think of places like Ohio." Dick chuckled.

So much for the study of U.S. geography in the California school system, I thought. I pointed out that Iowa was *west* of the Mississippi River. Al was surprised to learn that. I was later to come to find out that a surprisingly large number of native Californians know very little about anything in the U.S. beyond the borders of California. A lot of them know a great number of things that aren't true. For example, some of them think Des Moines is the capital of Idaho, or Boise is the capital of Iowa, or Chicago is within easy commuting distance of New York City. I even met a few who thought you needed a visa and shots to visit New Mexico. I was to find I was now living in a very self-absorbed state.

Al said he thought my Iowa accent was cool. Iowa accent? What accent? Well, I guess I must have one because Rich agreed with Al. But for the life of me I couldn't hear any difference between the way I pronounced things and the way they did. *Texans* have an accent. *Bostonians* have an accent. Folks from Alabama have an accent. People from Brooklyn have an accent. But an Iowa accent? That was a new one on me. Still, Al and Rich both insisted they could hear an accent when I talked. I decided to take comfort that if I had an accent at least it was 'cool.' I noticed they both knew how to correctly pronounce 'Iowa.' If you're wondering, it's I'-oh-wa, not Ah-wa.

In the weeks to come, Rich, Dick, and I became pretty close chums. It turned out Rich loved sailing and I've always liked being out on the water. There was a charter association, the Northern California Sailing and Charter Association, in the Bay Area and the three of us would often rent a sailboat and do a little day sailing in the Bay on weekends. I would have loved to take the boat out under the Golden Gate Bridge and into the Pacific Ocean proper, but the Association's insurance wouldn't allow that. On occasion Al would come along with us, but for the most part Al had his own interests. Rich, Dick, and I chummed around so much that the rest of the division started thinking of us as a kind of team, The Three Richards. Nobody, so far as I know, ever referred to us as the Three Stooges. The three techno-geeks maybe. There isn't much doubt that the three of us were the most aggressive when it came to jumping on top of the new technologies that began pouring out onto the scene one after another during those years. There was a technological revolution just beginning to roll when I arrived at HP and I was getting in on the ground floor of it. □

The next day my first order of business was finding a permanent place to live. The information they had supplied me with was a big help and in very little time I found a nice one-bedroom unfurnished apartment on Cypress Point Drive, just off where Moffett Boulevard turned into Castro Street. The apartment belonged to the Cypress Point Apartments complex, which had a common room, a pool, and a laundry building. It was a much nicer place by far than the Lincoln Apartments had been and had a bedroom, a bathroom with tub shower, a living room with a nice balcony (mine was a second-floor apartment), a kitchen, and a dining area. It was half-again or more larger than my apartment in Ames had been. Rent was two hundred thirty dollars a month, including utilities, and, fortunately for me, the rent wasn't due until the end of the month. If they'd charged the rent in advance, like they had done at the Lincoln Apartments, I wouldn't have had the money for the first month's rent. As it was, I had enough for the 'cleaning deposit' – the new term for damage deposit – and was able to move in that day. I hadn't forgotten that I was already two hundred bucks into HP for that salary advance, so meeting the rent at the end of the first month was going to be close. But I'd have enough, just barely, to meet it and after that

there wouldn't be a problem. Now the movers had an address they could deliver my stuff to.

'My stuff' did not include any furniture, so that was the next order of business. The Cypress Point folks recommended a place called GranTree Furniture Rental as a good place to rent some furniture. They were my next stop. GranTree turned out to not be a very friendly business. Before they'd deliver the furniture I wanted to rent they insisted they'd have to do a credit check on me. I got this from a pompous young man a couple years older than me who wore a cheap polyester suit. The process would take three days and I could come back then to close the deal. I wasn't too happy about that; it meant I'd be sleeping on the floor for the next three days. You'd think I was asking them for a loan instead of renting a few pieces of furniture. But, a little foolishly as it turned out, I agreed to their terms.

When I came back on Saturday, my 'loan officer' was very unfriendly. They weren't going to rent any furniture to me. "We called your bank," he said accusingly, "and they never heard of you."

What? "Who'd you call?" I asked. He just said, "We called Maquoketa, Idaho, and they never heard of you."

"It's Maquoketa, IOWA," I said. Was I going to have to spell it for him? He just glared at me with suspicion and ended the conversation. Since there is no "Maquoketa, Idaho" I doubted if they'd actually called anybody. I was pretty mad when I left GranTree. I'd have to find another place to rent furniture, and that probably would mean more nights sleeping on the floor. The floor of my apartment wasn't exactly comfortable either. However, it just happened the next furniture place I found didn't think it was a bank and they were happy to rent me all the stuff I needed. They even delivered it that very same day. It was fairly cheap furniture, true, but part of the deal was that I could apply part of the rental money to eventually buying that furniture outright, which I later did. My furniture rental was forty-eight dollars a month, which effectively made my overall rent two hundred seventy-eight dollars a month. My finances were strained pretty tight at this point, especially since the apartment rent and the furniture rent fell on the same day of the month. My total take home pay after taxes and various withholdings was about four hundred sixty dollars a month, not counting the money being steered into my new account at the CU. But it still beat the Russian immigrant lifestyle of a college student by a long way. □

At work I soon found out that my engineering education at Iowa State had left me well prepared to deal with the theoretical aspects of design but there were a great many practical things I still had to learn. That first year with HP was in many ways like a fifth year of college.

Del's group was responsible for the division's top-of-the-line product family, the Transmission Impairment Measuring Sets, commonly called the TIMS product line. A TIMS was a very specialized measurement instrument used mainly by the telephone company to ascertain the quality and capability of telephone lines to carry computer data from a computer in one location to a second computer in some other location. Delcon had introduced the first TIMS product, the HP 4940, in 1974. Most of our group was now working on a lower cost version that did not provide all the measurement capabilities of the original TIMS but would be significantly less costly. Appropriately enough, this project was code named Mini-TIMS. It would be officially known to the world in less than one more year's time as the HP 4942. The older TIMS predated the microprocessor – as microcomputer chips were called at the time – and the Mini-TIMS would be one of the first products anywhere to use a true microprocessor. As I mentioned before, these new and revolutionary devices were available only in sample quantities the day I arrived at HP, but in only a few more months they would be available in mass quantities. There had, of course, been products available for a couple of years that used the first not-quite-a-microprocessor-yet integrated circuit, Intel's 8008 'microprocessor.' But that chip fell short of being a true microcomputer chip. The decision had been made that TIMS would not use one. But Mini-TIMS was a different story altogether. The microprocessor chip it was using was produced by Motorola and was called the M6800. This chip was the closest approximation to a real computer – the Digital Equipment Corporation's PDP-11 computer to be precise – that had yet appeared. Intel was at the same time in the process of bringing out its improved 8008 design, which was called the Intel 8080.

Erhard and I, on the other hand, were to work on the next generation full-blown TIMS, to be code named TIMS-II, which would bring the benefit of the new microprocessor technology to the original TIMS concept. Erhard had been working on the general design plan, which is known as the 'system level design,' for some time before I got there and had the technical plan for developing this product generally laid out already. Erhard took the greater part of my first real working day after I'd settled into my new apartment to explain to me what a TIMS was and what TIMS-II was going to be. He was planning to incorporate most of the designs already going into Mini-TIMS. This is known in engineering as 'leverage.' But a full-blown TIMS had to do more things than the Mini-TIMS could do. In particular, there were measurement functions TIMS-II had to have that the Mini-TIMS did not have, and the old TIMS designs for these functions had to be brought up to date and changed to take advantage of microprocessor technology. That was where I came in. I was to start designing the new electronics for these functions. And Erhard knew which one he wanted first. "You'll be designing Hits and Dropouts," he told me.

"Great! What's a 'Hits and Dropouts'?" I asked. I'd never heard of such a thing.

Erhard answered my question by handing me a several hundred page manual entitled *Theory of Operation of the HP 4940.* Along with it he handed me a telephone company pamphlet entitled *Bell Publication 41009*. "It's all in there," he said with a grin.

This is what I meant when I said my education had prepared me very well for the theory side of my work. One of my senior year courses had explained a little about 'transmission impairments,' but there were others, such as Hits and Dropouts, it hadn't mentioned at all. In point of fact, over 99% of the EE world doesn't know what 'Hits and Dropouts' are. The fact I didn't know wasn't a reflection on my education. It was a reflection of the fact that every high technology corporation has engineering problems very specific to their business that other high tech companies neither know nor have to care about. An engineering education prepares you in the fundamentals that are used regardless of whether you are designing a TIMS or a toaster. And it also prepares you to be able to *teach yourself* what you need to learn in order to work in whatever specialized problem areas your company has to deal with. If it didn't do these two things, it wouldn't be an 'education'; it would be 'training.' In 1975 the managements of America's high technology corporations knew that and knew the difference between education and training. Today I'm not so sure they do.

Anyway, I lugged that four inch thick stack of documents over to my desk and set to work learning what 'Hits and Dropouts' was. Within about a week I thought I had a pretty good handle on what it was and had managed to sketch out the general technical plan for the electronics that would be needed to measure it. (This kind of technical plan is called the 'block diagram level' of the design). Erhard looked my work over and pronounced it a good start. He also pointed out a few practical things I still needed to figure out in order to get my developing design to fit in and work with the rest of the instrument.

The nice woman in Personnel on my first day had told me ties weren't required at HP, but she hadn't said anything about them being forbidden so I was wearing a tie at work each day. No one else did, but I like to wear a tie. To me it's a constant personal symbol that I'm not working in the bakery anymore. You might say it's my own private little badge of triumph. Yes, I know a lot of men complain that ties are uncomfortable, that they're 'choke collars' and so on, but that actually isn't true. Buy a shirt with a neck size that'll go around your neck without needing a winch, guys. It's your shirt, not your tie, that's choking you. Anyway, about the third morning of real work I was sitting at my desk deep in thought about Hits and Dropouts and scribbling some things in my lab notebook. My desk sat along the corridor of the lab and it, along with the short wooden bookcase sitting on it, formed part of the 'wall' that defined the corridor. Suddenly I heard a stern sounding Voice From Above:

"WHO gave YOU the day off?" it demanded.

Startled, I looked up and there was Bob Allen, the Lab Manager, standing in the corridor, peering

down at me with a scowl from over the top of my bookcase. My face must have been a study in bewilderment because he suddenly broke out in a big, toothy grin. "Everybody knows you can't think with a tie on," he added. Then he strolled off down the corridor, still grinning.

He left in his wake a fairly unsettled twenty-one-year-old. I didn't know if he was just kidding me or not. I knew I didn't know him well enough yet to be able to tell. I did come to find out later that Bob liked to tease people; he was a bit like Grandpa Teters in that regard. So it's possible he was just teasing me. On the other hand, no one else wore a tie, these people didn't know *me* yet either, and Bob might have been letting me know in a jocular way that I was violating some kind of unwritten HP folkway. Clearly, judging from a couple of the guys in the lab, HP didn't mind its engineers coming to work looking like they'd just finished weeding their gardens. But maybe they *did* mind it if somebody wore a tie. Maybe some of them would think I was trying to show them up or something. It was keenly in my mind that I was in that six month probationary period, so I decided discretion was the better part of valor and I should quit wearing a tie to work. At least for six months anyway. In the grand scheme of things it was an awfully minor matter. Still, though, I was pretty irritated about it. Apparently it was okay for somebody to exhibit his freedom of expression by wearing blue jeans that let his kneecaps show, but it was *not* okay for me to show *my* freedom of expression by wearing my little badge of accomplishment. Fair? No. But I'd known life is often unfair since I was ten years old. My ties stayed home in the closet after that. For the time being. □

I'd been working on my assignment for about two weeks when Del called a group meeting. The ten members (including Del) of the TIMS group gathered in the division's conference room just after lunch. There Del told us the U.S. Navy was interested in our Mini-TIMS except for two things. They wanted it to be able to measure a transmission impairment called 'phase jitter' (which *was* one of the transmission impairments that had been covered in my senior course) and they wanted it to supply output signals they could use to drive an old-style analog X-Y plotter to make a permanent hardcopy record of the testing. Phase jitter was one of the measurements TIMS made that Mini-TIMS did not. The other feature, which came to be known as 'analog outputs,' was something even TIMS did not do.

Del did not explain that adding the U.S. Navy to the list of Delcon's customers would be a very good thing for our small division. I didn't think that needed any explaining; it was obvious. So when he told us he had decided to put TIMS II on hold and reassign Erhard and me to the task of designing a second version of Mini-TIMS that would have these features I wasn't surprised. Apparently I was wrong, though, about how self-evident the benefit of bringing in the Navy as a customer was. Some of the older guys were pretty upset about the decision and voiced their disagreements right there in the meeting. This surprised me for a couple of reasons. The first was just because they didn't see the self-evidence of the benefit like I did. The second was because the guys who spoke up really weren't personally affected by the decision. They weren't the ones having their assignments switched. Only Erhard, me, and one other guy, a young engineer named Dave Novotny, who was a couple years older than me, were directly affected, and Erhard and Dave weren't among the guys objecting to Del's decision.

But Del listened calmly to the guys' objections and quietly responded to them one by one. By the end of the meeting the guys in the section might not have agreed with his decision but at least they accepted it. I was impressed for two reasons. First, the guys who had spoken out against the decision *had* spoken out against it. The fellows I'd worked with at the phone company never openly argued with the boss in public like that. They rarely agreed with the boss' decisions, but instead of saying so they'd just grouse about it in private at coffee break. Second, Del seemed to take it as a matter of course that some people *were* going to disagree with his decision and that it was his job to convince them to support it whether they agreed or not. He could have just said 'the decision is made, that's all there is to it.' After all, he was our boss and nobody was going to quit over this. But that's not what he did. I later learned that what I was witnessing that day is called 'consensus building' in manager terminology. It's the difference between being a leader and being a ruler. Del was our boss, yes, but he was also our *leader*. After the meeting was over, I never heard one single bit of grousing over the decision from anybody. We were all signed up that

bringing out a second version of Mini-TIMS was now an objective for our group.

Del made Erhard the project leader for this new project. Erhard, in turn, assigned the phase jitter measurement design to me and the analog outputs design to Dave. I'm pretty sure Erhard wanted to get this project over with quickly so we could get back to TIMS II, and his assignments were in line with this. Analog outputs would be a completely brand new TIMS feature that had never been done before. It had to be an invention from the ground floor up. Phase jitter, on the other hand, had been done before in the original TIMS. It was basically a leverage assignment, copy-and-modify-to-fit-into Mini-TIMS. Dave had close to two years of experience already while I was a raw, wet-behind-the-ears rookie with the ink still drying on his diploma. Dave was a proven performer while I had yet to prove I could actually do anything. Erhard was making the smartest use of his people.

Dave wasn't actually completely done with his assignments on Mini-TIMS yet, but his designs were far enough along that he felt comfortable taking on added design responsibility. At least he looked comfortable with it as far as I could tell. One of the Mini-TIMS' new features had come straight out of the microprocessor revolution. It was a printed circuit board plus microcomputer software (called 'firmware' because the computer programs were stored permanently in special chips called 'read-only memories' or ROMs) that allowed a Mini-TIMS to be controlled by a computer. This, in turn, allowed customers to automate their testing processes. The basic idea for this hadn't originated in Delcon Division; I'm not sure if it had been thought up first at HP Labs, the company's 'pure research' lab, or if it had been thought up at one of the company's other product divisions, or perhaps at Corporate Engineering, a part of the company whose work had an across-the-company scope. But whichever was the case, this feature was being designed into most of the company's new instrument projects that year. It was officially known as the Hewlett Packard Interface Bus or HPIB. HPIB *did* require invention on Dave's part because HPIB was really a standard for designs rather than the design itself. A few years later there would be standard integrated circuit chips for implementing the HPIB function, but these did not yet exist at that time. HPIB was also eventually made a standard by the Institute of Electrical & Electronics Engineers (the IEEE, which is the main professional society for electrical engineering) and would become known as Standard IEEE-488. But this, too, hadn't happened yet. HPIB was still too new an invention. HP's products that came out the same year Mini-TIMS did were among the first products in the world to offer HPIB.

Dave's other responsibility was a measurement called 'noise with tone.' Noise with tone had been one of the measurements built into TIMS and included in the Mini-TIMS. It had been Dave's first assignment on Mini-TIMS after he'd joined the company and, except for technical details, that assignment had been pretty much like the first assignment they'd given me. He had mastered it already and his design was pretty much done except for cleaning up occasional problems uncovered during testing of the Mini-TIMS prototypes. Dick occasionally teased Dave a little, in a good-natured way, by calling him 'Dave Noise-with-Tony' instead of 'Dave Novotny.' It was a way of acknowledging Dave's first big design success.

As for phase jitter, that had been done once already for TIMS. Paul Winninghof, one of the older guys, had been the inventor. Erhard's instructions to me were pretty straightforward: Copy what Paul had done in TIMS and modify it as needed to work in a Mini-TIMS. If I had any technical questions as I went, I was to consult with Paul. It wasn't what you'd call a glamorous assignment, but it wasn't all that much different from what I'd planned to do with Hits and Dropouts anyway. At least I already knew what 'phase jitter' was from my college course and had a better idea of how measuring it was probably done as I went into my new assignment. I still more than half thought of myself as just a college student masquerading as a real engineer and, frankly, almost everything about my new job was still pretty intimidating. I was almost desperately anxious to prove to these guys, and to myself, that I had the talents and abilities to be a good design engineer. Just because I had a job here didn't mean I'd made the team yet. Not in my mind anyway. In the pros most rookie athletes get cut; I didn't see any reason that couldn't happen to rookie engineers. So if my team needed a nose tackle, hey! I'll do it! Put me in, Coach.

Del had a suggestion of his own that Erhard was only too happy to agree with. New product design

goes in stages. It's often called 'the product life cycle.' It begins with the conception of a product, goes through a definition stage, then an initial design called a breadboard prototype, the purpose of which is to prove the basic concept of the product. This is then followed a more advanced design, called a lab prototype, that actually works in all particulars and meets the product's specifications, followed by another prototype, called the production prototype, that proves the product can be mass produced. The breadboard prototype is usually a hand-wired collection of electronic assemblies called breadboards. The later prototypes do away, mostly, with hand-wiring and use what are known as printed circuit boards. These are glass-epoxy boards with the wiring already built in using lines of copper called PC traces. Printed circuit boards are called 'PC boards' or 'PCBs' or 'PCAs.' (The 'A' stands for 'assembly').

This whole design process might sound needlessly rigid and inflexible, and managers lacking product design experience often think it is, but in fact it is the most efficient way to get from an idea to a money-making product. At every stage in the process there arise particular classes of problems that have to be solved and the product life cycle process is designed to deal with the peculiar natures of these problems and *when* they have to be solved. Managers who are ignorant of the nature of the design and invention process are often known to try to speed things up by trying to shortcut this process. What always happens is that the problems still crop up, still have to be solved, and the 'wing it' approach these managers try always ends up taking longer and costing more to get from idea to shipping product. Despite what the Harvard Business School might think, it simply isn't true that a manager doesn't need to know the specific details of the business he's managing. That is one of the many great and stupid management myths that were to become popular in the 1980s. In my more than thirty years of professional engineering and engineering management, I've seen smart people try to shortcut this process many times and they have failed in the attempt to shorten up the cycle every single time. Sometimes their failure takes their whole organization down with them. Neither divisions nor companies are immortal. Ask Clinton Engines.

Naturally, I knew nothing at this time about the product life cycle. But there was one big difference between the Mini-TIMS and the new project being launched. Only mine and Dave's parts of it were new. All the rest was the same as Mini-TIMS itself and only our new designs needed bread-boarding. Mini-TIMS was just then at the edge of the production prototype phase and we could use these prototypes as the foundation of *our* breadboard phase. And that was Del's suggestion. (Even if Del hadn't suggested it first, Erhard *would* have; it was plain old common sense, which engineers are supposed to have a lot of). The way Del told *me* about it was to tell me, with a kind of evil little grin, that the next thing I'd be doing was building one of the Mini-TIMS production prototypes, turning it on, and testing it. Once I had it working as a Mini-TIMS then I could go ahead and have my way with it in bread-boarding the phase jitter design. The prototype I built would become the first breadboard HP 4943. (Our project never did get a code name of its own; I'd suggested 'Mili-TIMS' since the whole thing started with the Navy, but Del vetoed that idea; we just ended up calling it 'the ′43').

Bright and early the next morning my pal Al Howard came by with a mechanical carcass, a big box of parts, and a stack of pasteboard binders containing the theory of operation, schematic, and turn-on and test procedure for each and every PCB in Mini-TIMS. He dumped them with obvious enjoyment on my workbench, gave me an ear-to-ear grin, and left with a cheerful, "Have fun." I stared ruefully at that big pile then sighed and turned on my soldering iron. I wasn't too happy about this particular task. It seemed to me it was the sort of thing a technician should have been doing. But there weren't any technicians in our R&D lab and Mini-TIMS didn't 'belong' to production yet.

As it turned out – and I'm sure Del and Erhard both knew this perfectly well right from the start – putting that prototype together was a valuable learning experience for me. I knew next to nothing about the details of the Mini-TIMS design when I switched on my soldering iron, but I sure as heck knew a lot about it by the time that prototype came to life. In the process I also learned a lot about practical circuit designs. I knew the basics, yes, but my colleagues knew a lot more than the basics. I got ideas for how to do things out of each and every PCB I tested and turned on. As a crash course in the *practical* art and craft of electronics design, that assignment couldn't be beat.

It also helped me get to know all the other guys in our group much, much better. These PCBs were their designs and boy-oh-boy did I ever have questions as I was turning on and testing the prototype boards. The guys were as tolerant of me pestering them with my questions as if I were their kid brother or, in Paul's case, a favorite nephew. When I came to the magical heart of Mini-TIMS, the microcomputer PCB, Dick took me under his wing and taught me a lot about both the hardware and the firmware. He was in charge of all the firmware going into the project and had designed almost all of it single handed.

It took me longer than it would have taken a technician, but finally I had that prototype running. It was time to start doing my phase jitter design and converting that HP 4942 into the first HP 4943. I now had a much clearer idea of how I could take advantage of that nifty little computer built into the product and I kept this constantly in mind as I studied and understood Paul's design from the original TIMS.

Erhard gave me a couple of days to learn about Paul's design then asked me to give him a plan for how I was going to go about doing it for the ′43. A plan? Okay. Good idea. I'll do that. Then he asked me to include a time schedule for the different specific tasks I was going to do. My face fell when he said that. "I've never done this before," I confessed. "I don't know how long any of this'll take."

This was the first time since my arrival I'd had to admit I didn't know how to do something. Believe me, I was pretty scared about having to 'fess up to it. But good old Erhard, bless him, appreciated my honesty and I'm pretty sure he sensed how nervous I was. We sat down at his desk right then and there and he explained the general sorts of things I'd probably need to do – not in specifics, of course; in general – and about how long each one of them would typically take to accomplish. Some of the things he explained were things I wouldn't have even thought about. By the time he finished, my confidence was back and I had something new under my arm: an understanding of what was expected of my job performance as far as roughly how long it should take me to do different things. All by itself that went a long way towards relieving my anxieties about how I'd know if I was proving myself and how I could evaluate *myself* in terms of whether or not I was doing a good job. It was like getting a peek at the answer sheet before a test. By the time I went back to my desk, I was feeling *much* better about my job.

Erhard had told me to copy Paul's design as much as possible, and that's what I did initially. Of course I went through the numbers and did the math for myself. I had to do that or I wouldn't have known what I was doing. Also, there were a few things that could and should be improved simply because there were newer, cheaper, better parts available in 1975 than existed when Paul did his original design. I could change the design to use these better parts without any real problem. Next, there were a few things that *had* to be done differently just because a Mini-TIMS wasn't a TIMS. My design had to accomplish the same function, but it had to accomplish it a little differently because some pieces of the old design just didn't exist in the Mini-TIMS. It gave me the chance to do a little innovating of my own, which made the job just tremendously more fun for me. I was able to come up with a few snazzy little circuit designs I felt pretty proud of. Most of this came straight out of the fact that Mini-TIMS had a microcomputer in it and TIMS did not. The 'missing pieces' were missing because the microcomputer did that job in firmware and the hardware had been eliminated.

But there were two things about the old design that, strictly speaking, didn't *have* to be changed but which I thought *ought* to be changed. The first was this strange little circuit Paul had included in the original design. I figured out what it did and how it worked, but what I couldn't understand was *why* it was needed. The more I looked at it, the less sense it made to me why it was there at all. I decided to ask Paul about it. If I was missing something, he'd tell me what it was. If he was okay with eliminating this circuit I'd be able to tell Erhard that Paul had okayed my taking it out. Either way, I'd still be following my instructions to copy the TIMS design.

So I went to the quad next door where Paul sat. A 'quad' was a little four-man office area, kind of the forerunner to today's ubiquitous office cubicles except it held four people instead of one. Paul was at his desk. He was bent over and really concentrating on something. Paul was bald like Uncle Wayne and had a little ring of graying hair that looked for all the world like a monk's haircut from the middle ages. His left

hand was on top of the bald spot on his head and his nose was about three inches above a tablet of engineering paper that held some scribbled equations he was focused on. He was a man deep in thought.

I walked up to his desk, dragging a chair behind me, and sat down. "Excuse me, Paul," I said, "but do you have a minute for a question?" He slowly turned his head and looked at me. He didn't straighten up and his hand never moved from his bald spot. He looked at me with unblinking eyes. I took that to mean he had a minute for me so I launched into my question. "You know that phase jitter circuit where you . . ." My question was pretty technical and it took me about five minutes to ask it. All the while Paul never moved or blinked. Finally I finished and waited to hear his answer. A few seconds went by in silence. Then half a minute. Then all of a sudden Paul blinked and sat upright. "I'm sorry," he said, "I wasn't listening. What did you say?"

Now *that's* concentration. It struck me funny and I chuckled a little bit before repeating my question. This time Paul was listening and he explained to me why he had put that circuit into the design. I thanked him and went back to my desk. There I thought about his answer. The reason he'd given me was pretty mathematical so I won't try to explain it here. But the more I thought about it, the more convinced I became that there was a flaw. Paul's reasoning was sound, but it was based on an assumption I didn't think was true. I worked out the math in more detail and when I was done I was convinced Paul's circuit was solving a problem that didn't really exist. It could be removed entirely and not change anything except for reducing the cost of the PCB.

Now I found myself in a kind of dilemma. The circuit I wanted to get rid of was relatively expensive and complicated and I was sure eliminating it was the right decision. On the other hand, I'd been told to copy that design; time was of the essence in doing this project. Also, there was still a possibility I'd made a mistake and Paul was right all along. Paul had received his *Master's* degree in EE the year I had started kindergarten; I might be arrogant sometimes, but I wasn't so arrogant that I didn't respect the *decades* of actual design experience Paul had that I didn't. I decided to design my breadboard to include a little jumper wire arrangement whereby I could switch Paul's circuit in and out of the design. That way I could actually *test* both alternatives and, if I was right, I could show Paul and Erhard I was right. If I was wrong, no harm done. I'd just wire Paul's circuit in permanently and learn from the experience.

The other thing I thought ought to be changed was a little bigger matter because it involved more than just the phase jitter measurement PCB. I wanted to change something in the way the TIMS *system* was arranged. Here I felt like I was going way beyond my charter. I was responsible for the phase jitter PCB, not for how the ′43 *as a whole* was to be designed. This issue had to do with the order in which electrical signals were being processed within the product. A raw rookie wanted to tell the very people who had invented TIMS that there was a better way to do it. There was a Yiddish word I knew, *chutzpah,* and I sure felt like it took a lot of it to even propose doing what I wanted to do. But I had done the math and then double checked it and then double checked it again and I was certain I was right. My way would be a little better in terms of measurement accuracy and it would also be a little cheaper to build. But, again, what if I'd made a mistake? I decided to do my jumper wire trick with this change, too. That way I'd *know* and, if I was wrong, again no harm done. If I was right, I could *prove* I was right by the only way that really matters in engineering: by showing them in the prototype itself that my design worked *better.*

There was one more thing that went beyond my charter that I wanted to do very badly. I didn't want to do just the phase jitter PCB hardware design; I wanted to do its *firmware* design too. I had just started my senior year at ISU when the invention of the first *true* microprocessors had been announced to the world at large with great fanfare. I had known immediately that the consequences of this technology would be nothing short of revolutionary. The chance to work with microprocessors had been one of the big factors in my decision to take HP's job offer. Erhard might have been billing me as the 'crack new analog guy' but his crack new analog guy very badly wanted to get his hands on the microcomputer part of the project. There was a revolution going on in the electronics world and I wanted to be in the thick of it.

Erhard had only assigned me to do the hardware. In those early days of the microprocessor, most

people took the firmware for granted, if they thought about it at all. Dick had been doing most of the firmware for Mini-TIMS; the small fraction he hadn't been doing Dave had done. I think Erhard might have just been planning to have Dick whip out the phase jitter firmware in an afternoon or two. He might even have been thinking maybe he'd do it himself. I know Erhard had a real hankering to get his hands on this technology too. Every bit as big a hankering as I had.

I asked Dick if he thought there'd be any problem with me doing the firmware for my design. I didn't need to sell Dick on the idea, as it turned out. Firmware design simply *wasn't* the easy stroll in the park a lot of people thought it was in those days. It took every bit as much design effort as hardware did. More, in fact, because as soon as people found out they could do one new thing with this microcomputer innovation they immediately wanted to do *more* new things with it. Specifications for what the firmware was supposed to do were in such a constant state of change that designing it was like trying to shoot ducks from the back of a rodeo bull. Over Friday night beers after work Dick often complained that people didn't properly appreciate firmware or how much work it was to do. He was a guy who wasn't about to turn down any help graciously offered.

Next I had to sell Erhard on the idea. This took a bit more talking. He wasn't too enthusiastic about the idea at first. Fortunately, I had taken another special problems class my last quarter in school on the basics of microprocessor hardware and firmware. My professor for that class was a former Silicon Valley guy who had friends at Motorola. They had given him some very early prototype microprocessors and, as luck had it, they were M6800 microprocessors, the very same kind we were using. I could point to that as credentials for being able to do the job. On top of that, Dick endorsed the idea on the grounds he didn't know when he could get to it but it wouldn't be for awhile. In truth, the phase jitter firmware was pretty simple stuff compared to all that Dick was doing. If Dick's work were compared to a term project, my work would be nothing more than a homework assignment. Erhard could see how eager I was to take on this job so he did what a good boss always does: He gave me all the rope I was asking for. The task was mine to do. I was confident in taking this on because I knew *I* wouldn't have to shoot ducks from the back of a bull. The phase jitter hardware designer was a *very* close friend of mine: Me.

Mind you, I wasn't doing this to try to impress people. I wanted to do it so badly because I wanted the experience. I knew microprocessors were going to change everything in our world. I also figured that if electronic brains ever did become a reality the odds were very, very high that microprocessors would play a central role in them. So I wasn't doing this to impress anybody. I was doing it for *me*.

Give or take a few days it took me almost exactly the amount of time to get the breadboard prototype running as Erhard had told me it would. First I tested and debugged my design using the TIMS circuit configuration just as I'd been told to do. Once I got this working, I tested the two 'extra' changes I wanted to make. As I had thought, that one circuit of Paul's proved to be unnecessary. As soon as I'd verified that I went straight to Paul to tell him. I first explained my math to him to show why I'd thought we didn't need it. Then I showed him the breadboard. I was a little nervous about how he might react, but I needn't have been. He was professional about it all the way. "That's good!" he told me. "That's a real improvement." I beamed from ear to ear.

Next I tried out the other change. It, too, worked just like my calculations had predicted. I went and got Erhard. First I explained what I'd done and the reasoning behind it. Then I showed it to him in the breadboard. We looked at the key signal on an instrument called an 'oscilloscope' and he could see for himself the improvement my change had made. The cost savings he'd noticed right away when I was explaining what I'd done. He gave me a very pleased smile and a pat on the back. "That's good," he said. "Do it your way." Kites don't fly as high as I was soaring that day.

I was sitting at my desk the next morning when to my surprise Erhard brought Brian Moore, the Division Manager, into our quad to see the ′43 breadboard. He had me give Brian a demo of the phase jitter measurement. Brian seemed pleased and Erhard looked about two inches taller than he usually did. Then Brian, who rarely came into the lab and didn't see the prototypes very often, impulsively reached

forward and switched the measurement selector switch on the front panel. He wanted to see one of the other Mini-TIMS measurements at work.

Uh-oh, I thought. One thing I hadn't bothered to mention to Erhard was that there was a problem with that switch. When I'd put the prototype together I'd left a loose connection somewhere and almost every time anybody turned that switch it lost contact. The unit would make a funny sounding noise – ding, ding! *ding! DING!* – and the front panel display would go out. I'd intended to get around to fixing it eventually but since I pretty much always left that switch set to 'phase jitter' it hadn't been a high priority to me to do the fix. I had found out that if the connection did let go a light tap to the chassis with my ball peen hammer always 'fixed' it.

Sure enough, the second Brian turned that switch the unit made its funny noise and the front panel lights went out. "What is it doing?" Erhard cried out, his German accent a little heavier than usual.

"It's just a loose connection," I said casually, like nothing was wrong. "Don't worry."

"Can you fix it?" Erhard asked anxiously.

I shrugged. "Sure." I picked up my hammer and gave the unit a light tap. It quit making noises and the front panel came back on. Erhard's face turned all red and Brian gave him a half amused, half bemused look and left without a word to go back to his cubicle.

Erhard told me to fix the loose connection. □

Most of the time that's spent in developing a new product is spent testing it, finding out what doesn't work quite right, and fixing the problems. The process is called 'debugging' because the problems are referred to as 'bugs.' Usually a project had one breadboard unit, then a few lab prototype units, and finally a larger number of production prototype units. Debugging is on-going throughout the design process. Bill Hewlett and Dave Packard, the founders of the company, called it the 'test-fix-test' process. If not for Erhard's guidance, I would have badly underestimated how much work goes into debugging. But thanks to the heads-up he'd given me, I figured I'd have my hands full right into autumn. Therefore when I applied for admission to Stanford I'd asked for, and been accepted for, a winter quarter start. It turned out I did indeed have my hands full right through autumn and Stanford's fall quarter.

The breadboard had been built using electronics parts the lab kept in stock. But as we advanced into the lab prototype stage I needed to order some parts for it we didn't keep in the lab stock. This resulted in my meeting Lee Brooks.

Every manufacturing operation has at least one person known as 'the buyer.' The buyer does what the title implies: she buys things. Delcon had one buyer, an overworked woman named Lee Brooks. Lee was middle aged when I met her, but I bet she was an absolute knockout as a young woman. Because she was the one and only buyer for the whole division, and because most people tend to forget that parts don't just magically materialize on the doorstep the next morning, it was common for lab engineers to put off telling Lee they needed parts. This tended to put almost all the lab's dealings with Lee on an emergency footing and, quite naturally, Lee didn't harbor many warm feelings toward R&D lab people.

Lee and Rich especially didn't get along, even when Rich did remember to order his parts on time. You see, Rich had what you might call a Don Rickles sense of humor. Not too surprisingly, a lot of people found him irritating instead of funny and Lee was one of them. He had referred to her, more than once and in her presence, by the nickname 'Babbling Brooks.' When I first got to Delcon he called me 'Oil Wells' for awhile until I told him my dad's name was Earle. 'Oil' and 'Earle' sounded close enough that I guess he decided that nickname wasn't funny. Which, of course, it wasn't.

I winced the first time I heard him call Lee 'Babbling Brooks,' and I winced again when I saw the look she gave him. Lee always had about a two foot stack of purchase orders sitting in her inbox and whenever one of Rich's purchase orders came to her desk it went straight to the bottom of that stack and tended to stay there awhile. He pretty much never got his parts when he needed them.

When the time finally arrived for me to order parts for the prototypes I dutifully started filling out the purchase order, asking Erhard to decode the parts of it I didn't understand. There was one line on the form for stipulating by when the parts would be needed. I asked Erhard what I should put in that blank. I didn't want to say something too close to when I'd actually need them, but I'd lugged enough hundred pound flour sacks and fifty pound boxes of shortening off the delivery truck to know supplies didn't materialize on the doorstep overnight.

"Put ASAP there," Erhard said. I asked him what that meant. "As Soon As Possible," he replied.

That was one bit of advice I decided not to follow. If everybody in the lab was using that for a due date, I thought it was probably more than a little likely ASAP would really mean 'as soon as Lee felt like getting around to it.' I decided to leave that space blank and go see Lee instead. I hadn't actually been introduced to her yet, so this would be our first actual conversation.

When I walked up to Lee's desk, which was just off the factory floor production area, she gave me that special look she reserved for lab engineers. The one that says, "What the heck does *this* bozo want?" I politely said hi and introduced myself. She politely replied, "What do you want?"

"Well," I said, "I'm new here and I was wondering if you could give me some advice about how I should fill out this purchase order." Lee blinked twice then suspiciously asked me what I wanted to know.

I pointed to the 'due date' line and said, "I'm not sure what's the usual amount of time I should use for this date," I said.

"Six weeks," she snapped.

I thought about that for a couple of seconds and then slowly said, "Ooo-kay. I *guess* I can make that work." I filled in a date six weeks hence. Lee looked a little astonished. Then I asked her if she could check the rest of the form and tell me if I'd made any mistakes. She looked it over and pointed out a couple of things that should have been different. I changed them to what she said. Lee looked even more astonished. She held out her hand and I gave her my purchase order. She put it on top of her stack.

Three days later I got my parts. I went out to her desk again and thanked her. "That really helped me out, Lee," I said. "I really appreciate what you did for me." She claimed she hadn't done anything.

For as long as I was at Delcon, I always got my parts in three days, four max. □

Lee wasn't the only direct source for parts that weren't in the lab stock. Another and more often used source was production itself. There was an area just off from where they assembled the printed circuit boards where row after row of shelves were set up. They looked for all the world like library book shelves, and this was where production parts were kept. When we took parts from production we were supposed to fill out a little form documenting what parts we had taken, how many, and which project they should be charged to. Filling one of these out took about five seconds. However, it was fairly common for lab engineers to ignore this 'bureaucracy' and not bother with this form.

It was Bob Allen's custom to hold an offsite lab retreat at a hotel in Palo Alto every three years, and it so happened there was one of these my first summer at HP. The purpose of these retreats was to review how we did things in the lab and to modify the way we conducted our day to day R&D business to improve the process. In addition, there were also gripe sessions where there was no rank in the room and anybody could gripe about anything they wanted. Bob and his managers took these retreats very seriously and most of the suggestions and ideas that came up were soon implemented back at Building 30. That summer the Production Manager had a gripe. Not too surprisingly, it was about the way lab engineers would take parts from production without filling out those slips. He made a plea to us to stop doing that.

Personally, I thought it wasn't unreasonable for him to ask us, very nicely, to quit stealing parts from production and I didn't think what he was asking was too much trouble. However, not every one of my colleagues saw it this way. Several of us were walking down El Camino Real afterwards on the way to

lunch and I happened to be walking next to Johann Heinzl. Johann was from Austria and spoke with a thick German accent. After Paul and Erhard, he was probably the oldest guy in our group and a brilliantly talented circuit designer. There is an important technique used in electrical engineering called 'feedback' and Johann was such a master at using it that I called him the King of Feedback. It seemed to me like there was nothing he couldn't get a circuit to do using this method. I learned a tremendous amount about it from him, including my first exposure to what are called 'adaptive' circuits – circuits that in a sense modify themselves and 'learn' how to improve their own performance. This is done with feedback of a special kind known as 'performance feedback.' I was later to learn the underlying theory for this technique from one of my favorite Stanford professors, Dr. Bernie Widrow, but I learned my first lessons about it from Johann.

There isn't much doubt that Johann had the heart of a rebel or maybe an anarchist. He was one of the guys whose normal working attire suited working in a garden equally well. He had long, unkempt hair that rarely met up with a comb and was the only guy in the lab to sport a full mountain man's beard. With his thick accent, general unconcern for his personal appearance, and brilliant abilities as an engineer he conjured up images in my mind of Einstein. Anyway, as we were walking down the street he suddenly turned to me and, out of the blue, said in that thick accent, "Wells, I'm luckier than you."

I was a little surprised by this remark and asked him what he meant. "When I join the company," he said, "we get to design two, three boards a year. Now *if you're lucky* you get to design *one* board a year and spend the rest of your time doing *paperwork!"* Johann didn't like to fill out forms.

Bill Hewlett and Dave Packard both seemed to have a soft spot for our division. Delcon division had been Delcon Corporation until Bill and Dave bought it in 1968. Every once in awhile one or the other of them would come down from Palo Alto unannounced and just drop in to see what was going on at the company's tiniest division. When I joined HP the company had just had our first billion-dollar year. Dave was chairman of the board and Bill was president and CEO. Dave tended to come in rather unobtrusively and just wander around the place talking to whoever he met. He did this late one afternoon and wandered out into the production area.

One of the women who worked in the production stockroom area was kind of short and couldn't reach the top shelf of the parts bins. That particular day she needed something from up there but somebody had run off with the little library-style wooden steps she used to reach the top shelf. Dave, who in many ways resembled Abraham Lincoln without the beard, was a very tall man, an ex-football player, and he just happened to walk into the stock area as she was looking for the missing steps.

She saw Dave but, being fairly new herself, she didn't know who he was. She pointed a finger at him and said, "You! You're a tall fella. Reach up there and get that box for me, would you?" Dave did and then had a pleasant little chat with her before resuming his wanderings. Her supervisor came rushing over to her and, a little out of breath, exclaimed, "Do you know who that was!?"

"No," she replied cheerfully, "but he sure was a nice fella!"

When Bill dropped in for a visit his entrances tended to be a little more visible. About the best way I can describe Bill Hewlett is to say imagine what Dennis the Menace would be like when he grew up. There was a pathetic terrorist organization operating in the Bay Area when I first moved out there called the Red Army Brigade or something like that. They were a stupid and inept hangover from the sixties. My first summer there they had tried to bomb the HP Labs facility at Deer Creek. There were all these chemical tanks sitting outside the building which stored various chemicals – some of them rather toxic – that were used to fabricate integrated circuits. The bombers blew up the only tank on the grounds that was filled with water. They also tried one time to kidnap Bill Hewlett's son right in front of his, the son's, house. Since they seemed to have a special animosity for HP, the company accordingly tightened up its security procedures. One of these reinforced security procedures required the receptionist in the front lobby to inspect everybody's name badge or employee ID card before granting admission to the building.

There was a new receptionist working our front lobby one day when Bill dropped in. He'd parked his car in the visitor parking lot out front, came in, and proceeded to charge straight through the lobby to the door leading inside. Our young receptionist cried out, "Sir! I need to see your identification!"

Bill never even broke stride, "I'm Bill Hewlett," he said and charged on inside. She grabbed the phone and immediately called our captain of security, whose desk was just down the first hallway and had a clear line of sight to the door. "Some guy just walked in here like he owned the place!" she cried.

The captain had a perfectly clear view of who was charging down the hallway. "He does," he replied. When Bill heard about this he went back out to see the receptionist, praised her for her work, and asked her if she'd consider coming up to company headquarters in Palo Alto and working *his* reception desk there. □

I started attending Stanford in January of 1976. I belonged to what was known as the Honors Co-op Program, which was a professional master's degree program Stanford set up to serve the thousands of working engineers in the San Francisco Bay area. Students in this program attended school part time and, as I mentioned before, HP gave me paid time off during the day to attend classes and reimbursed half the costs of my graduate education. Stanford's fee for Honors Co-op students at that time was one hundred ten dollars per course credit. My first quarter at Stanford coincided with when I became eligible for HP's employee stock purchase benefit as well as for the company's profit sharing program. Consequently, after payroll deductions money was pretty tight my first quarter and I took only one three-credit class. Later I paid for school by selling my quarterly HP stock purchases and handing the proceeds over to Stanford. The stock market at that time wasn't going anywhere in particular so there wasn't much to be gained immediately by hanging on to my HP stock. The stock market malaise would continue, drifting up and down within a trading range, until 1983.

Stanford required me to submit a study plan of the courses I was going to take. Before putting this plan together I wanted to touch bases with Bob Allen to get an idea of just how far the company was willing to go with this paid time off benefit. After all, our lab projects were in full swing and I figured there had to be some kind of limit to HP's tolerance of my absence from work. I asked Bob what I should plan on for a quarterly course load at Stanford.

"Take two courses a quarter, hurry up and get your degree, and become useful," Bob said.

If we'd had this conversation at the start of fall quarter I probably wouldn't have known Bob was kidding about the 'become useful' part. In fact, I probably would have been worried to death that I wasn't cutting it in the lab. However, in November I'd received a nice ten percent raise so I just grinned at Bob when he made that wisecrack. I continued getting ten percent raises at six month intervals for the next couple of years, and that was all the proof I needed that I had made the cut and my bosses were happy with my work.

My advisor at Stanford was John Linvill, who was then chair of the electrical engineering department. John was a kindly, white-haired gentlemen who was internationally recognized for work he had done in the 1950s on mathematical modeling of that then-new wonder device, the transistor. The term 'modeling' is used to mean the development of a mathematical theory for describing how something works or behaves, and for a time the Linvill model of the transistor was very important as scientists and engineers came to understand this device and to develop the circuit theory needed to properly use it. From John and a couple other professors there I learned a great deal about how to develop models for integrated circuits and devices. In my own research work later on I was able to expand upon what I learned from John to the extent that today I call myself a 'model maker' – which means I develop theory describing how any sort of thing works. A great deal of my current work in computational neuroscience – the mathematical theory of the brain and spinal cord – is the direct descendent of the science I learned from John back in '76.

The physics and technology of semiconductor devices – the silicon devices from which the great majority of all electronics is made – was one of my special areas of interest at Stanford. There were two

reasons for this interest. The first had to do with HP. The microprocessor revolution and the integrated circuit technology revolution driving it was having a clear impact across the high technology spectrum. It was clear to me in '76 that we were then seeing only the beginning of this. In fact, I made a prediction to Del and some of the other folks I worked with that within about seven years we'd be developing our own custom microchips in almost all HP's products. Most people were skeptical about this prediction, but as it later turned out this prediction ended up being pretty accurate and started happening at just about the time I'd predicted it would. Another part of this prediction was that the key electronic technology would eventually end up being neither purely 'digital' (computer-like circuits) nor entirely 'analog.' It would instead be a combination of both on the same integrated circuit microchip. This, too, ended up being the case and is today known as 'mixed-signal very large scale integration' ('mixed-signal VLSI'). In '76 the prevailing assumption was that 'digital' was the 'wave of the future' and 'analog' would be going the way of the dodo. That never happened. I don't think it ever will.

The other reason for this interest was, of course, my private off-duty interest in electronic brains. One of the courses I took early on at Stanford was a course named Biological Signal Processing. I hadn't taken a biology course since junior high and I knew I needed to know more about the central nervous system (brain and spinal cord). This course was a terrific way for someone with my background to enter into the world of brain science. After all, if a person really wants to work on creating an electronic brain, it pretty much is a given one has to know how biological brains are put together and how they work. The course required a term project in which the student had to model some biological system. I chose the eye of the nudibranch mollusk and was able to put together a nice mathematical model as well as a preliminary electronic circuit design for imitating how this eye worked. Of course, in 1976 the technology for doing a practical implementation of this electronic eye wasn't there yet, nor was the biological knowledge of it fully complete. (The latter is more complete today, but still not entirely complete).

From studying biological signal processing theory it was clearly self-evident that if electronic brains ever became real, they would involve enormous amounts of integrated circuitry. Hence the other reason for my interest. It turned out that Stanford had a terrific bookstore stocked with well-written books on a wide spectrum of subjects I regarded as being probably important in the quest for electronic brains. It soon got to the point where I couldn't visit the Stanford Bookstore without walking out with an armful of books, most of which I bought as part of my private research into electronic and biological brains. HP, of course, didn't reimburse me for these and there was no reason they should. It was my private interest being served by these purchases and I always budgeted part of my take home pay for book purchases.

The second area where I concentrated my graduate studies at 'the Farm' (as Stanford is affectionately known by its alumni) was in digital signal processing and the mathematical theory of digital systems. Again there were two reasons for this. One was, of course, the microprocessor revolution itself. To an EE a 'signal' is any physical quantity that can be said to carry information. Voltage and current are two examples of this but so are electromagnetic field intensities, fluid pressure, temperature, mechanical vibrations, chemical transport phenomena (such as is found in the connections between nerve cells in the brain) and an endless host of other real world phenomena. Signal processing theory deals with the mathematical representation of these quantities and with the changes and transformations produced in the 'flow of information' carried in the signal by the physical entities. These act on, and in turn are acted upon by, physical signals. In fact, a great deal of what electrical engineers do can be accurately said to be signal processing. Electronic circuits are the main means by which this signal processing is carried out.

Before the microprocessor most electronic signal processing was carried out by 'analog' circuits. But with the coming of the microprocessor it was now starting to become practical to augment and in some cases replace these analog circuits using microprocessors and firmware. I was already doing some of this in my phase jitter design. The theory of digital signal processing had already been around for a relatively long time but it had been a kind of theoretical backwater in which only a few dedicated specialists worked. Now with the existence of microprocessors, digital signal processing suddenly became something the EE world at large was paying attention to. Beginning around 1976 it had, almost overnight,

become the hot topic. Since digital signal processing is carried out using what are known as digital signal processors, and since digital signal processors are one brand of digital computer-like systems, studying digital signal processing and the mathematical theory of digital systems went hand in glove.

The second reason for my interest in this area was the exact same reason as for my interest in semi-conductor physics and technology: electronic brains. One of the most startling things I had learned in my biological signal processing course was that a great deal of (although not all of) the signal processing that goes on in real brains is nothing else than a form of digital signal processing. Once again I found that the things I wanted to learn about in order to do my job better were also the exact same things I needed to learn about for my private research. Indeed, I was surprised to learn that the original concepts that had led to the invention of the digital computer itself – which is largely credited to an amazing mathematician named John von Neumann – came straight out of brain studies by physiologists. These studies had given rise to a science known as 'neural network theory' and it turned out that the very first digital computers were designed to be 'neural networks.' *That* was the reason they had been called 'electronic brains' when I was a boy. So it turned out that Walter Cronkite hadn't lied to me after all; it was just that the computer people had been exaggerating and romanticizing what they were doing.

In my studies of this topic I was fortunate to have two remarkable professors. The first was Bernie Widrow. Bernie is today recognized as one of the early pioneers of neural network theory. He is an absolutely great teacher as well as a world-recognized authority in his field. From him I learned digital signal processing theory and had my introduction to neural network theory. When I later did become a college professor, I modeled my own teaching and lecture style after Bernie's example.

My other great professor was Ed McCluskey. Ed was also already a world-recognized expert. In his case, he was known for his work in the theory of logic circuits. From him I learned the mathematical theory of digital systems and received a formal education in computer theory in general. As it happened, Ed was never too thrilled to be spending his time in a classroom teaching these basics to us thick-skulled graduate students. But he was pretty accessible outside of class and I had many fascinating conversations with him during my time at Stanford. I think I learned a lot more valuable things from him outside of class than inside the lecture room. Ed was an inspirer of *ideas*.

When coupled with my R&D work back at Delcon, my Stanford years were just a terrific time of personal growth for me as a scientist. Looking back, it is amazing how well the two experiences meshed together to create a whole that was undeniably more than the sum of its parts. On the whole I very much enjoyed my Stanford experience and graduated with my master's degree on January 4th, 1979. □

1976 was another presidential election year. President Ford was running for reelection and being challenged by the former governor of California, Ronald Reagan. The Democratic candidate was the former governor of Georgia, 'Jimmy' Carter. I wasn't entirely happy with President Ford but I wasn't entirely unhappy with him either. The Democrats, who by then were dominated by the liberal wing of the party I always detested so much, had swept the 1974 congressional elections and I thought President Ford was a counterbalance to many of the things the liberals were wanting to do in the way of ruling us. When South Vietnam had fallen to North Vietnam in 1975, he had not tried to get us re-engaged in that immoral war. I generally approved of his foreign relations policies and the progress that seemed to be going on there toward ending the Cold War. I thought that in a number of ways President Ford was closer to being a Kennedy Democrat than any of the liberal Democrats were, although both were a far cry from actually *being* a Kennedy Democrat. On the other hand, I still wasn't too happy about the Nixon pardon, and I wasn't in favor of giving up the Panama Canal. But what disappointed me about President Ford the most was his lack of leadership in getting the economy put back together after the disaster of the Nixon years. The poster child example of this had been his pathetic 'whip inflation now' program with its pathetic WIN buttons. It was nothing more than a publicity stunt and even as a slogan it fell way short of *ask what you can do for your country.* I thought President Ford on the whole was a good man but not much of a leader.

Both Governor Carter and Governor Reagan had published little paperback books during the election campaign and I read both of them. Governor Carter's book, *Why Not The Best?*, impressed me a great deal. Unfortunately, this impression was entirely negative. Most of it was autobiographical, which was okay but not all that central to what he would do if he became President. The smaller part of the book that talked about what he wanted to – he never even said *would* – do as President was almost all Mom-and-Apple-Pie pabulum. *'All our citizens must know that they will be treated fairly,'* he wrote. No, all our citizens *must be* treated fairly. I'm pretty sure knowing we'd be treated fairly would automatically follow if in fact we *were* treated fairly. Most of the book had this passive tone to it. It was a recipe for ineffective leadership and maybe even no leadership at all. The liberals were going to own this man.

Governor Carter had written, *'I am a farmer. . . Also, I can claim with credentials to be an engineer, a planner, a nuclear physicist, a businessman, and a professional naval officer.'* Aside from the fact that made it sound like he didn't do any one of these occupations very well, what came through to me all the way through his book was that he was really a preacher. With the single exception of Dr. Martin Luther King, Jr., I've never seen a preacher end up being anything other than a disaster as a leader. I'd sooner vote for Mickey Mouse than for a preacher. They both live in the same world. It's down in L.A.

It didn't bother me in the least that Governor Carter was a Baptist. I'd know a fair number of Baptists, including some Southern Baptists, and they were all good kids. They didn't take their particular religion any more or any less seriously than the Lutherans, Methodists, Presbyterians, Episcopalians, Catholics, Mormons, Reorganized Latter Day Saints, Moslems, Jews, and others I knew, and they were content to let the rest of us go to hell in our own way. But a preacher is usually an ideologue and not many of them are tolerant of the views of anyone who hasn't been 'saved' according to their particular dogma. Of all the various Protestant cults I liked the Baptist cult the least. It seemed to me their brand of 'Christian' dogma spent the most time of any of them in the Old Testament, the least time in the New Testament, and of the whole Protestant lot they knew the least about God and tended the most to think of God as a fearsome and vindictive Mesopotamian despot. I don't know why Joshua ordered the murder of all the little children of Jericho, if that ever really happened, but I am certain of one thing: If he did, God didn't tell him to do it. So it did bother me Governor Carter was a Baptist *preacher*. I thought he was probably a good and decent man at heart, but I didn't trust him an inch to lead our country.

Governor Reagan's book, which was actually written by a guy named Charles Hobbs, was entitled *Ronald Reagan's Call To Action.* That, at least, didn't sound like he planned to be a passive President. It really came out too late to affect the '76 election, but it did profoundly affect *me*. I had always associated Governor Reagan with the Goldwater campaign of 1964 and with that lunatic wing of the Republican party known as the conservatives. These were the people who had caused the 'under God' clause to be inserted into the Pledge of Allegiance. These were the people who were always in the biggest hurry – even more so than the liberals – to change that pesky document called the Constitution whenever liberty and justice got in the way of their ruling the rest of us. These were the people who longed to return to the nineteenth century, pre-Teddy Roosevelt days of the robber barons when a handful of super-rich men practically owned all the rest of us as serfs. These were the people whose bible was Adam Smith's *The Wealth of Nations,* and who picked and chose from that great book the same way most Protestant cults pick and choose whatever suits them from the Old and New Testaments. Conservatives are always quick to hold up the parts of Smith's book that tout the rights of business owners while at the same time ignoring something else Smith had written about, namely that labor unions were the only way most working people had to counter the economic and political power of the wealthy few *and that it was necessary for the good of a nation that the power of the few be checked.* For all the conservatives' slogans about 'free enterprise' and their mantra that free-market capitalism was always absolutely good – which the history of the nineteenth century had proven wasn't true – the fact was and is that the right wing agenda they work towards inevitably leads to tyranny and the destruction of the social contract that holds America together. I didn't detest the conservatives *more* than the liberals, but I did and do detest them as much.

So by and large I hadn't planned on paying much attention to Ronald Reagan. Del, however, told me I really should at least take a look at him. He said he was a different kind of conservative. And since I did respect Del's opinions, I bought a copy of Governor Reagan's book and started reading.

There were things in there I didn't much like, but to my surprise there were many things in there I did agree with. More to the point, he came clean on many more specifics about not only what but *how* he was going to try to change things. I didn't see very much at all in the way of brainless conservative-for-the-sake-of-being-conservative dogma. I didn't see much in the way of let-the-free-market-take-care-of-itself-and-it-will-take-care-of-you nonsense. He opposed pretty much everything the liberals were doing, but the way I saw it he was against *how* they were doing it rather than the end goals themselves. For example, he said, *'Welfare reform must start from the assumption that everyone can contribute something productive to this society. Then the goal becomes to make as many people as possible independent of the need for welfare.'* Well, if that can be done it's called 'fighting poverty' and that *is* what is meant in the Constitution when it says one task of our government is to promote the general welfare. Del had been right; Governor Reagan *was* a different kind of conservative. I even had the at-first-ridiculous thought that maybe he wasn't really a 'conservative' at all. Compared to the liberals he was, of course. But compared to the arch-conservative kooks in the Republican party, he didn't seem to be. And there was no trace of Nixon – the conservatives' conservative – at all in what he was saying that I could find.

I had thought of the Republican party as being a party dividing itself into two wings. One, of course, was the wing who would rule us as robber baron despots; the other was the office-seeking wing that day by day became more like the detestable liberals. Now I was developing a feeling deep in my gut that maybe there *was* an alternative to our rulers of the left and right. Maybe here was a *leader,* the first one I'd seen since President Kennedy. If he could push the wing nuts out of power in the Republican party and pull the real Democrats – not the liberals but the kind of Democrat I was – away from the Democratic party, there was, I thought, real hope for restoring the America I knew before the disasters of the Vietnam era sixties and the fascist years of Nixon. There might be a chance to develop a Great Society that *did* work. Maybe the effort would fail; there aren't any guarantees in the world. But it was surely a duty to *try*. I did something I never thought I'd do; I joined the Republican party so I could do what I could to support Governor Reagan the next time. I had become a Reagan Republican. The year was 1976.

Everyone, of course, knows what happened that year. President Ford became the nominee of the Republican party and Governor Carter became the nominee of the Democratic party. It would be another year when not-the-best men were the only candidates. President Ford ran against Governor Carter and Governor Carter ran against Nixon. I voted for who I thought was the best of the not-the-best men, President Ford. Governor Carter took the South, except for Virginia, a swath of states running northeast from Kentucky to New York and Massachusetts, and the liberal-leaning Midwest states of Minnesota and Wisconsin. The rest of the Midwest, the entire West, and most of New England went to President Ford. Governor Carter won fifty percent of the popular vote, vs. forty-eight percent for President Ford, and two hundred ninety-seven electoral votes vs. two hundred forty. If a mere twenty-five thousand votes in Wisconsin and in Ohio had gone the other way, President Ford would have won. It was that close. The Carter years had begun. □

From mid-1975 through 1976 technology to support the microprocessor revolution was developing rapidly. At the time I had arrived at HP this technology was, to say the least, primitive. To make a micro-computer based system work requires a lot of very detailed debugging of the firmware and the interactions between the microcomputer and the rest of the system. Semiconductor manufacturers such as Motorola supplied some basic development tools of course, but by themselves these really weren't sufficient for dealing with all the different technical problems we faced and had to be augmented by other test and measurement instruments and computer peripherals. For example, when Mini-TIMS first started the nearest thing we had to a computer monitor was an old-style teletype. Besides being slow and noisy, these proved to be unable to take the constant pounding that our debug printouts required. Along one whole wall of one of our quads were the broken carcasses of teletypes that had simply worn out under the

strain. Test instruments were even more inadequate. We were trying to bring the future into being using the test and measurement technology of by-gone days.

Other divisions of HP stepped up to fix this problem. New computer terminals, which replaced the old teletypes altogether within a few short years, were developed by HP's Data Terminals Division in Cupertino. This was a development that didn't really respond to the microprocessor revolution; it was a general need throughout the computer industry and a number of computer companies responded to it all within a short time. Test equipment was a more serious issue and HP's division that made logic analyzers, instruments used to debug computer circuit designs, stepped up here. Engineers from this division began visiting our lab, and others within HP, to find out what we needed to do the job. We were only too happy to let them know. By the latter half of 1976 a new breed of test instruments was rolling out, designed according to the things we'd told the engineers from the logic analyzer division, and as a result HP became the leading company in this particular arena. The Mini-TIMS projects benefited from being among the earliest recipients of this new technology. We had these tools on our workbenches before the ink on HP's marketing brochures was dry. These new logic analyzer projects had a tremendous impact on the high technology world at large and they helped shape the course of high technology for the whole world for many years to come.

A number of different outside companies, semiconductor companies who wanted to get into the business of selling microprocessor chips, also began paying us visits. During 1976 it sometimes seemed as if a new brand of microprocessor was being introduced by somebody almost every week. Most of these did not survive the intense competition of the years that followed, but for awhile it was pretty much snowing new microprocessors. The companies coming to talk to us were already looking ahead to their next generation microprocessor designs and they came to see us to find out what features and capabilities these would really need. They also wanted to find out what they were doing right and what they were doing wrong in terms of the support products – things like the computer programs we used to develop the firmware for microprocessor-based products. Again, we were only too happy to tell them. Again, the new tools that eventually came out of this helped shape our world.

Furthermore, we ourselves were learning better design techniques for microcomputers. As the first Mini-TIMS, the HP 4942, was going into production, market research by our marketing department had uncovered a need for yet a third version of Mini-TIMS. This new project was a lot like the ′43 except that instead of the phase jitter measurement it would have a different TIMS measurement called 'non-linear distortion' or NLD. We called this one the HP 4944. Del made Johann the project leader for it and Paul did the measurement design. Al Howard made the necessary design changes to the mechanical portion.

With three such very similar products, it should have been easy to leverage our firmware designs and rapidly finish off the firmware parts of each product. In fact, though, our first generation firmware design was proving too unwieldy to do this. The technical reasons for this were obvious. Better design techniques for *firmware* were badly needed, and Dick and I developed these. Later, with HP's permission, I would be teaching these methods at an IEEE-sponsored night class held at San Jose State University and from there they seeped out into Silicon Valley to a number of companies. Again the work helped influence the future, although not nearly to the extent the other two things did.

The years from 1975 into early 1977 were the years when the promise of the microprocessor revolution became the fact of the microprocessor revolution. And, yes, things were never the same again after this. I had the extraordinary luck to be a foot soldier in just the right place at just the right time to be in the thick of this exciting and adventurous event and to play a part in shaping this new world. To this day, and correctly I think, I can look back on those few crucial years and know that I had helped make a difference that echoed far beyond my little corner of the world. I had been able, in my own small way, to pay the first installment toward keeping my Promise. □

As 1976 was coming to an end our project was finishing the production prototype phase and getting ready to be released to manufacturing. For me this meant many of my day to day tasks involved making

sure the documentation for my designs was complete, production test procedures were in place, and that generally production wouldn't have any design related problems building the product. Product development engineers do not build the products; production does that. In a real sense you could say that the sum total of my work was all aimed at producing this documentation. No lab engineer really likes this phase of a project all that much, but the fact is that it is for the sake of this phase that everything else is done.

In those days hand assembly techniques were used for relatively low manufacturing volume products like those Delcon produced. Automated assembly machines existed at the time, but they were expensive and the capital investment required really only made sense for high-volume products. To support the work of the production people who would assemble my printed circuit board, one of the things I had to do was build an 'example' board for them with all the pieces snugly soldered into place. Now it so happens that production people do a lot more soldering than an engineer does and as a result they become pretty top craftsmen at it. I built my example board – my very first design that would actually sell for money – and carried it proudly out to the production supervisor. She thanked me, flipped it over, and looked at the back side where all my soldering joints were.

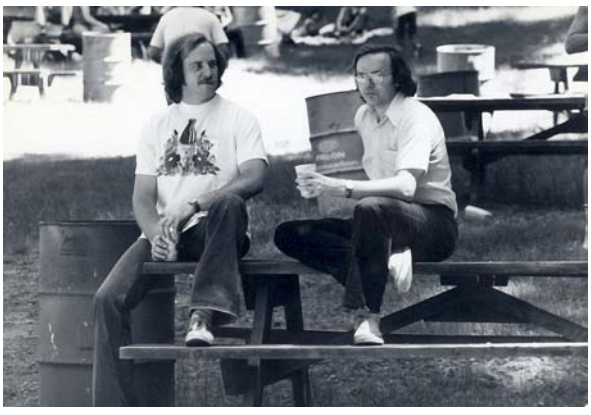
And laughed. Out loud. In front of everybody.

My face turned red. Naturally my feelings were a little bit hurt. But, like I said, every woman on that production line could solder better than I could.

For the turn-on and test procedures for my board I basically just wrote down precisely all the steps I had used all along while developing the design. I also specified all the test instruments that were to be used and the measurement settings for each instrument. The document ran to several pages in length. My next task was to train the production technician in the specific procedure.

The technician assigned to my board was a young guy, possibly a year or so younger than me. But he had been on the job longer than I had (technicians graduate with a two-year associate degree) and was generally regarded as the best technician in the division. He listened patiently as I walked him through the procedure step by step. We finally came to one fairly complicated part that took five or six steps to accomplish. He dutifully followed my procedure, then looked over at me and said, "Why don't you just do this?" He flipped a couple of dials on the measuring instrument and zip, zam, zot accomplished the very same thing in one step.

I tried very hard to keep my mouth from dropping open. Not entirely successfully I should add. Then I grinned at him a little sheepishly. "You know," I said, "that way's a lot better. Why don't we do it that way instead?" I changed the procedure to his way of doing it. He, in turn, went around telling all the rest of production that I was the best engineer in the lab. It's amazing how often it happens that listening to smart people makes me look smarter. □



HP company picnic at Little Basin (1977). The guy on the left is one of Delcon's technicians, the guy on the right is me (age 23). The photographer took me by surprise in this picture.

The little celebration the division had on the day I first arrived was the only one I ever saw at Delcon. On the other hand, every summer every HP division had a company picnic. In the Bay Area, where the company had a lot of small to medium sized divisions, it was usual for several divisions to hold their picnics on the same day in a beautiful wooded

area up in the nearby mountains called Little Basin.

When I first moved to the Bay Area I didn't even know there *were* nearby mountains. Most days you couldn't see them through the haze the Bay Area smog produced. But they were there. I'm not sure how much area Little Basin covers, but it seemed like a lot. Because Delcon was the tiniest of HP's divisions that meant most of the people at the company picnic were from other divisions and I didn't know them. It was a little hard to hunt down people I did know in the crowd that gathered there and I still had my old sense of discomfort among crowds of strangers. Nonetheless, I wouldn't miss the picnic for anything. It was one of the finest old traditions of the company and had first started in HP's very early days when the whole company was smaller than Delcon Division was in 1977. The company picnic was one of the many elements of the common culture of HP that was known as 'the HP Way.' So even though the picnic meant rubbing elbows with a lot of strangers, I always thoroughly enjoyed them.

Pranks and practical jokes were another part of the HP way of life in Del's group. Bob Weisickle was another young engineer in our group. Bobby was a year older than me and, until I arrived, had been the youngest engineer in the lab. He and I tended to be the main instigators of practical jokes although we were by no means the only pranksters in Building 30.

One of Bobby's favorite vehicles for pranks was paper tape holes. Every computer, including a micro-computer, uses what is called a 'machine language.' This basically consists of packets of ones and zeroes, known as 'bytes,' that instruct the machine what to do step-by-step. Each different kind of computer has its own machine language. However, it is difficult and error prone to try to write firmware directly in machine language. Instead a symbolic language, called an assembly language, is used by programmers to write the firmware. This assembly language must then be translated into the machine language. In those days we would write our microprocessor firmware using a minicomputer, an HP Series 1000, which would do this translating into the machine language for the M6800 microprocessor. The minicomputer would output the series of machine language bytes by punching a series of holes in a paper tape. The paper tape was about three quarters of an inch wide and when it was rolled up on a reel would usually be about five or six inches in diameter. The tape would then be read into the microprocessor development system using a paper tape reader. The residual paper left over after all the holes were punched were collected in a little bucket-like receptacle. These residues were the 'paper tape holes.'

Each paper tape hole was a tiny, circular bit of paper and we always had thousands and thousands of them laying around in the paper tape hole bucket. Bobby would collect these and use them to set various kinds of booby traps. One morning when I came in to work, he had rigged up an air powered gizmo to spray paper tape holes and hidden it in my center desk drawer. When I sat down and opened my desk drawer *whoosh!* out came this mushroom shaped cloud of paper tape holes and I almost jumped out of my skin. I had paper tape holes all over my desk, all over my work area, in my hair, in my mouth, in my shirt pocket, and some even got inside my shirt. It took me almost half an hour to clean up the mess.

Naturally, I would always retaliate with some prank of my own. A lot of creativity would go into the pranks we pulled on each other, although Bob Allen did draw the line on how far we could go. For example, he wouldn't let us have water fights with the portable fire extinguishers. Well, not more than once anyway.

Age was no protection against being the victim of a practical joke. Anyone was a potential victim. Anyone but Bob Allen, that is; nobody ever did quite have the guts to pull one on him, although I secretly thought he might have enjoyed it. Bob had the soul of a prankster. Paul, who was the oldest guy in the lab, wasn't granted this immunity. There was a sex hotline in Palo Alto and anyone who called it was treated to a sexy-sounding woman's voice making all kinds of interesting suggestions. Paul was a pretty religious guy, very much a married man, and had no vices that I knew of. The combination was too good to pass up. One morning when Paul was away from his desk Bobby and I left him a phone message note telling him to call this hotline number. When he came back to his desk everybody in the group except Erhard, who didn't know about it, was covertly watching Paul to see his reaction when he heard that hot

dish on the other end of the phone.

Paul found the note, picked up the phone, and dialed the number. Unfortunately, he got a busy signal so he just hung up and went back to his work. It was a big letdown and all the rest of us went back to work too. Later that afternoon Paul got back around to that phone message and dialed it again. This time nobody was watching but all of a sudden the peace and quiet of the lab was interrupted by Paul's high pitched voice, "Erhard, you S.O.B.!" Everybody knew what had happened immediately and the whole group erupted with laughter. Everybody except Erhard, that is, who didn't have a clue what had happened. The fact that Paul blamed Erhard for the phone message made it all twice as funny.

That was the first and only time I ever heard Paul cuss. Another time I was at work extra early in the morning. We had an important project checkpoint coming up and everybody was making a maximum effort to meet the deadline. My phone rang and I picked it up. It was Paul. He was out in the lobby and had forgotten his employee name badge and his employee identity card. The security guard on duty therefore wouldn't let him come in the building. Could I come out and identify him so he could come in to work?

When I stuck my head out the door into the lobby Paul was seated on one of the visitor's couches. "Oh, good!" he said when he saw me and he scurried up to the lobby desk to sign in and put on one of the temporary ID badges. I said to the security guard, "What's going on?" He nodded toward Paul. "This guy says he works with you," he replied.

"I've never seen him before," I said. "Don't let him in!"

Paul's mouth dropped wide open and for a delicious second he couldn't say anything. Then he yelled at me, "You . . . you . . . *you dirty guy!"* I laughed and told the guard it was okay, Paul did work here.

One of the ways you knew where you were in the lab's barnyard hierarchy was by the kind of electronic calculator you had. Bob Allen didn't believe in spending his lab budget capriciously and so when somebody got one of the newest HP calculators he passed his old one down to the next senior guy, who passed *his* down to the next guy, and so on. When I started I was given an HP-35, the original and cheapest model. Don Dresch was one of the more senior guys in the calculator chain. He was an avuncular man in his mid-thirties and worked as one of the project leaders. We nicknamed him "Dr. Don" after a local radio personality by that name. One day Don became the proud recipient of HP's newest and most powerful model of electronic calculator. He kept it locked in a security cradle on his desk and the day it first came he couldn't resist showing it off to us younger guys. Hmm . . .

In those days printed circuit boards were designed by laying out the patterns of copper traces on these big transparent sheets of plastic using a sticky red tape. This was called 'PC layout' and was done by skilled people known as PC layout artists. The PC layout tape was exactly the same color as the red calculator displays, which in those days were made using red light emitting diodes (LEDs). That evening after Don went home I drifted over to the PC layout department and sliced off a piece of that red tape. Then I went to Don's desk and carefully stuck it down over the display of his new calculator. Each evening that whole week I added one more layer of tape to Don's calculator. Friday morning we found him hunched down over his calculator trying to read the display. His nose was practically on top of it. "Gee," he said to us, "these LEDs are sure dim!" □

I would spend part of my vacation time each year going back to Iowa to see the family at Christmas. Christmas was always a big event in my family and I didn't want to miss it. I would fly from San Francisco via either Denver or Chicago and then take a connection to Moline, IL, where somebody would meet me. I found a surprise waiting for me Christmas of '75. Dad had turned the bakery over to Melody and her husband, Kenny, and moved back to Maquoketa. Sherri had built a second house on her ten acres in Reynerville, which isn't a town but rather is what that particular section just outside the Maquoketa city limits was called. Mom and Dad were living in that house. It surprised me a little that Dad had retired so soon – he was only sixty-two at the time – but then, as I have said, bakery work was hard work and I

guess by then it was just too physically demanding for Dad to do anymore. It didn't surprise me they had moved back to Maquoketa. Mom considered Maquoketa home and hadn't liked living in Bellevue.

Christmas, as always, was wonderful except for the fact that Kenny made something of a pest of himself trying to get chummy with me. I was polite to him, of course. For better or worse, he was family. But I didn't particularly want to be buddies with him. Kenny must have sensed this because he said to Mom privately, "I don't think Rick likes me." Mom tried to reassure him by telling him, "Rick doesn't warm up to people very quickly." True, but Kenny was right, too. There was just something about him I didn't like very much. The following year, around Easter time, he ran off on Melody and I never saw him again. It had turned out he was every bit the bum I had always thought he was. Dad sold the bakery after this happened and that was the end of our bakery business. Melody went on to attend a nearby college, within commuting distance from Maquoketa, and eventually became a CPA. The world lost an artist.

I would never spend all my vacation time in Iowa. I always saved some for other enjoyments. In the winter of '76 Glen gave me a call. A bunch of our brothers were planning a ski trip to Snowbird, Utah, and did I want to join them? Did I? You bet! The one problem was that the ski trip would overlap my first exam in John Linvill's course. I spoke to him about this and he readily agreed I could sit the exam as soon as I got back.

I'd never skied before; there aren't any mountains in Iowa. But several of us were in that boat so we took ski lessons the first day on one of the little bunny slopes at Snowbird. Tom Korpela, who was then a senior and Lorne's roommate, proved himself a natural athlete and picked it up right away. I, on the other hand, had a lot of difficulty with the ski maneuver known as 'the snowplow.' You see, my feet naturally turn slightly outward and the closest I could come to doing a snowplow was to put the skis straight ahead. This works pretty good for high speed ski runs but not so good for doing the snowplow. I took an extra day of private instruction from a beautiful ski instructor who tried everything she could think of to teach me how to do it. For some reason, though, I turned out to be a *very* slow learner. Finally she gave up and taught me how to control my speed by doing tight little turns, which I could do.

When I finally did hit the real slopes I had an absolute blast. I was a long way from being the most skilled skier to ever tear down the side of a mountain. I had the turning radius of the battleship Missouri and on my first day of real skiing my brothers tagged me with a ski nickname: Avalanche. But it was great fun and it was great to be with my brothers again, so I hated to see our ski trip come to an end.

When I got back to Mountain View my phone rang. It was John Linvill. He asked me politely how my trip had gone and I told him it was great. "No injuries?" he asked. "No broken bones?" Nope, I told him. I was flattered that he asked. "Then you can take the exam tomorrow?" he asked. Oh. Yep, can do. □

When the ′43 went into production I had expected to be assigned to work on TIMS II again but plans had changed. Instead 1977 saw me and a bright, younger, newly hired engineer named Willy Sagun, who had just graduated from Cal Poly San Luis Obispo, assigned to a "blue sky" project Del wanted to try. A blue sky project is a project that is regarded as high-risk because when it starts no one knows if it can even be done. Bob Allen liked to hold about ten percent of his R&D budget in reserve to try blue sky projects. If one succeeds it usually more than pays for the nine previous ones that failed. As R&D assignments go, being entrusted with a blue sky project is a pretty big compliment to an engineer's ability. For me it was a double compliment because I was also being asked to be 'big brother' to Willy, just as Erhard had big-brothered me when I had first arrived. For the first stages of the project we didn't even have a project leader we reported to. Del handled things like performance evaluations and salary administration that had to be done for us. For a lab engineer it was a dream assignment.

One disadvantage of the test equipment we manufactured was that in order to use it the telephone line had to be taken out of service while it was being tested. In the mid-1970s more and more high speed data communication between one computer and another was taking place and this had led to a classic 'who is at fault?' argument between modem owners and the telephone company. 'Modem' stands for 'modulator-

demodulator' and is the name given to the part of your computer that communicates over the phone line. When a problem develops with having too many data errors happen during transmission, modem owners would generally claim the phone line was bad, while the telephone company generally claimed it was the user's modem that was at fault. Our new blue sky project was aimed at providing a way to resolve these kinds of disputes.

The basic idea was to invent a TIMS-like instrument that could test the phone line *without* taking it out of service. This is called 'non-intrusive testing.' The main technical problem was that a TIMS used test signals it generated and fed into the line, which would be 'intrusive' testing. We were to look for a way to build a TIMS that didn't generate any test signals. This had never been done before. Del's idea was to see if we could somehow use the modem's signals and the information they carried within them in place of the suite of TIMS test signals. He let Willy and me choose the code name for this project and we decided to call it 'Watch Dog.'

For the first little while I worked on Watch Dog by myself while Willy was given a starter assignment to help him over the initial new job jitters and so he could learn a little bit about what a TIMS was. After about a month of research work, I had figured out there was a pretty fair chance that Watch Dog could be built using the power of digital signal processing methods. The biggest technical issue was that the micro-processor chips available at that time weren't powerful enough computers to handle all the calculations that would be required. However, the nature of these calculations was such that they could be broken into simpler pieces that individually *could* be handled by individual microprocessor chips. What that meant was that Watch Dog would have to be a special kind of computer that used many microprocessors all at the same time. This kind of computer is called a 'multiprocessor' computer and up to that time these kinds of computers had only been built on an enormous scale and were known as 'supercomputers.' But it looked like Watch Dog might be possible using this approach and it wouldn't cost remotely as much as any of the big supercomputers did. I estimated we could do it – if in fact it *could* be done, which wasn't at all a given yet – for about the same cost as a TIMS. This approach also meant that the crucial part of the design would involve the algorithms – the computer programs – that would actually carry out the digital signal processing. The hardware would be relatively simple compared to these and the specific details of the multiprocessor design would be dictated by the nature of these algorithms. Later this kind of approach to design would come to be called 'hardware-software co-design,' but that term hadn't been invented yet. Willy and I would be developing a design method for doing this along with the Watch Dog itself.

Once I'd convinced myself this approach was worth a try, I presented it to Del and Bob Allen for their review. They likewise decided it looked like it might be do-able and gave the go-ahead to move on into the breadboard phase. It was at this point when Willy came on board full time. We started working on algorithm development and on what is known as 'simulator software' to use as an initial vehicle for testing and debugging these algorithms. Once we had the basic algorithms developed part of the lab proto phase would involve modifying these algorithms to use simplified computer arithmetic approximations, called 'fixed point arithmetic with scaling,' because the microprocessors of the day weren't really powerful enough to do what is known as 'floating point' arithmetic, the most commonly used form of arithmetic in bigger computers. Our breadboard phase algorithms would be 'proof of concept' designs and the real designs would follow during the lab prototype phase.

The digital signal processing mathematics we were using had all kinds of exotic and impressive-sounding names such as 'homomorphic deconvolution' and 'complex cepstrum domains.' We weren't shy about throwing these mysterious sounding monikers around either. At that time very few engineers had even heard of them and the terminology lent an air of wizardry to what we were doing. Basically, we were showing off. I was, anyway. Willy took this all pretty seriously, as rookie engineers always do. We talked such a good game that Bob Allen decided to feature the Watch Dog project during division review.

Division review was a once-a-year happening when HP's top managers and members of the Board of Directors came around to an operating division to find out what was going on. Division reviews happened

at different times at different divisions, but every single division of the company always got its chance to shine once a year. Bob told me I'd be making the lab's presentation for Watch Dog.

Well, I put together my dog and pony show for the review and on the appointed day the big dogs came down from Palo Alto. Bill Hewlett led the procession, and I noted he wore a short-sleeved white shirt *and* a tie. Mine were still hanging in the closet at home. Bill sat right up front, about three feet away from where I stood. Next to him was John Young, who had just been designated as HP's president and would also become CEO when Bill retired in another year. Sitting among the Board of Directors was Luis Alvarez, the 1968 Nobel Prize winner in physics. At age twenty-three I was about to make a presentation to this group of corporate and scientific Olympians. Was I nervous? *Oh, yeah!*

Well, I launched into my talk, fancy buzzwords and all. I was kind of half-hoping that our intimidating terminology would hold down the questions I might get asked. I should have known better. These guys didn't get where they were by *pretending* they understood things. I'd gone about five minutes when John Young interrupted me with the first technical question. "Rick, can you explain . . .?"

Before I could say a word, Bill turned to him and said, "Well, John, the way that works is . . ." I was a little taken aback by Bill Hewlett fielding the question I'd been asked, and I was *very* impressed that he not only answered it but *he answered it correctly*. I'd thought this stuff was so ink-still-wet new that nobody would really follow all the details. Bill turned back to me, leaned forward, and with a small wave of his hand said, "Go on."

The next question came about two minutes later. It was from Luis Alvarez. "Rick, what does . . .?" Bill turned around in his seat and said, "Well, Luis, what that does is . . ." He got that one right, too. He turned back to me, gave me that little wave of the hand, and said, "Go on."

That's the way the whole presentation went. I'd talk, somebody would ask a question, Bill Hewlett would answer it with the right answer, and then say to me, "Go on." When the presentation was over the managers and Board members all complimented me on it, and Bill said to Bob Allen, "I'm glad to see your lab's staying on top of new technology." Bob was beaming from ear to ear and standing about two inches taller than he usually did. The whole thing was a great success. □

Bob Brown, my fellow Iowa Stater, had come to work in the cable fault locator group in our lab, which was the same group Rich Page and Don Dresch worked in. A cable fault is a problem such as an open circuit or crossed wires (called a 'split') in a telephone cable. The products that group built were instruments for locating where the problem has occurred. Bob had worked on the HP 4910G Split-Open Locator, which was also released to production about the same time my project was. Between the time I arrived in the summer of '75 and early 1977 the division introduced seven new projects to production, which is pretty high R&D productivity considering the small size of our lab. In fact I never saw this level of productivity in new product development matched again by any other organization I've known in the thirty years that have passed since then. But at the time I didn't know I was witnessing something extraordinary.

Bob didn't stay in the lab after he finished his work on the HP 4910G. He was ambitious, wanted to rise in management, and he saw a career opportunity to do so by transferring into our marketing department. From there he rubbed elbows much more with Brian Moore and the division's other functional managers than I did and so I got to hear more inside gossip about some of the things that went on outside the lab. One of these tales I found the most interesting involved a problem with the 4910G that was discovered shortly after it was announced and released to production.

It turned out that a bug had been missed in the ´10G's firmware and, as a result, a measurement inaccuracy had been introduced. The details are fairly technical but the basic problem was that there were some conditions that are known to occur in the field under which the instrument could be off by as much as five feet or so in telling the customer where the cable fault is. That might not sound like very much over the course of a mile or so of telephone cable, but to the guy with the shovel who goes out to fix the

cable it is a big error. Brian Moore called a meeting of his top managers, the functional managers of R&D (Bob Allen), marketing, production, and, if I recall correctly, one or two of the regional sales managers to discuss the problem.

On a purely technical level the problem wasn't hard to fix. It was, after all, just a bug. It would cost the division about five thousand dollars in new tooling for the Read Only Memory, but on the industrial scale of things this is a minute expense. The real issue was that we would have to recall all units that had been shipped in order to fix them, replace all the inventory of old ROMs that contained the bug, and delay on-going production and shipping of the product. Also, of course, it would embarrass HP in the eyes of Delcon's biggest customer, Ma Bell. The meeting was called to talk about these problems.

Somewhat early in the discussion someone – I don't remember if it was the marketing manager or one of the regional sales managers – asked, "What happens if we don't do anything?" What happens, in other words, if we kept the problem a secret and just went on selling a defective product. There was a hushed silence for a second or two around the table and then someone asked, "Is that ethical?"

Before Brian could say anything, Bob Allen replied, "Well, that depends on your view of what ethical is. When Bill (Hewlett) and Dave (Packard) come down here and ask Brian why he did that, if Brian can explain it to them and feel good about his explanation, then it's ethical."

Brian immediately said, "We're not going to do that."

We ended up fixing the problem, doing the recall, and all the other things. As it turned out, the problem ended up not seriously affecting sales of the product and the phone company even thought highly of HP for owning up to the problem right away and fixing it. □

As 1977 drew near its end Willy and I were happily buried in our work on Watch Dog. Del had given us a free hand to pursue the applied research work we were doing and, more and more, things seemed to be coming together nicely and the product looked more and more feasible with each passing week. Rich had moved into the TIMS section and he, Dick, and Erhard – among others – were working on TIMS II. Then something pretty awful happened: Del was promoted to functional manager of marketing and was replaced by one of our other group leaders, a man in his late thirties named John.

Of course, this wasn't an awful thing for Del. His new job was just one step below division manager now. But for me it turned out to be an awful thing because John was as different a manager as could be. To be specific, he was what is these days known as a 'micro-manager.' Overnight I lost one of the best managers I'd ever work for and, in his place, got one of the worst.

A micro-manager is called that because he insists on knowing about and approving every single little thing his subordinates do. An excellent manager like Del knows he can tell whether things are going well or badly by watching the visible signs of progress in his group and from periodic but relatively infrequent status reports. He trusts his people to do their jobs and knows that if some big problem does crop up they will tell him about it. A micro-manager is just the opposite. John immediately demanded that I tell him every little thing Willy and I were doing and questioned every technical decision I was making. The latter might not have been all that bad, considering how young I still was, if John himself had been technically up to date and capable of understanding the technology we were working with. But he wasn't. Most engineers will put up with a small amount of being micro-managed if they respect the technical abilities of their supervisor. If the boss really knows his stuff technically, a good engineer isn't afraid to learn from his usually greater experience, the way I learned from Erhard. It didn't take very many weeks for me to not respect John's technical abilities at all. However, that didn't stop him from second guessing me at every turn and I found myself having to spend hours each week trying to educate him about technical things of which he was wholly ignorant and didn't really care to learn about anyway.

Under Del we were working at a gallop. We made mistakes, of course, but we also soon discovered them and fixed them. And we could *try* things, see if they panned out, and if not we'd then know why

they hadn't panned out and would learn ever more detailed knowledge about the nature of the problem we were working to solve. Under John this fast, free-wheeling, and *efficient* way of doing our job came to a screeching halt. You see, a micro-manager doesn't really *trust* his people to do the right thing. He's always looking for them to make a bad mistake and he wants to prevent mistakes from ever happening. Now, it is true enough that most managers can fall temporarily into micro-manager mode during emergencies or during periods of great stress. The very best ones, like Del, never seem to succumb to this, but most of the rest of us mortals do from time to time.

With John, though, micro-managing was the normal way of doing business and not a once-in-awhile thing. Micro-managers tend to be 'thing oriented' and rarely 'people oriented.' Among other things that means they seldom appreciate their people's strengths, although they're pretty reliable about appreciating their people's weaknesses, both real and imagined. A micro-manager will take a thoroughbred racehorse and hitch him to a plow. And that is exactly what John did to us.

The consequence for me was that Watch Dog soon ceased to be the fun and all-absorbing 24-7 center of my universe it had been and increasingly became a daily exercise in frustration. Anyone who knows me could easily predict how I would react to this. I increasingly came to regard *John* as the greatest single obstacle to the success of the project and our relationship became increasingly one of mutual hostility. *I* was hostile anyway, and more than ready to interpret almost anything John said or did as a sign he felt the same way about me. Eventually John dealt with this by placing a project leader over us, a guy who likewise knew nothing about the technology we were using. This shielded me from having near-daily confrontations with John, but since he then proceeded to micro-manage our new project leader, and he in turn was forced to micro-manage us in order to be able to respond to his own micro-managed condition, things actually went from bad to worse. I came to loath the two of them.

I have always believed life is too short to spend it working for a stupid boss, and by early 1978 that was exactly the situation I felt myself to be in. In many places if a situation like this develops the employee is just stuck. A person has to have a job and an income, and many people find themselves with no recourse but to trudge on. However, in Silicon Valley a good engineer almost never faced that kind of trap. There were hundreds of other places he could always go to work for the same or even better money. I had no desire whatsoever to leave HP, but HP had a lot of divisions in the Bay Area. I started looking around for 'other opportunities' and soon found one.

Over in Cupertino there was an interesting project going on that was being managed by a guy who had previously been a group leader at Delcon. I already knew him from my original interview trip. His name is Jim Hood. I had liked him when we'd met previously and the guys in the lab who had known him very well all spoke highly of his abilities as a manager and as a person. He had left Delcon for personal reasons unrelated to work. And he had an opening. I gave him a call.

Jim remembered me and seemed delighted at the prospect of having me come to work for him. I would have to submit to another technical interview – that was a normal part of the process even when a person is merely transferring between organizations in HP – but I wasn't worried about that. The job involved bringing the microprocessor revolution to bear on the electronics that control computer peripherals – mass storage devices such as disk drives and tape drives in this case – and I knew that at that time there weren't all that many people who had the kind of actual experience in this work that I had. Jim knew that too. We arranged for me to come down to Cupertino and interview for the opening.

The rules at HP said that when you do something like this you must inform your own managers and let them know what's going on. The rule is there mainly to make sure that such a transfer doesn't do severe damage to the business operation a person would be leaving, but it is in any case the ethical thing to do. But since I neither liked nor trusted either my new project leader or John, the person I told was Bob Allen. Bob wasn't happy about it, but he was a good and decent man and he put no obstacles in my way. I went to the Cupertino interview with his full permission and knowledge if not with his heartfelt blessing. The only thing I didn't tell him was the very personal nature of my motivation. I disliked John a great deal,

but I wasn't going to attack his character by telling Bob what I thought of him. My dislike for him was *personal*. If he and I had both been ten-year-olds we probably would have settled it by duking it out on the playground but that's not how you do things in the adult world. A professional divorce would settle things just as definitively and nobody would lose any teeth.

On the appointed day I drove down to Cupertino for the interview. Jim's guys put me through the usual technical grilling common throughout HP in those days, but I had a big two and a half years of experience and a couple years of graduate school behind me this time so it wasn't really all that bad. Not too surprisingly, everybody in Jim's team was older – most of them a lot older – than me, but they were all pretty good guys and I liked them. I especially liked Jim. His management style wasn't the same as Del's, but he was personable, easy to talk to, and definitely *not* a micro-manager. John was a ruler I had to knuckle under to; Jim was a leader I would follow, and that makes all the difference in the world. It does to me, anyway.

The job was pretty interesting, too, although not nearly the technical challenge Watch Dog was. In a computer system there is what is known as a 'memory hierarchy,' a progression of different technologies for storing data in such a way as to optimize the performance of the computer. At one end are the very fast, very expensive semiconductor memories called 'registers.' Often next comes a small amount of slightly slower, slightly less expensive type of memory called a cache. Next come larger, slower, even less expensive memories. These are technically known as the 'main memory' but most people these days know them by the acronym RAM. After that comes the high capacity, slow, very cheap electromechanical memories known as disk drives. Computer engineers also refer to these as 'mass storage' generally speaking and as the 'backing store' more specifically. Next and finally, particularly in those days, came the extremely high capacity, extremely cheap, and extremely slow memories known as the 'backup store' or tape drive. Disk drives and tape drives, taken together as a class, are the 'mass storage devices.'

Most tape drives are said to constitute 'off line storage' because you have to go get the tape manually and put it in the tape drive whenever you want to store or retrieve something. Jim's project was different. It would be an 'on-line' tape drive that could fetch and install a library of tapes automatically, thereby constituting what was being called 'a true fourth level in the memory hierarchy.' The idea had been invented by IBM and commercialized in a million-dollar tape library system known as the IBM 3850 System. What we were doing was a much lower cost, scaled down version of this suitable for use in minicomputer systems (rather than the giant mainframe computer systems IBM built at that time). The project was code named 'Jumbo' and it needed a mass storage controller.

The mass storage controllers of 1978 were much more primitive, and much more costly, than they are today. Today's mass storage controllers usually include their own RAM memory devices to act as a cache memory, control more of the 'nuts and bolts' operation of the disk or tape drive (thereby freeing the computer's software from having to do this), and incorporate very sophisticated circuitry for detecting and correcting data errors from the disk or tape, thereby greatly improving the protection afforded to your stored data. None of these things existed in the controllers of '78 except for some relatively primitive error detecting and a limited amount of error correcting capability. My job would be to design a new generation of mass storage controller and, by working with other engineers in HP's disk drive division, help define a new common architecture for mass storage controllers that would be used throughout the company's computer product line. HP had entered the minicomputer business in 1966, the same year I had become interested in electronic brains, and our computer business now amounted to about half the company's total revenues, somewhere in the neighborhood of a billion dollars a year in 1978. We were an up-and-coming upstart in the minicomputer world, and I would once again be in the thick of the action. The thing that would make this all possible was, once again, the microprocessor revolution.

The other guys on Jim's team had all given me a 'thumbs up' following my technical interviews and Jim offered me the job on the spot. I accepted immediately and we shook hands on it. My transfer wouldn't be official until Bob Allen okayed it from Delcon's end, but for all practical purposes it was a

done deal.

When I got back to Building 30 I went immediately to Bob and told him what had happened. I was happy and excited about my new job, but at the same time I was sad to be leaving Delcon. I would miss the people there – with two exceptions – very much. Bob took the news calmly and then, unexpectedly, made me a counteroffer. If I would stay at Delcon I would be promoted to project leader of Watch Dog.

I was surprised, stunned, and very, very flattered he made such an offer to me. I had only been with the company for two and a half years and becoming a project leader in that short a time wasn't very common. Nothing Bob could have said or done could have moved me more deeply than that because it proved more than anything else could how highly he thought of me. Nonetheless, and with real regret, it was an offer I had to turn down. The prospect of still having to work for John wasn't really the issue because I'm pretty sure if I'd made that a negotiating point I'd have been out from under John in the blink of an eye. But there were other factors that were issues in my having to turn down Bob's offer.

First, getting a fast promotion had never once entered my mind. If I accepted Bob's offer it would have felt too much like I'd blackmailed him into giving it to me. I hadn't, of course, but it would have *felt* like I had, and Bob would never have been able to be sure that wasn't what I had in mind all along. Such a thing is not uncommon in big business. Today the euphemism they use for this is 'hardball negotiating.' These people, and Bob not the least of all, had been very, very good to me, had welcomed me into their midst with nothing but kindness and patience, and they were my friends. I just *couldn't* let personal gain bring along even the appearance that I thought so little of them and distrusted them so much I would be willing to stoop to blackmail to advance my own career. Some of them – Dick and Rich and Willy in particular – would know I hadn't done this, of course. But could Erhard or Paul or Johann or Dave or Don or Del or Bob or any of the others ever really know that? Of course they couldn't. I valued and cherished their friendship and respect too much to risk losing or tarnishing it.

Second, there was Jim. We had made a deal. We had shaken hands on it. I had made him a promise that I would join his team and I wasn't about to break that promise and back out on it for the sake of a promotion. In my eyes nothing would have been more dishonorable. I wouldn't make myself into another Collins Radio. And maybe Jim might have questioned if my whole purpose had really been nothing other than to bludgeon a better job offer out of Bob. It was a matter of ethics. Other people might have felt differently and made a different decision and if so I would not prejudge them. But for *me* there was no other decision possible than the one I made. It was a matter of what the philosopher Kant had called a categorical imperative. Kant wrote, *the love of honor is the highest duty of humanity to oneself, so little capable of abridgment that it has to go further than love of life.* That was the way I felt. □

My new group did not belong to any of HP's divisions. Although we were housed with the Data Systems Division of HP – the division that made the company's line of HP 21XX minicomputers – we officially were part of what was known as Computer Systems Group Corporate Engineering and Jim's immediate boss was a guy named Marco Negretti, who was the engineering manager for CSG and the unofficial dotted-line boss of all the R&D lab managers on the computer side of the company. Marco liked to keep one or more little R&D labs on the side where possible innovations in computer systems that didn't fit neatly within an operating division's charter could be tried out. If one looked good, it would later be transferred to one of the operating divisions for further development to become a new product. I think it is likely, although I don't really know for sure, that doing Jumbo was originally Marco's idea.

By the time I had joined the team the decision had already been reached that if Jumbo's breadboard design proved the concept of a 'miniature IBM 3850,' the project would be transferred to the company's disk drive division in Boise, Idaho. This division was relatively new – it had come about because HP was starting to diversify its operations out of California, where the business climate had become less friendly in the judgment of Bill and Dave – and although it had been officially in existence for a bit over a year it was, for all practical purposes, still a start-up division. It had been an explicit part of the understanding in Jim's job offer to me that I would at least *consider* transferring with the project to Boise when it went.

The company had no intention of forcing anyone to move to Idaho if they didn't want to or couldn't, but the agreement was that the team working on Jumbo would keep an open mind about going with the project when it was transferred.

I was perfectly willing to be open-minded about this for two reasons. One of them had to do with being able to own my own house one day. As bad as inflation was running – during President Carter's first year in office inflation ran a little over 7.5% as measured by the spending value of a dollar, and it would explode to over 11% between 1978 and 1979 – the price of houses in the Bay Area was shooting skyward at an even more ludicrous rate. Rich, for example, had paid sixty thousand dollars for a one-bedroom condominium, which was three times what our house on Judson street had cost us. To find a house he could afford, Bob Brown and his family had to go all the way to San Jose, which gave him a three hour commute *in each direction* on that great parking lot known as the Bayshore Freeway during rush hour. Even very modest houses out in the far boonies cost well over four times my total before-tax income, which in those days meant no bank would make me a housing loan. And the upward spiral in housing prices showed every sign of accelerating to still more ludicrous levels. Simply put, I was priced totally out of the Bay Area housing market.

Apartment rentals were also climbing steeply. In 1976 I paid $240 per month on my apartment; in 1977 it climbed to $280/month, and in 1978 it climbed again to $310/month before falling back later that year to $285/month after Proposition 13, the one percent initiative on property taxes, passed. It wasn't just my apartment complex that saw this either; every apartment complex in Mountain View was doing exactly the same thing. It was becoming very clear that landlord companies could keep raising the rent as much as they wanted to and there was absolutely nothing someone like me could do about it except move. But move where? As I said, rents were all doing the same all over. My income had climbed faster than this, but I didn't kid myself that I was going to continue to see ten percent raises every six months forever. As more and more people found themselves locked out of the housing market, like I was, I could only see the rent situation getting worse and worse. That's just basic freshman economics.

My other reason was that I was finding the social life in the Bay Area to be far different than I had assumed it would be. Californians just weren't Iowans, by which I mean they didn't seem to be a very sociable bunch of people. I mentioned before that Mountain View was basically a city of apartment dwellers. One reason I had chosen to live at the Cypress Point apartment complex was the presence of a large, nice common room and a very nice swimming pool. The presupposition I had made was that these were the natural gathering points for the single people who comprised the main body of tenets at Cypress Point. I would be able to meet my neighbors, especially those of the opposite sex, in a natural setting that would be comfortable to one and all. After all, we would all be 'home' in a manner of speaking. From there it would be easy to make friends and maybe even meet a nice girl with whom there might develop something more than friendship.

As I said, this proved to be nothing but a supposition. Most days and times the common room and the swimming pool were utterly deserted except for the staff that ran the complex. Cypress Point was a dwelling without a community. The situation wasn't confined to just Cypress Point either; if it had been I'd have moved someplace else where there *was* a community atmosphere. Even stranger, as I listened to my coworkers who were already married with families, it seemed to me that when the weekend came mom and dad took off in one direction and the kids took off in another. Every house I saw in the Bay Area came with a very big fence around it, far too tall to even look over the top of, as if the individual houses were isolated fortresses. It looked to me very much like even the communities weren't communities in the Bay Area. This social climate was something totally outside my previous experience and, when all is said and done, I thought it was very impoverished.

I belonged to both a weight lifting spa and a racquetball club. I joined the spa because pushing a pencil around isn't too strenuous and I wanted to keep in shape. My coach there was an inspiring guy named Clancy Ross, who was the 1946 Mr. America and the 1953 Mr. World. These days a spa like this is likely

to have about equal numbers of both sexes, but it wasn't that way yet in the 1970s. The members were all male, although there was one guy I thought probably wasn't 'straight.' Likewise, the racquetball club turned out to also have an almost all male membership. Thus, while there was some pretty good locker room camaraderie at both places, there was something pretty important missing.

That left the singles bars scene. Here the stilted conversations were even more plastic than in Iowa. Everyone was posturing and pretending to be someone they weren't. It was prime turf for a lounge lizard. Too bad I wasn't one. So, while I loved the many cultural features of the San Francisco area, the more or less ready access to major league sports, and the many very fine restaurants, I was finding it impossible to think of the Bay Area as 'home.' Outside of work I had no roots here and it didn't look like I was going to be able to plant any roots any time soon. Things were probably different for people who were born there, went to school there, and grew up there. But I was finding myself a stranger in a strange land. □

The Cupertino site where my new group worked was at that time one of the largest in HP. The complex of buildings there housed three of HP's computer group divisions. Data Systems Division designed and built the company's line of minicomputers aimed at customers with technical applications such as in engineering and factory automation. General Systems Division designed and manufactured the company's HP 3000 line of business minicomputer systems. Data Terminals Division manufactured the company's line of computer terminals. HP's vice president in charge of the Computer Systems Group had his office on that site as well. It was the center of HP's computer universe at the time, although the next few years would see our desktop calculator division in Colorado enter the computer market proper as the desktop calculators turned into desktop computers. Later still HP would introduce a not very successful line of personal computers made at a division in Oregon. Interestingly, the Cupertino site had been the workplace of a young engineer named Steve Wozniak, who left the company after HP turned down his proposal to do something called a 'home computer.' Wozniak teamed up with another young guy named Steven Jobs and started his own company, Apple Computer. This wasn't the only time HP's computer side suffered from lack of market vision, but it was probably our most famous bad call.

Going from HP's tiniest division to its largest site was something of a culture shock for me, but at least my ties could come back out of the closet now. In that sprawling site nobody particularly noticed them. I figured that if Bill Hewlett got to wear a tie then I could too. The Jumbo team was located in Building 42 Upper, just about dead center in the middle of the Cupertino site. I was again the youngest person in my group. The oldest guy in our group was a physicist-turned-engineer named Bill Girdner. Bill was a real old-timer; he had been the first college graduate hired by HP in the early years of the company. When he interviewed with Bill and Dave, he had been so excited about the company that he forgot to ask what his salary would be before he accepted the job. Jumbo was his last project before retirement. In actual fact, he had more time served with the company than either Bill Hewlett or Dave Packard because, as he put it, "both those fellows had time off." Bill Hewlett had served in the army during World War II and Dave Packard had served a stint as deputy secretary of defense in Washington, D.C. from 1969 to 1971. Bill and Dave both came down for his retirement party near the end of 1978 and, when Hewlett commented that Bill had been with the company a long time, Girdner laughingly reminded both of them he'd worked here for more years than either of them. Bill actually lived in Monterey and kept an apartment in Palo Alto where he stayed during the work week. He was a very cool, unassuming guy and you'd never guess he was a millionaire many times over by the time I met him. His responsibility on Jumbo was the design of the helical scan magnetic tape heads used in Jumbo.

The three next oldest guys were Jerry Ainsworth, Bob Colpitts, and Earl Stutz. Bob and Jerry worked on the analog electronics for Jumbo and Earl was our chief software guy who worked with the systems software people in DSD and GSD in defining how HP's computer systems would use Jumbo. Jerry's job was designing the electronics that actually wrote data to and read it back from the Jumbo tapes. He was a tall, lanky guy with a dry sense of humor that really cracked me up. I ended up learning some valuable things about high frequency circuit design from him.

Bob Colpitts was kind of the opposite from Jerry. He didn't smile much and was kind of gruff, but he, too, was a pretty good guy. His job was doing the electronics that controlled the actual movement and positioning of the tape. Toward the end of 1978 he was stricken with viral encephalitis, which is a disease that attacks brain cells. Nobody, including him, knew it at first. The best guess of how he contracted the disease was from a mosquito bite out in the woods somewhere. The first symptoms came when he started forgetting how his own circuit designs worked or what they did. He went downhill pretty fast, eventually even forgetting who his wife was, which was what led to his disease being diagnosed. It was eerie to watch, and when we found out one morning that Bob was in the hospital we were a pretty nervous work group. Viral encephalitis can be very contagious and we had been working in very close quarters with him. But luckily nobody else caught it. The disease is usually fatal, but Bob did survive it. Sadly, though, it wiped out his memory of all his engineering training along with I don't know what else. HP found him a job working on one of the company's production lines after he recovered.

Earl was kind of a rabble rouser at heart, and he soon discovered that I made a pretty good rabble to rouse. Whenever there was something he didn't like about the project or the way management managed or whatever, he'd get *me* all fired up about it and when Jim came in to work he'd sic me on Jim. I'd kind of blindside Jim over his first cup of coffee about whatever it was Earl had stirred me up about. If Jim hadn't been such a good guy I'd have probably gotten myself into pretty serious trouble. As for Earl, he was the picture of calm statesmanship whenever Jim would come talk to him about whatever it was. Then I'd get pretty ticked off at Earl for setting me up like that. You'd think after a time or two I'd have learned my lesson, but I was twenty four, full of fire and vinegar, and had a lot of hot buttons. Earl really knew how to find and push them. With friends like him, who needs enemies?

There were two guys who were just a few years older than me. Bob Frohwerk, like me, had come over from the instrument side of the company and was working on the error correcting code system that would go into the Jumbo controller. He was a quiet guy, a graduate of Cal Tech, and we became pretty good friends. Bob and I ended up being the only ones who went with the project to Boise when it was transferred there. Billy Moon was the mechanical engineer who designed the complex tape transport mechanism for automatically mounting and dismounting the tapes. He had previously worked on the company's line of disk drives before that operation had been turned into a division and moved to Boise. That meant he'd already turned down moving from California once, and he wasn't too happy about this project being sent there also. But he did an incredible design job and by late 1978 the breadboard tape transport system was working perfectly. It was practically a lab prototype.

I had jumped on my assignment with both feet and was making pretty good progress. At that time there was quite a controversy going on over whether or not a microprocessor would be capable of being used in a mass storage controller. The argument against it was that it was too slow to handle the high speed data transfers to and from a disk drive or other mass storage device. It turned out that the data path was the only thing a microprocessor was too slow to handle, though, and I proposed a controller architecture where the data path itself was handled by a special circuit, called a direct memory access or DMA circuit, while the microprocessor handled everything else. That approach ended up being adopted by the operating divisions. Another question that was up in the air at that time was whether or not to put a local random access memory (RAM) cache into our mass storage controllers. At that time RAM technology was barely out of its infancy and RAM storage was still fairly expensive. RAM chips fast enough to do the job came with only 1024 bits (128 bytes) of storage. Nonetheless, I was able to show people that this would be cost effective and provide a number of performance benefits, and so that, too, ended up being adopted by the company. Neither of these things represented any great flash of brilliance on my part; the decisions were obvious once someone had done the calculations. It just turned out that I was the one who ran the numbers first and showed them to various project managers within the company.

The most controversy, as it turned out, involved the decision over which microprocessor to use in a mass storage controller, and here I wasn't successful at selling my proposal. At that time there were a great many commercially available microprocessor chips being sold by a number of different companies.

By this time managers within HP had come to recognize that firmware development was the costliest and most time-consuming aspect of microprocessor/microcomputer product development and, as a result, there was a strong push to standardize the mass storage controller design across the different product lines. This meant choosing *one* of the available microprocessor models. The question was: Which one?

Whichever one it was, it would have to be powerful enough to handle the company's most high-performance products. Different microprocessors had different performance capacities, so I undertook a performance study to find out which ones were viable candidates and how their relative performances stacked up. It turned out that the fastest one was an internal HP microprocessor called the MC5, followed next by Motorola's M6800, then one from the Zilog Corporation called the Z80, and finally one produced by the Intel Corporation. My study also showed that the Z80 would end up being a performance bottleneck for our high end mass storage devices, and so from a technical standpoint only the MC5 and the M6800 were really viable for a 'common controller architecture.'

Complicating the issue was the fact that the MC5 was based on a brand new semiconductor technology known as 'silicon-on-sapphire' technology. At the time this wasn't a proven technology. HP was trying to develop it internally and it was having a whole host of problems. One consequence of this was that MC5 chips cost divisions fifty dollars apiece at that time, compared to five dollars for the M6800, and even at that price the company was losing money on each MC5 it 'sold' to the divisions. To me it seemed clear there was really only one choice, and that was the M6800. That was what I proposed we use.

Well, it turned out no one else saw it that way. Jim sent me up to Boise to present the results of my study to the Disc Memory Division staff. I made my presentation to a room full of young engineers and only slightly older project managers. One of the things I emphasized was the issue of performance bottleneck my study had turned up. After I finished my presentation and made my recommendation, one of the young engineers – a fellow named Greg Spohn who would one day come to be the best boss I ever had – remarked that he had already written his firmware for a Z80 machine. I did warn folks up there that this machine would not be capable of meeting the performance specifications for their high-end product, a disk drive codenamed 'the Big Fixed Disk' or BFD, but the DMD lab decided to ignore this and went with the Z80 as their standard. It turned out later that BFD *did* end up having the controller be the performance bottleneck and they had to mount a 'performance improvement project' after it was introduced to fix the problem I had warned them about. It really was a dumb decision on their part.

Jumbo ended up not using my recommendation either. Paul Ely, who was the vice president in charge of HP's computer business, heard about my decision to go with the M6800 and invited me down to his office to talk about it. He listened while I outlined all the technical reasons why this was the right choice. Then he patiently explained to me that it was more important for HP as a whole to develop the silicon-on-sapphire integrated circuit technology and that to do this it was necessary for business reasons that everyone use the MC5. It turned out DMD was able to defy this edict, thanks to a very nasty reliability problem that was later discovered. But Jumbo worked for Marco, Marco worked directly for Paul, and so while Paul complimented me on my technical analysis, the answer was going to be the MC5. Period. It turned out later that HP never did manage to make the silicon-on-sapphire technology viable, so this too ended up being a bad decision. I was finding the whole situation frustrating. Jim had hired me because of my experience in doing microcomputer designs, but nobody was giving this experience any weight in the decision making process. Technical issues were taking a back seat to microprocessor politics and there was nothing I could do about it. □

As 1978 drew near its end DMD had me fly up to Boise for a job interview and to give me a look at the city. I appreciated the look at Boise because I had to make a decision over whether or not I wanted to move there. I was less happy about the interview part because, in effect, I was being interviewed to see if I could keep the job I already had. I felt a bit insulted by that and went into that interview process with a chip on my shoulder. However, after all was said and done I guess I did okay in spite of my more or less

rebellious attitude because DMD did offer me my position, on Jumbo, in their R&D lab. The job would start in early January, 1979, just after my graduation from Stanford.

The new Idahoan. Me at age 25 when I moved to Boise (1979).

I found Boise to be a very attractive place to live. It struck me as being kind of like a miniature version of Des Moines. At the time its population was just a bit over one hundred thousand, big enough to provide the benefits of a metropolitan area but small enough to not be as impersonal a place as the Bay Area was. The housing market there just then was a buyer's market because the raging inflation going on under President Carter had pushed interest rates into double digits but, at the same time, Idaho had a usury law on the books that capped the rates banks could charge at ten percent. The net result was there were a lot of new houses that had been built that the builders were having trouble selling. I was able to get financing and make a deal on a nice little brand new three bedroom house on a quarter-acre lot in a new subdivision on the west side of town. So it was that the day after New Years in 1979 the movers came to my apartment, loaded all my stuff on the truck, and I left California to become an Idahoan.

I arrived in Boise on the afternoon of January 3rd. Because the closing on my new house wasn't for another nine days yet, I first stayed at the Quality Inn, which called itself a 'motor hotel' – basically it was a pretty fancy motel, much nicer than a Motel 6 but less grand than a full-fledged hotel. HP was paying the costs of my lodgings there until I could move into my house; this was a relocation benefit from the company. Bob Frohwerk and his wife arrived in Boise at the same time. We had in fact 'convoyed' from California to Boise together. Bob and I were the only two from our Cupertino group to transfer with the project. Jim had been intending to come as well, but in the end he felt he couldn't leave California. He had been divorced a few years earlier and there were certain legal complications attached to the terms of the divorce, mostly having to do with his kids if I remember correctly, that stopped him from leaving the state. Bob and I would be getting a new boss as a result.

The company gave us both a grace period before we actually had to report in to work. This was intended to let us take care of the details that come with moving to a new city. Since my house closing was still several days away and there wasn't much I could do until then, I decided to report in to work the next day just to let folks know I'd arrived and to get situated in my new workplace at least. I figured that when the closing finally got here I'd take whatever time off I needed to take care of things then. My new lab manager, John Stedman, readily agreed to that. There weren't any time clocks anywhere in HP; no one ever had to 'punch in' to go to work, and the whole system was pretty laid back. I also got to meet my new boss, a section manager named Rich Smith. Rich was a white-haired, friendly guy, easy to like, and my first impressions of him were pretty favorable.

Another person I touched base with was a woman in Personnel named Addie Jensen. Addie had been a huge help during my house hunting trip. Before coming to work for HP Addie had been a realtor and she knew much, much more about the ins and outs of buying a house than I did. In fact, she had given my realtor a regular third degree grilling after I'd settled on my choice of houses, asking him pointed questions such as 'was the house on the city water supply' and dozens of other pretty important things it never occurred to me to even think about. She took such good care of me that I called her Aunt Addie.

Now she helped orient me to my new surroundings and gave me a lot of good tips on the practical mechanics of getting settled in Boise. These included things like where the best deals on various things were to be found in town, a map of the city, and a bunch of other small but important tidbits of information. Addie was a one-woman Welcome Wagon and she made it easy to get settled in. I always liked Aunt Addie a lot, although after her retirement a few years later I didn't see much of her again.

My personal finances were pretty tight all during that first year in Boise. The monthly mortgage payment on my house was four hundred sixty-one dollars a month, which was one hundred seventy-six dollars a month more than my apartment rent had been. But at least this payment was fixed – I had a thirty year mortgage and this was before variable interest rates had been thought up by the bankers – and there would be no more uncertainty from year to year on what my monthly 'rent' would be. In addition, I had another couple of smaller monthly loan payments to make stemming from other miscellaneous house-related expenses such as putting in a yard, installing a water conditioner to take care of Boise's famously hard water, and a few new appliances, such as a refrigerator and a clothes washer and dryer, I hadn't needed as an apartment dweller. I was also making car loan payments to the HP Credit Union. In 1977 my old Buick had finally pretty much had it and I had purchased my first new car, a 1977 Buick Skyhawk. The car had cost seven thousand dollars – a huge sum – and I'd taken out a six thousand dollar loan from the CU to buy it. I also still owed the Maquoketa State Bank three thousand dollars from my student loans, but fortunately I didn't have to begin repaying that until January of 1980 since I had just graduated from Stanford – officially on January 4th, 1979 – and there was a year's grace period on student loans.

So, all told, I was in debt to the tune of about fifty thousand dollars with a monthly take-home pay, after taxes, withholdings, and other payroll deductions, of about eight hundred sixty dollars a month. My total monthly expenses actually exceeded this amount but between selling my HP stock purchases, which came every three months, the twice-a-year profit sharing checks I received, and income tax refunds I did manage to just barely keep my nose above water without having to go even deeper into debt. Basically, every three months my checking account would dip into the red at the end of the month and a couple of days later I'd get money from selling stock and/or profit sharing, and that would give me the cushion I needed to get through the next three months. Occasionally some unexpected expense would crop up and I'd have to dip into my savings at the CU to cover it. I hated to do that. Financially I wasn't getting ahead any but at least I wasn't getting behind either. In 1979 I was living right at my disposable income.

I was even able to scrape up a little money – one or two hundred dollars here and there – to help support Governor Reagan's presidential campaign. Even before moving to Idaho I had become extremely dissatisfied with President Carter's inability to bring inflation under control and I generally regarded the things he had tried as ineffective and not really dealing with the root problem, which was a too-loose money supply. The government was paying for things by printing new money. On top of that, and as I had feared in 1976, the liberals in Congress had indeed succeeded in blocking the relatively few things President Carter had proposed that I did like. Domestic policy wise, they owned him and were ruling us. I had applauded President Carter's Executive Order declaring total amnesty for Vietnam-era war resisters, which he had issued on the first day he took office, and I had been deeply impressed by his accomplishment of the Camp David Accords, in September of 1978, which finally brought about peace between Egypt and Israel. But these were about the only things he had accomplished that I agreed with. I strongly disagreed with the Panama Canal Treaty in September of 1977. The SALT-II Treaty with the Soviet Union hadn't happened yet, wouldn't happen until the end of 1979, and even then would never be ratified because of the Soviet invasion of Afghanistan.

The economy during President Carter's term in office had continued to be flat at best – it was referred to as 'stagflation' – and that wasn't good either. On the other hand, I was succeeding in making a little extra money in the stock market by trading stocks. While still at Delcon I had set up a small account at Dean Witter and when I moved to Boise I had transferred this account to their Boise office. One of those little relocation chores I did have upon arriving was to meet my new local broker – or 'account executive' as stock brokers like to be called – a guy just a little older than myself named Scott Krueger. Scott and I hit it off very well at our first meeting and he's been my broker now for almost thirty years and through three different brokerages. My account wasn't too big in 1979 – just a few thousand dollars – but the drifting economy was producing fairly predictable up-and-down patterns in stock prices. I learned how to chart them to spot low points – where I could buy in – and high points – where I could sell out. I'd win some, lose some, but overall I was managing to inch ahead. Because I had so little money available to

invest, in those days I mostly traded stock options, which are very volatile but do have a limited amount of downside risk on the one side and the potential for very large returns when you do it right – or least did have in those days before stock index futures and programmed trading. I had learned about stock option trading from an HP Corporate attorney I had met in the summer of '77 at a company training course I had been sent to in Monterey. Paul was originally from New York City and he practically lived for option trading. He was a good teacher.

Today I wouldn't recommend this kind of stock market trading, but in the stock market environment of the President Carter years, and for someone with my limited resources at the time, it was a good way to grow my money little by little. But there's also a certain element of 'gambling' involved in the stock market and I had a pretty hard rule that my stock account had to take care of itself. I wouldn't, for example, pull money out of somewhere else and put it into my account with Dean Witter. The sole exception to this was that I did deposit my HP stock in that account. But since I also used proceeds from selling that stock to cover my living expenses, even this was a limited amount of infusion. I also made it a hard rule that I would never engage in heavily leveraged investments – such as futures trading – nor would I sell stocks 'short' – which has a limited upside and practically no limit to the downside risk. As much as it is possible to be a 'conservative trader' in the option market, I was conservative. I was going after increments, not a big killing. As they say on Wall Street: Bulls make money, bears make money, but pigs never make any money. And this saying is true. □

Disc Memory Division – DMD, as it was called – turned out to be one of the strangest places in many ways I've ever worked. It's main, and really only, business was the design and manufacturing of disk drives, most of which went into HP computer systems. Despite the fact that the industry spelled 'disk' with a 'k,' the division spelled its name 'Disc' with a 'c.' This was one of its more minor oddities. It was well known within the company that HP's computer side had a bit different culture from the rest of the company, although the HP Way was still a part of it. But DMD's culture, especially for the first few years I was there, was even more different. In many ways it was more like a colony of HP than part of the HP mainstream.

In the first place, it was a pretty new division. It had been started a little over a year and a half or so before I got there – I no longer remember the exact startup date for the division – and was experiencing the kind of phenomenal growth rate one doesn't often see except at a successful startup company. We were growing at a rate of about thirty percent per year when I first got there, which is a rate of growth that turns out to be extremely difficult to manage. Almost everyone there – from Dick Hackborn, the division manager, right down to the R&D engineers on the bench and the production operators on the lines – were new at their jobs. And it was a *young* division in terms of the ages of the people working there, too. Although there were a few experienced lab engineers still working as engineers, such as Bob and myself, the great majority of the R&D lab was made up of kids fresh out of college plus a few more who had been out two years or less. I'm not sure how big the R&D lab was when I got there, but it was at least four times larger than Delcon's had been and probably swelled pretty close to at least a couple hundred engineers within my first two or three years there. That's a lot of young people.

One of the signs of this demographic was the parties. For about my first two years in Boise someone would throw a party practically every Friday and Saturday night. DMD was always a pretty stressful place to work – in part because most of us were still so young and therefore inclined to be a bit nervous about our jobs, as I had been when I arrived at Delcon – and the R&D lab had something pretty close to the same 'work hard, play hard' ethic my fraternity had had in college. A big fraction of the lab were people who were already married when they arrived – and the young wives took full part in the parties – but another large fraction was still made up of single people. Although the lab was again numerically dominated by men, there were a few women in the engineering ranks here, which I immediately marked down as a tremendous improvement in the work environment, both professionally and socially. If you're wondering: Yes, a woman makes just as good an engineer as a man, and we had some really good ones.

Another sign was the 'over-thirty/under-thirty' football game. For the first couple of years we had a Saturday touch football game held at a nearby junior high school field where one side was made up of guys age thirty and above and the other was made up of guys under thirty. The over-thirty guys were pretty much all managers while the under-thirty team was pretty much all non-managers, so it wasn't too unusual to find yourself lining up against your boss (although not in my case; Rich was pretty far past age thirty and didn't participate) or even *his* boss or even his boss' boss. Although the game was touch football and nobody wore pads, that didn't really moderate the hitting that went on, and I'd come out of that game with black and blue bruises all over my body. They'd heal up just in time for the next game. After a few more years had gone by, I'd gotten to the point where those bruises wouldn't be healed up in time for the next game, and that was my clue that my football days were finally over once and for all. (I had played intramural flag football when I was in college and once in a great while we'd put some games together in the park when I'd worked at Delcon).

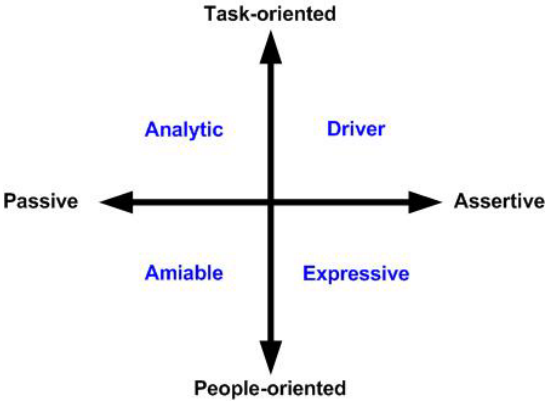
Dick Hackborn, the division manager, always held Friday 'coffee talks' that lasted about a half hour or so and at which he and the other higher-level managers shared information with all the division's employees. Work would stop during coffee talk and people would cram into wherever it was being held to hear about what was going on. For my first couple of years at DMD, if anyone had turned thirty during that week they would hold a kind of mock ceremony where that person would be awarded 'Ye Olde Stick of Thirty,' which was invariably a walking cane to help the 'elderly' person hobble about the workplace.

For many years DMD also held frequent Friday 'beer busts' every time we had anything to celebrate or even whenever the division management team thought it had been too long since the last celebration. There were actually three beer busts held any time we had one, one for each of the three shifts of workers, and the division manager or one of the functional managers – lab manager, manufacturing manager, admin manager, marketing manager – would show up for each one of them. Beer busts involved plenty of kegs of beer, wine coolers for those that preferred them to beer, and grilled hamburgers and hotdogs. Especially for the first few years, these tended to get to be pretty wild parties in their own right, and when the company's beer finally ran out, there were usually two or three dozen of us or more who would move the party to downtown Boise and continue it into the wee hours of Saturday morning with dancing and whatever else came into our heads. There was no rank during a beer bust. One time a bunch of us threw the general manager into the man-made lake that had been built on the HP campus. Another time the manufacturing manager and I got into a kind of slam-dancing contest in a downtown Boise nightclub where the party had been moved; every time we and our dance partners came within arm's reach as we were dancing, *yahoo!* he and I would throw elbows at each other. Hard. Just for fun. I'm pretty sure he had as many black and blue bruises to show for it that weekend as I did, but it was a blast.

For those Fridays where no beer bust or big private party was planned, many of the lab section managers would throw parties at their houses after work. By comparison with some of the other section managers, Rich's parties tended to be pretty tame, but some of the other managers threw parties that could have come straight out of Hollywood. Most of DMD's managers had moved to Boise from the Bay Area and had made so much money when they sold their houses down there that their Boise houses tended to be palaces, complete with pools and hot tubs. No movie star ever had more fun than we did.

So, especially for the first two and a half years I lived in Boise, DMD was more like a way of life than a place of employment. About the best way I can describe the period from 1979 to mid-1981 is: We weren't a company; we were a tribe. I've never seen any other place I could remotely begin to compare to it. For me that first year at DMD would have been paradise on earth if the Jumbo project had been going well. Unfortunately, it did not go well at all. □

I want to make something clear right up front. No nicer man than Rich Smith ever drew a breath. To this day I consider him a friend and there aren't too many things I wouldn't do for him if it were within my power to do so. But one of the things I wouldn't do is work for him again. When it came to the job of new product development, Rich and I turned out to have irreconcilable differences.



Dimensions of interpersonal styles

At root the underlying reason for the difficulties Rich and I had with each other was a pronounced difference in our two styles of interpersonal relationships in the workplace and our joint failure to recognize that each of us was creating problems for the other as a result of this difference. Just a couple of years later the company began holding a management training course, called 'Managing Interpersonal Relations,' that talked about this, but in 1979 I knew nothing about personality theory and I doubt if Rich knew any more about it than I did. But the main idea is that how other people perceive you in their interactions with you, and how you behave so as to leave them with this perception, can be modeled using two dimensions of behavior. The model is illustrated in the figure shown above. Today psychology has made some refinements to this model – the more recent version is called a 'circumplex model' – but the basic factors are the degree to which one's behavior is assertive vs. passive and task-oriented vs. people oriented. These two factors are used to define four interpersonal relation types called Drivers, Analytics, Amiables, and Expressives. For example, the stereotypical 'used car salesman' personality type is a person who is highly assertive (think of high-pressure sales pitches) and highly people-oriented. This type is called an 'Expressive.' Diagonal personality types on this graph are called 'poison relationships' because the two styles are opposites of one another and so two people with such opposite styles have the most difficulty understanding where each other is coming from. HP introduced their training course to teach managers and project leaders how to recognize other peoples' interpersonal styles and to adapt their own style to the person with whom they were dealing.

There is no 'good-bad' that attaches to any of the four styles. Nor is a person's style in the workplace necessarily the same as it is in other settings. In my early years at DMD a lot of my new friends made remarks from time to time that I was two different people, Rick-at-work and Rick-off-duty, and they were right. I've mentioned before the tendency for my family on Dad's side, and me as well, to take things pretty seriously, especially when it comes to work and getting the job done. This is the 'task-oriented' side of the vertical axis on the graph. One of the results of the relationship between Dad and myself going all the way back to the time when he sent me out to sell lawn mowers is that I grew up developing a lot of independence and drive in going after what I wanted. This is the 'assertive' side of the other axis. Put them together and they come up 'Driver' on the interpersonal style graph so far as my workplace behavior goes. It was, of course, a different thing when it came to our after-work parties where the 'task' was just to have fun with my friends.

Rich, on the other hand, was an 'Amiable.' Amiables tend to regard preserving their relationship with other people to be of paramount importance and they tend to give hints rather than come right out and say what they're thinking. A 'Driver' or an 'Analytic,' on the other hand, tends to say what he thinks pretty bluntly and expects other people to do the same. One of my favorite Erhard stories happened one day when he and I were talking about his project plan for the HP 4943. There were a number of minor points in his plan I thought could be improved and I was cheerfully, if rather assertively, nitpicking him on these points. Finally even Erhard's near-inexhaustible patience wore a bit thin and he said to me, "Look, Rick, when you're in charge we'll screw it up your way. Until then we screw it up my way." When he said that I broke out in a big, delighted grin and said, "Fair enough, Chief." We did things his way and as it turned out his plan worked just fine. With Rich, on the other hand, I very rarely could figure out what he was trying to get at and usually didn't understand what he was saying at all. To me it almost always seemed like we were having two entirely different conversations. On the flip side, I'm pretty sure he must have found my blunt, outspoken way of talking awfully upsetting. I thought of it as candor; I'm sure he must have thought of it as something else.

We had a 'new' guy in our group, an ex-IBMer named Ted who was several years older than me and working with me on the Jumbo controller design. Ted was every inch the same 'Driver' personality style I was. There were a thousand details regarding various technical decisions about the controller design, and Ted and I loved to argue about them. One of us would throw out an idea, the other would disagree with it, and we'd go back and forth until we ironed out our differences and came up with an idea that was better than the ones either one of us had started with. Our arguments tended to get pretty loud and noisy and were sometimes laced with remarks like, "Look, blockhead, don't you see *this* would cause *that* problem?" Ted and I were having great fun, but I can see how it might have seemed to other people overhearing us that Ted and I were deadly enemies. Rich, who was scandalized by the way we talked to each other, was certain of it. Remember, an 'Amiable' wants to preserve people relationships above all else. A 'Driver' wants to get results and get the job done. And doesn't particularly like to be told what to do. Amiables hint; Drivers tell. I don't know if Rich ever talked to Ted about how we behaved with each other, but he regularly chewed my hind end out about it and he flatly refused to believe me when I'd tell him Ted and I got along great. Afterwards I'd ask Ted if he felt like we were getting along okay, and he'd just give me an incredulous look and say, "Sure. Don't *you* think so?" So then I'd get ticked off at Rich for chewing me out over nothing. I don't think it ever occurred to Rich how much he was getting on my nerves; I know it never occurred to me how much I was getting on his.

Still, none of this might have mattered – or at least might not have built up into a big problem between Rich and myself – if the Jumbo project itself had been making progress. But it wasn't. As I saw it the only progress we were making was backwards. In Cupertino the team had come up with a working breadboard prototype. At DMD, with all the new people coming on to the project, it was to be expected there would be a steep learning curve as everybody was figuring out what a Jumbo was and so it was to be expected that the transition from breadboard to lab prototype would be slower than usual. Unfortunately, some time prior to the project's transfer to Boise the local DMD management had decided to change one of the project's most basic technical specifications, namely how much data was to be stored on Jumbo's tape cartridges. Our design, which matched what IBM had done with the IBM 3850 system, stored fifty megabytes (fifty million bytes) of data on one tape cartridge. The basic Jumbo transport held sixteen of these cartridges, giving it a storage capacity of eight hundred megabytes. DMD's largest disk drive at that time stored one hundred twenty-five megabytes, and the largest of the new disk drives under development right then stored four hundred megabytes. Our Jumbo system also had an additional library storage element – we called it 'the can' – that held three hundred and eighty tape cartridges, each capable of being mounted on a Jumbo tape transport automatically using a bit of clever robotics. That took our tape library system up to an online backup capacity of nineteen *billion* bytes – far more than the total storage needs of any HP computer system either then or for the next decade.

However, somebody at DMD – who exactly I don't know – argued that this storage capacity wasn't enough. One basic Jumbo wouldn't have enough capacity to back up 'the Giant Fixed Disk' or GFD. The GFD was a disk drive in the early 'where do we go from here?' planning stages and was planned to hold one billion bytes of data. It turned out later that DMD never did start the GFD project and, in fact, nearly a decade more would go by before we produced such a high-capacity disk drive. GFD was science fiction. But, nevertheless, it was decided a Jumbo would have to store one hundred megabytes on each cartridge – twice its designed capacity – to be a 'viable' product. For a great many technical reasons, this decision meant that practically everything else about Jumbo's design had to undergo very major and very, very technically difficult changes.

I don't know if the DMD folks who decided on this change ever discussed it with Jim Hood or not. I know they never discussed it with the Cupertino design team. We would have argued strongly against it if anyone had discussed it with us because it made the project impractical with the state of the art technology we had available in 1979. But, instead, we were just told of the decision very shortly before the transfer to Boise happened. I never knew if Rich's amiable nature just made him go along with this decision or if he just never realized how impractical the challenges it caused were. What I did know was

that in Cupertino we'd built a working breadboard. In Boise we had nothing and were having to start all over again practically from scratch and with a design team in which no member had ever designed anything remotely like what we were now being called upon to develop. With our young engineering team the original Jumbo specifications would have been hard enough to develop; with the new ones it turned out to be impossible to do at that time. DMD's decision was a terrible blunder.

As a month, and then two, and then six went by with no visible signs of progress being made I became more and more frustrated. Not the least of my frustration came to center on Rich because, with his amiable and no-pressure style of running the section, it looked to me like nobody else cared about our total lack of progress. I began wondering if DMD even cared whether this product ever came out or not. That bothered me a lot because I believed in the importance of this project; I wouldn't have joined Jim's team in the first place if I hadn't been convinced of the product's merits. I'm sure this impression of mine was over-exaggerated; no engineer and no manager ever really doesn't care whether or not what he or she is doing is successful. But since I couldn't see Rich doing anything to push us out of the rut and get the project back on track, I think the erosion of my morale was understandable. □

In an R&D lab as big as ours that has multiple projects going on, there is never any shortage of critical problems in need of people to solve them. As Jumbo continued to languish there was another project, a disk drive product called the HP 7910, that was up to its eyeballs in all kinds of technical problems. Disk drives were DMD's bread and butter, and when a project like this one needs help R&D management always looks around to see if they have people working on less important things who can be pulled off and employed to work on more important things. Nothing is less important in a lab than a project that is making no visible progress, and our section was a natural place to look for people to lend a hand. So when the call came for Jumbo to provide somebody to help out on one of these problems, Rich had just the guy for them – his favorite troublemaker, me. It was the first decision he had made in months that I went along with wholeheartedly. I was sick to death of Jumbo by then, could clearly see the project was doomed to be canceled, and I jumped at the chance to do something useful again.

The particular job I was reassigned to was an assembly line tool used by production called a 'servo writer.' Disk drives record special information on the disks that the disk drive control system uses to align its mechanics in order to be able to organize, store, and retrieve your data. This information is called 'servo code' and it plays a functional role not altogether different from the grooves on an old-style phonograph record. But disks do not come with this code already in them; it must be put there and that is what a servo writer does. In many ways a servo writer is kind of like a very specialized robot and you can't build a modern disk drive – or even a vintage 1979 disk drive – without one.

Production had a servo writer but it had been designed while the 7910 project had still been in California – prior to DMD being set up – and the original designer had stayed behind in California. (I met him a number of years later; he was a pretty good guy and the servo writer had been taken away from him and sent to Boise before he'd had a chance to really finish it). Production was having a lot of problems, both with the existing servo writer itself and with other production problems they had come to blame on the servo writer – many of which were not actually problems with that tool. In a nutshell, production was demanding a new servo writer tool.

I was teamed up with a relatively new twenty-three year old engineer, who was just a year out of college, named Vern Knowles. I had known him slightly during Jumbo, but the servo writer project was the first chance I had to actually get to know him. It turned out that Vern and I, over the next couple of years, became very close friends. He is smart, technically top-notch as an engineer, an exceptionally good craftsman, exceptionally dedicated, and he tops it off by being one of the finest, most honest, most honorable men it has ever been my privilege to know. I didn't know it when we first started working together, but Vern would become one of the very few of those closest friends I call my brother in everything but blood. He is the brother I mentioned earlier in these memoirs.

Vern and I split the workload between us. I designed the microcomputer and the firmware for the new

servo writer – a capability the old one didn't have – and Vern designed everything else. We made a great team and in less than a week I went from feeling frustrated and angry about Jumbo to having a great deal of fun working with him on our new assignment. Vern had been working on this problem before I was assigned to it and already had a pretty thorough technical idea of how it should be designed. I was immediately impressed with his abilities. This didn't keep me from teasing him a little bit from time to time. Vern takes his job pretty seriously too, but I found there was a lot of good humor and laughter in him always ready at the surface. Plus, of course, there is a bit of Grandpa Teters in me. And, as it turns out, Vern could give back just as good as he got from me. We were playing golf together one evening at the Eagle Hills golf course when two huge, separate swarms of mosquitoes decided we were just the thing to have for supper. As we were headed back to the clubhouse, Vern suddenly cut in front of me on the run and deposited his whole buzzing swarm on me. He ran back to the clubhouse laughing and unmolested by mosquitoes with me and my now gigantic swarm in hot pursuit right behind him.

It was just the sort of thing I wished I'd thought of first.

Officially Rich was still my boss but in fact he pretty much ignored what we were doing. Except for one thing. I'd known while I was still in Cupertino that DMD was going to throw out HP's MC5 micro-processor first thing, so I'd prepared on the side an alternate microcomputer design using the M6800. The DMD lab had also already decided to go with the Z80 part, as I mentioned earlier, but I had still hoped that since Jumbo wasn't a disk drive I might be able to get them to go along with how I wanted to do the controller. This turned out to be naive, as I found when John Stedman, the lab manager, called me to his office for a little chat one afternoon.

I'd gotten to know John a bit while I was still in Cupertino. Because all our equipment was going to end up going to Boise, Marco had decreed that all capital equipment costs be cleared through John. One of the big ticket capital items was an HP minicomputer system to support the controller firmware development. I'd gotten permission from Jim to order one and, in due course, the purchase order came to John for his approval. The cost of this equipment was around forty thousand dollars.

Now, one thing I didn't know was that John had figured out he could buy HP computers for a lot less money by ordering their parts and simply putting them together ourselves. He'd instituted doing this up in Boise already, but I didn't know about it. One day when he was down in Cupertino for a visit, he sat down with me to talk about my purchase order. He wanted me to buy my computer using this same trick. I understood what he was suggesting – John made suggestions rather than gave orders; a smart person soon learned to listen to his suggestions, too, because there was a lot of good thinking that went into them – but I wasn't eager to follow this suggestion. It meant a lot more work for me at a time when I was already pretty busy. But I wasn't having any luck talking him out of it. All the while I was sitting there wondering to myself, 'Why is he insisting on this?'

Suddenly it hit me. "John," I said, "this is *Marco's* money." John's eyebrows went up a tiny fraction and he suddenly broke out in a grin. "Oh!" he said and he immediately signed my purchase order. In that single instant I knew John and I were going to get along great. He had the same pragmatic attitude about things as I did.

So the day John asked to see me in his office to talk about 'the microprocessor issue' I wasn't worried. He listened patiently while I went through the same technical arguments that hadn't worked with Paul Ely. After I was done talking, he patiently went through all the management, cost, and development time business issues in favor of using only one common microprocessor design throughout *all* of DMD's products. What it came down to in the end was an unknown: Was it really, really true the Z80 *couldn't* be made to work in Jumbo? That's the kind of question you can't really answer with 100% certainty before you build one so what it boiled down to was a question of making decisions in the absence of complete and certain information you'd like to have in making the decision. In the economics of management it's called 'decision making with risk' and it's what people in John's position get paid to do. I really appreciated the fact that he'd taken the time to *talk* with me about it instead of just telling me how it was

going to be (the way Paul Ely had). I also understood the fact that at the end of the day it was John, not me, who would be the guy held accountable for the overall success of running his lab. I thought I was right on a technical level, but I didn't know for a stone cold fact I was right and one thing was for sure: If we didn't try to make the 'common controller' strategy work we would fail to achieve the larger objectives John had for the lab. Under HP's system of management by objectives, this was one of those cases where my job was to help meet the bigger objectives. I agreed I'd get with the program and that was that. I felt like John and I reached the decision *together*. I had no hard feelings and I think John respected me for being a team player instead of a prima donna.

But the servo writer was a different story altogether. It didn't have anything to do with on-going or future new product developments. It was a one-of-a-kind production tool and the objective was to get it working and out on the production line as fast as possible. And I had a finished hardware design already in my pocket and ready to go. All it needed was firmware. I decided to go with it for the servo writer.

Rich had a conniption when he heard about it and called me into his office for another hind end chewing. What was the matter with me? Why was I insubordinately flouting the lab strategy? I was going to climb down from my big ego and comply with the Z80 common controller decision.

I came pretty close to losing my temper – which if I had really would have been insubordination, something that in any company gets you fired pretty fast. I doubt if I was able to hide how I felt about this meeting. "Look, Rich," I replied, "I don't see why you care about this. It's just a five dollar part and there's only going to be one of these *ever* built. It's just a production tool. I've got a design ready to go and all the tools needed to do it. If we do it your way the design starts all over again and we need to buy new tools we don't have right now to do the job. Do you want me to get this job done as fast as possible or do you want me to screw around with it for an extra month or two more than it ought to take when we're ready to go *right now.* Tell me which you want and I'll do it."

I was almost certainly more confrontational about this than I needed to be or usually would have been, but that had more to do with all the previous frustrations than about this one disagreement. Rich and I had been building up to this for quite awhile now. I know Rich didn't like my tone, but he was too good an engineer not to be able to see I was right about this and that it really *didn't* have anything to do with the lab strategy. Plus, troublemaker though I might be in his eyes, I was still one of his people and I think he sensed how close I was getting emotionally to telling DMD and HP where to shove it. So he put his own feelings in his pocket and told me to go ahead with what I was doing. He didn't forget about the incident, but he did leave me alone to do my job after that. And at that point in our relationship, that was about the best either of us could hope for.

And so Vern and I happily went ahead and designed a new servo writer for production. Toward the end production asked for some auto-diagnostic features to be added to it so a third guy, a software writer named Phil, joined us to do that part of it. We did the job in a pretty short amount of time compared to how long this kind of work usually takes and got it installed and running down in production in the autumn of 1979. We finished the job just a short time before the Iranians stormed the American Embassy in Tehran and seized fifty-two Americans as hostages. □

When I first arrived in Boise there were two divisions located on the large HP site: DMD and the Boise Division, which manufactured the company's line of computer printers. The two divisions were housed in two large two-floor buildings, Building 81 (Boise Division) and Building 82 (DMD). DMD was growing so fast that we were literally crammed knee to knee on the upper floor of Building 82. As soon as the winter weather cleared work began on the construction of a third large building, Building 83. DMD would expand into that building as soon as it was ready to occupy. The division's incredible growth rate fueled plans to rapidly expand the company's line of disk drive offerings and there were a number of high-demand new products just waiting for development teams to come work on them. As a consequence, while Vern and I were finishing up the servo writer the inevitable finally happened. The Jumbo project was cancelled and our section was broken up to provide engineers to work on these new products.

Vern and I ended up being assigned to two different projects. He would be going to work on HP's first five-and-a-quarter-inch disk drive, while I would be going to our first eight-inch disk drive project. Both these projects 'belonged' to the same section manager, an interesting and ambitious guy named Ken Jochim. My new project manager was a energetic HP veteran in his thirties named Chet Haibel, who reported to Ken. My friend Bob Frohwerk was assigned to a related project, a more traditional tape cartridge product that would 'plug in' to a box that integrated a disk drive with this tape drive to produce what was known at the time as an 'integrated storage solution.' Only one other guy from Jumbo ended up on the same project as me, a good, solid engineer named Craig Walker who was fairly new to HP but had a lot of design experience from working at the Naval Weapons Lab in China Lake. Craig had been one of the designers of the Sidewinder missile.

Rich ended up moving over to the Boise Division since he no longer had a section to manage inside DMD. He and I never worked together on any projects after that, but we'd bump into each other in the hallways from time to time. Once our 'poison' boss-subordinate relationship ended, I was able to remember Rich's warm and very human qualities without the stress of the project getting in the way. I had liked him a lot when I first moved to Boise and once we no longer had any reason to clash over things I could like him again. I wasn't unaware that half the problems we'd had with each other were my doing. But really none of them had been personal. We just didn't see eye to eye on how to do projects and that's not something to hold a grudge about. Over time we repaired our friendship and forgot about the past.

Chet and I were pretty opposite in a lot of ways but our differences complemented each other. His personality style was 'Expressive,' which is a style I've always found very easy to work with because I never needed a secret decoder ring to figure out what was being said to me. Chet would give it to me straight and I could be equally forthright in talking to him. His mind was an boiling geyser of new ideas, a lot of which weren't too practical but a fair number of which were nothing short of brilliant. Chet was a much more fertile idea man than I ever was. The problem was that he wasn't so strong on dealing with the myriad details that have to be worked out to bring an idea to life. But that was always *my* strength. I could take one of Chet's ideas and plow through all the nits and grits that had to be solved to make it work. The two of us put together made an incredible team and I loved working for him.

He started visiting the old Jumbo section to meet and get to know me practically the minute he found out I'd be on his project – maybe even a little bit before he was supposed to. I was a little wary of him at first and, given what had been going on between Rich and me, he was a little bit wary of me. But he never seemed to look at me as a potential problem; he looked at me as a challenge for his leadership to overcome. And he did that in a fairly unorthodox way by challenging me to sporting contests after work.

Like me, Chet is very competitive. One of his favorite recreation activities when he'd lived in California was hang gliding. I'm not exactly unadventurous, but that was too much adventure even for me. I'd been a bit wary of heights ever since that day Lyle and I had tried to climb down that bluff outside Maquoketa. Fortunately for me, his first challenge was the exact opposite of extreme sports: bowling. I'd mentioned to Chet that I'd done some bowling in college. I failed to mention that I'd competed in intra-mural bowling and I was probably the best bowler in the frat house. Dad had taught me how to bowl and when I'd had that paper route that went out past the bowling alleys in Maquoketa I'd often stop off at the Hi Ho on the way home and bowl a few games. So as soon as I mentioned that I was a bowler he challenged me to a match. Chet wasn't a bad bowler either. But he wasn't a '200' bowler and at that time I was. I rolled three '200' games in a row, each game scoring higher than the one before. If I remember correctly, my last game was something like a 260, which turns out to be the best game I ever rolled. Chet hates to lose, but he took it like the good sport he is and I started liking him.

A new racquetball court had recently opened in Boise and Chet asked me if I'd ever played. I admitted that I had, which I think surprised him a little. I'd started putting on a little more weight, probably from the stress I'd been feeling over Jumbo and from the problems Rich and I had been having with each other. Quite frankly, I didn't look like a racquetball player. But then a lot of people over the years had been

surprised to find out I had some athletic ability; I was a kind of 'stealth athlete.' I also somehow forgot to mention to Chet that I'd played racquetball on my noon hours practically every day for the last two years I was at Delcon. I'd often played Del, who was a terrific athlete and a considerably better racquetball player than I was. I'd become a better player from playing against him just for the sheer purpose of lessening the degree of embarrassment attending the shellacking I'd regularly receive at Del's hands. When it came to racquetball, Chet wasn't Del and I'd beat him fairly regularly. Again, he hated to lose but he was a terrific sportsman and before too long he'd won my respect and I think I won his. I really think that if you want to learn something about another man's character there's no better way to do it than through athletics. I was just glad he never challenged me to hang gliding. By the time our project was rolling, Chet was my pal as well as my boss.

One thing Chet did just as our project started really earned my gratitude. One of the standard procedures at HP at that time said that when a person got a new boss his old boss had the option of writing up a performance evaluation. HP's performance evaluation had a number of different evaluation categories and each one was scored as either unsatisfactory, needs improvement, good, very good, and excellent. (This scoring system was changed later, but this was the one they had in 1979). Rich chose to write up an evaluation on me. It was time for the chickens to come home to roost.

Up until that time I'd always received extremely good evaluations from my supervisors. This was something Chet would have known because he'd have seen it in my personnel file. Not too surprisingly, Rich's evaluation of me was a lot worse. He filled it out and then gave it to Chet because the rules said I had a right to see it and to set down any disagreements I might have with it. Given the chance, I'd have had a lot of disagreements with that one. But I never had the chance to respond to it. Chet showed it to me but before I had time to get mad he said, "You know, this just isn't right. This isn't you." He tore it up, wrote his own evaluation of me, turned it in, and saved me from having a big blot on my record. The kind of blot that would have ended up costing me a lot of money. From that second on, there was no way I was ever going to let Chet down. He could have told me to run through a brick wall and I would have. □

I met so many new friends during '79 and '80 that trying to name them all in these memoirs would be impossible. It would be a list to outdo the recitals of the generations in Genesis. But in any vote for the most colorful person I met during those years, first place would have to go to my friend Chic Slutz. Chic is a warm, big-hearted Texan who came to work as a production engineer working on the HP 7910, which was the disk drive product for which Vern and I were doing the servo writer. If you've never had the pleasure and experience of knowing a native of the Lone Star State, all I can say is you're missing something worth having. Chic is a living, breathing example of all the best – and some of the more exotic – qualities that I've come to expect of a Texan: honesty, integrity, loyalty to his friends, a love of life, trustworthiness, a taste for adventure, and a willingness to take life as it comes and bend it to his ways. Plus, of course, the rather unique dialect of a true Texan. It took me a little while to catch on to some of his words and phrases: 'fahr' for 'fire'; 'you did that like a frog walks' for something done clumsily or ineptly; 'turkey lips' for something that doesn't really fit or isn't quite right; and many, many other examples.

I liked Chic the first time I met him, which doesn't happen a lot with me. He, Vern, and I became chums almost right away and, if I remember correctly, within about a month of the time when I first met him we put together a weekly poker game that ran once a week like clockwork through almost all of the 1980s. The game is still going on today, although as we've all gotten older the frequency has dropped to once a month. When Chic bought his first house he spent an enormous part of his summer nights and weekends putting in a sprinkler system for the yard. Chic likes to work with his hands and I've lost track of the number of clever gadgets I've seen him think up over the years.

One Friday during the great sprinkler installation, I was sitting at my desk when Chic seemed to materialize out of thin air right beside me. "Whatcha'll doin' tomorrow?" he asked with a big, bright smile on his face. I don't remember what I'd been planning to do, but whatever it was I told him.

"Wrong!" he said with an even bigger grin. Vern and I ended up spending that Saturday helping him finish installing his sprinkler system. Once it was in, Chic began holding an Annual Texas Barbeque in his back yard each summer for the next several years. Chic's barbeques weren't ordinary barbeques, either. They featured endless amounts of mouth-watering food, cooked up Texas style, and oceans of drinks. They were always one of the most popular events of the year. I don't know how many dozens of people would attend these, but there have been conventions of Idaho State Democrats that weren't as well attended. I wouldn't have missed one of them for anything.

Chic quite literally married the girl next door. Patricia is a marvelous woman who lived in the house next door to Chick and worked for the Boise Cascade Company. I doubt if there's anything about trees and other plants she doesn't know. One day before Chic and Patricia got married, Chic materialized beside me again and told me I was helping plant trees in Patricia's back yard that Saturday. Vern was again involved and we spent an enjoyable day lugging trees around and helping set them up under Patricia's expert directions. She appreciated the help and not too long afterward, when I finally got around to having some landscaping done in my own yard, Patricia did the landscape design for me and helped me with the details of working with the nursery and picking out trees and bushes. And she did a fantastic job. Me? I know nothing about this sort of thing. I can usually tell the difference between trees and bushes, but that's about the extent of my knowledge of botany. Today Chic, Patricia, and their kids live on a small ranch several miles outside Boise. It's a little piece of Texas transplanted to the Inland Northwest.

My friend Candy Charity. This picture was taken at a company picnic in the early 1980s.

Another friend I met in 1979 was Candy Charity. Like me, Candy is an Iowa State alum and, in fact, we were contemporaries there although we did not meet until she was hired and moved to Boise after getting her engineering degree. It didn't take too long for us to become friends, although I'm almost always a little slow to cozy up to new people and this was the case with our friendship. Candy is pretty close to my own age and one of the first things I noticed about her was that she is a very intelligent person – which is only to be expected from an Iowa State engineering graduate. But as I got to know her better I found out she was also very level headed, a lot of fun to be with, and has a marvelous sense of adventure I liked very much. She also has a lot of courage and in those early years, as one of only a handful of women engineers working at HP, she wasn't afraid at all to stand her ground against the men. She has fine leadership qualities and a free-spiritedness I greatly admired. I number more than a few women among my friends, but as I got to know Candy better and better I slowly came to discover, to my amazement, that she was different somehow. It took me kind of a long time, too long as it turned out, to figure out how I felt about her because I'd never been in love before. I'm not very smart about that sort of thing. But eventually I realized what it was I was feeling and that she was the first woman I'd ever met who I wanted to marry. Unfortunately for me, I'm not very good at the courting game and by the time I'd actually sorted out my own feelings it was too late. Another good friend of mine, Keith Whitaker, also fell in love with Candy and before I had a chance to show her how I felt they got engaged. I don't really agree with the old bromide 'it's better to have loved and lost than never to have loved at all,' and I felt pretty bad about it for myself. But Keith and Candy were and are my very good friends and if it was fate for Candy to marry someone else, I'm glad it was Keith. I've always wished them the very best of happiness.

I've only fallen in love one other time and that was several years later. I don't really like to talk about this so all I'm going to say here is that one didn't work out either. But she was and still is my friend. □

When the revolution in Iran toppled the Shah and his government in the first few months of 1979 I

didn't have any particularly strong feelings about it. I didn't particularly like the Shah. I thought the few things he was doing to bring Iran into the modern age were fine, but on the other hand he was a dictator and a despot who ruled his country by force and terror. Although he had been an ally of our country, I didn't see any particular reason why competent diplomacy shouldn't succeed in keeping Iran as an ally without having to put up the tyrant. I was concerned about the radical fundamentalists, led by Ayatollah Khomeini, and became even more uneasy after Khomeini's fanatics emerged as the dominant force in Iran and set up the theocracy that actually rules the country. Still, for the next six months it didn't seem to me that what was going on in Iran was any of our business. Liberty means you should live *and* let live.

Then in late October President Carter allowed the deposed Shah to enter the United States to receive medical treatment for cancer. Probably like most people, I figured the Iranians wouldn't like that too much, but I didn't have any appreciation for how much they'd dislike it. On November 4th, 1979, a mob of revolutionary militants stormed our embassy in Iran and the hostage crisis began. During the first week or so the situation appeared to be just a bunch of crazies, but then Khomeini gave them his backing and, just like that, it was no longer just crazies but the Iranian government itself that was holding our people. My reaction was pretty much the same as everyone else's: I was outraged. On November 14th President Carter froze Iranian assets in the U.S. I guess the idea was to force Khomeini's government to bargain for the release of the hostages and to obey the unanimous U.N. resolution calling for the immediate release of our people. But the religious extremists in Iran weren't having any of that. They wanted the Shah, they wanted the Shah's wealth returned to Iran, they wanted a U.S. apology for ever supporting the Shah, and they wanted a U.S. promise to keep our noses out of Iran's internal affairs.

Although I had thought President Carter's decision to let the Shah into the U.S. was a case of preacher impulses overcoming good judgment, I didn't blame him for causing the crisis. Who in America would have guessed at that time just how little regard Khomeini's fundamentalist thugs were going to have for the customs and rules by which civilized nations coexist? I did think President Carter was inept at dealing with the crisis during most of the course of the next four hundred and forty-four days, and never more so than the pathetic and badly bungled rescue attempt he tried in April of 1980. Too little force applied too long after it should have been was how I looked at it. The bungled attempt looked especially amateurish contrasted with Israel's commando raid rescue of its hostages in Uganda. I looked at what Iran had done as an act of war against our country, and if Congress had seen it the same way, it would have been a war I wouldn't have had any moral dilemma about so long as we waged it to *win* it and didn't screw around with it like President Johnson had done in Vietnam.

In December of '79 the Russians invaded Afghanistan to restore their puppet government. There was a lot of talk at the time about this could be the start of a Russian move against Pakistan and India or a move to invade the Middle East to capture the oil fields, but I didn't think either scenario was the least bit likely. The Russians would risk all-out nuclear war to take over Pakistan? The very idea was ridiculous. The only thing more ridiculous was President Carter responding to it by declaring the U.S. would boycott the 1980 Olympic Games in Moscow. The Olympics, I felt then and I feel now, are something special, outside of politics altogether, and ought never to be abused, especially for a cheap publicity stunt. Maybe the administration thought they looked tough; I thought they looked stupid. What was Afghanistan to us? I continued to back Governor Reagan's presidential campaign. □

My new project was given the code name 'Peso' – supposedly because one Mexican peso exchanged for about eight cents at that time and the HP 7908, our product's official designation, would be DMD's first eight inch diameter disk drive. As it happened, the team had wanted a different code name, so when we got pegged with the Peso name, everybody just called our project 'the '08.' There were two other major projects already in progress when we started, a fourteen inch 'Winchester technology' disk drive family called the HP 7911/12 family and an old-technology fourteen inch disk drive, namely the BFD. By the time the '08 project started the BFD was no longer a 'fixed' disk drive, the decision having been made to use a removable disk pack. The BFD acronym had stood for 'big fixed disk' and so was no longer really accurate, but no one changed it. Although the '08 had started well behind the others we were

hoping to short cut the development cycle and leap frog the other two into production by using a disk mechanism purchased from another company. That way we would only have to develop the electronics and not the entire thing.

Vern's new project, a five and a quarter inch disk drive code named 'Nickel,' was a start-from-scratch project that wasn't planned for introduction until a couple of years after the '08, '11/12, and the BFD hit the marketplace. In addition to these direct projects there was also a special group, called the Controller Group, responsible for developing the common controller hardware and firmware for all three products. It was run by a pair of young project managers, Steve Lieske and Roger Buckthal, who managed the hardware and firmware teams, respectively. They reported directly to Ken but had a dotted-line report to the section manager for the BFD, a guy named Bob Passmore. DMD was trying out its first experience with what in manager-speak is called 'matrix management.' This overall organizational arrangement took me out of the microcontroller game once and for all, and I wasn't sorry about that in the least. I was tired of microprocessor politics and by this time I had all the experience with them I needed for my purposes.

All these projects except BFD were in Ken's section. I had found Jumbo stressful because of its total lack of progress. The '08, '11/12, and BFD projects were just plain stressful with sauerkraut on top. The work in Ken's section would have been extra-stressful just because of the fact that everybody was new to their jobs, except for a few 'old timers' like me, and the majority of the section was so newly graduated that the ink wasn't dry on their diplomas yet. The patient mentors who had brought me along at Delcon didn't exist at DMD. I mentioned earlier that high growth rates like DMD was going through are very, very tough to manage. The absence of experienced mentors is one big reason why. Then, as if the natural conditions weren't conducive enough to high stress, Ken notched it up even higher by posting signs all over the lab when we moved to the new building, Building 83, that read '$8 a second.' That was what it was supposed to be costing the company every second our projects weren't in production. You can probably begin to see why we partied so hard every weekend in 1980. This kind of work environment wasn't found anywhere else in HP. It was unique to DMD.

A lot of the young folks in our section were leery of Ken. His interpersonal style, like mine, was a 'Driver' style although in comparison with me his management of interpersonal relations was statesman-like. As it is with pretty much all Drivers, it was always fairly clear that results were what counted with Ken. Being a Driver myself, I understood his style, knew the rules he played by, and as a result I was always comfortable with Ken. He always seemed to me to be like kind of big Cheshire Tiger. 'Work hard, play hard' was definitely his philosophy and he would throw these Friday-after-work section parties at his house up in the Boise foothills. He had a pool and a hot tub and there was always plenty of beer, pretty close to no rules, and no rank at his parties. The first time I went to one of these I made the mistake of going straight there from work and showed up still wearing my tie and sport jacket. The second I stepped into Ken's back yard my coworkers pounced on me and threw me, tie, jacket, and all, straight into Ken's swimming pool. Although I normally go swimming in considerably less formal attire, it was all in fun and I didn't mind the dunking. Work hard, play hard. I didn't wear my tie or jacket to any more of Ken's parties, though. One time one of the guys arrived at Ken's bare-chested and wearing goat leggings.

Unlike Rich, Ken knew how to handle me. Our conversations were always plain-spoken and not too infrequently even pretty blunt. But the fact that they were always about getting results took the edge off. If he criticized me, he always did it in that context and in private so I never took it personally, the way I did with a lot of things Rich had said to me. It turned out that Ken had had his eye on me since before I ever moved to Boise. Chet told me one time when we were relaxing at the end of the work day that he'd been concerned about having me assigned to his project but Ken had told him I was a good guy and the only problem was Rich didn't know how to manage me. All he'd need to do was point and unleash me.

Ken had recognized how competitive I was, and not long after I joined his section he challenged me to a racquetball match. It was sort of the adult version of what the boys on the playground did back when I was a kid, or what Duane and I had once done in the men's locker room at the Hi Ho. Ken wasn't a bad

racquetball player either, and he was every bit as competitive as me. We played a hard-fought match but I was younger and able to edge him out and win it, whereupon he stripped off his sweat-soaked Tee shirt and gave it to me as a trophy. I still have it. Between Ken and Chet I was working for *leaders* again and in that stress-filled setting that made all the difference to me.

The ’08 was the smallest of the project teams in Ken’s section. Roughly speaking, a disk drive consists of the following subsystems: Head-disk assembly, also called the HDA but more often just called ‘the mechanism’; servo system, which sees to the control of the proper positioning of the drive’s magnetic recording heads relative to the stored data; read-write system, which actually writes data to the disks and reads it back; disk controller, which I described earlier; and power supply, which converts the power coming out of the wall socket into the voltages needed by everything else in the disk drive. Our disk controller design was being done by the Controller Group so the ’08 team didn’t have to do that part of the design. The mechanism we were buying as a component so the only other mechanical design needed was the outside packaging for the product. A newly arrived young mechanical engineer named Terrill Hurst took care of that. Chet had two experienced engineers on his staff, Craig Walker and myself. Craig was given the servo system and Chet handed me the power supply. The read-write was given to a new graduate named Larry Copp; later another new graduate, Lisa Hecht, came aboard to also work on the read-write. The thinking here was that read-write would be the easiest part of the electronics design, a misconception. Disk drive technology at that time was required to meet a performance spec of fewer than one error per ten billion bits transferred. This is called the ‘raw error rate spec,’ and it turns out that *everything* has to be done almost perfectly in a read-write design to meet this spec. In reality, read-write is probably the most difficult part of the design and not really the sort of assignment to be given to a rookie working under ultra-stressful conditions. But, newcomers that we all were to the world of disk drive design, nobody realized that when the project started.

Although the ’08 power supply design presented its share of technical challenges it was in pretty much every way a straight-up electrical engineering assignment and of all the things people were doing in Ken’s section it was probably the easiest assignment around. Between the disk drive mechanism, the tape drive mechanism Bob Frohwerk was working on, and all the various electronics going into the ’08, the numbers added up to a three hundred watt power supply design. I originally suggested we use one of the still-relatively-new-on-the-scene ‘switching’ power supply design approaches, but when the project started in 1979 ‘switchers’ still had a bad reputation for being quirky and too noisy for use in a disk drive because of the tight error rate requirements and its vulnerability to electrical noise. Consequently, lab management had banned the use of ‘switchers’ so the ’08 power supply was a classical ‘linear’ design. My job got even easier when we hired a bright young electrical engineering intern to come work with us. His name is Rick Hilton and he was a 4.00 student who had just finished his junior year at the University of Idaho, which is three hundred miles north of Boise in the little town of Moscow, Idaho.

I had been serving as a technical interviewer for HP since 1976, and my previous experiences with ‘straight-A’ 4.00 interviewees had left me with a generally unfavorable impression of them. They seemed to be ‘test taking experts’ who didn’t really have the basics nailed down. I had come to prefer students with grade point averages somewhere in the 3.30 to 3.90 range. The kids who had to struggle a little more usually seemed to learn more too. But young Rick was the exception. He had learned his lessons well, was very smart, a hard worker, and a marvelously pleasant young man. I’d given him a glowing thumbs up after interviewing him and when he was hired as an intern Chet assigned me to be his mentor and put him to work on the ’08 power supply. I tried to pattern myself as a mentor after Erhard; this was the second time I’d found myself in that role. Rick caught on very quickly and in what seemed like no time at all I was actually having to remind myself a lot that he still had a year of schooling to go. The more he demonstrated his skills and talents, the more responsibility I let him take on until the power supply was more his work than mine. I have very rarely met a more talented young man.

One of the principal technical issues in designing linear power supplies in our wattage range is electrical efficiency. Power supplies dissipate power too, and in fact linear supplies usually dissipate more

power inside the supply itself than they deliver to the rest of the system. One important factor in this is that the '110 volts' that comes out of your wall can really be as low as 105 volts and as high as 130 volts. The supply has to be designed to work at the lowest voltage in this range, and this means its efficiency at the highest voltage in this range is *very* poor. We needed to do something about that problem. Chet and I brainstormed about it and he came up with the idea of putting what we called a 'preregulator' circuit, built using a very old trick called a magnetic amplifier, into the design. The idea was that this preregulator would compensate for the wide range of voltages coming out of the wall so that the rest of the design could be done as if we had a nice, reliable single wall socket voltage to deal with. Chet had the basic idea, I worked out the design details, and Rick built it and got it working. Eventually the three of us were awarded a U.S. patent for this invention.

With young Rick able to handle so much of the power supply work, Chet decided I didn't have enough to do and so, with Ken's concurrence, he made me project leader for the '08. Probably as good a way as any to explain the difference between being a DMD project leader, my new assignment, and being a project manager, Chet's job, is to say the difference is like that between a noncommissioned officer and a commissioned officer in the army. Project managers are ultimately held responsible for the success or failure of their projects. They take care of salary administration and performance evaluation, participate in the business planning activities of the lab, and have to attend endless meetings for most of every day. Chet's chair at his desk was empty most of the day while he was away doing 'manager things.' But a high technology product development also has countless technical and interdepartmental coordination issues involving a lot of nitty-gritty engineering details. We had to coordinate with the Controller Group, make sure our design would meet the needs of HP's service organization (part of the marketing department), would satisfy the things production required to build the product, and dozens of other things. The work of all the individual lab engineers on the project had to be coordinated to meet the tight scheduling demands of the project, and there were a lot of tiny design details – such as cables, interconnections between the different printed circuit boards, and numberless other small, uninteresting, but vital things that had to be done. Responsibility for all of this now fell to me. I became the one engineer on the project whose screw-ups could kill the whole thing. Anybody else could mess things up for awhile, but if that happened it could always be fixed. Up until now my job had been routine and reasonably free of stress. Now the responsibilities I had came complete with all the '$8 a second' pressures our section labored under plus the normal challenges that always come with being the direct supervisor of a team of people.

I'm sorry to say that as a first-time supervisor I had a lot to learn and I made plenty of leadership mistakes during the '08. I was twenty-six, hadn't had this kind of responsibility before nor experienced the kind of frenzy that characterized DMD's R&D lab, and at this stage had no 'people training' in such things as how to handle interpersonal relations between myself and the people I was supervising. I hadn't learned how to be a leader yet; it would take me several more years before I learned enough about the art of leading a group of people to do a reasonably good job of it. I'd been made a supervisor, but I hadn't yet made myself into a good leader. I doubt if *I* would have put up with working for me as I was then.

Still, though, the team did manage to pull off what I have to say was a spectacular job of product development given how inexperienced we all were with high technology disk drive design and how inexperienced my friends' new boss was. It wasn't a neat and tidy process. In fact, it probably would have made anyone who likes things to go with orderly neatness according to a well defined process sick. But we responded to challenges and setbacks nimbly and flexibly as they came up and we did in fact come from behind to pull ahead of the other two projects and enter production ahead of them, just like the strategy said we were expected to do. As soon as it became clear the '08 *was* pulling ahead schedule-wise of the others, two hardware guys from the Controller Group, Ron Takasugi and Greg Esplin, were moved into our lab area to finish off the controller printed circuit boards for the '08. They were an important part of the project's success and made a lot of key contributions that got us down into the factory first. In doing this they were moved from under the supervision of Steve Lieske, who had excellent people skills, to being under a guy who didn't have those skills yet, namely me. I know that had to hurt, which is

something I have to apologize for to them, but the fact is we couldn't have pulled it off without them.

There were a countless number of tough engineering problems that had to be solved to bring out the '08, and everybody on the team certainly had their full share of them. In a lot of ways everyone's job was a kind of Sisyphean task in the sense that if anybody *did* get on top of everything they were responsible for doing, there was always some other problem somewhere else that needed solving and guess who that one would end up going to. I took to calling this 'the doctrine of equal pain.' Everyone on the team at one time or another – and usually more than once – stepped up to take on these challenges and that is why we succeeded. Since then I've worked with teams that were as dedicated, but never one that was more dedicated. The men and women of the '08 project embodied what the word *company* really means. If you look this word up, you'll find it goes all the way back to the Latin word *companis,* which literally translates 'with bread.' We all depended on each other for 'our bread,' and that is the essence of what Rousseau called the social contract.

I can't close the story of the '08 without mentioning a couple more people. One is Marla Schneider, who joined the team not long before we took the product down to the factory. Marla was an electrical engineer, from Minnesota if I remember correctly, and she took over the power supply after young Rick went back to school to finish his degree. I was helping out with the read-write debugging at the time. As I mentioned earlier, we had badly underestimated the technical challenges associated with it. It wasn't just the '08 that was discovering this; the 7911/12 project had run into the same kinds of problems we were having. Only the BFD wasn't having major problems with read-write and this was because they had two older, experienced engineers working on it. One of them was a brilliant circuit designer named Bob Batey, who is the single best circuit designer I've ever met. The '08 read-write didn't have any one single killer problem with its design, just a lot of little ones mostly centering around noise issues. They were the kinds of issues where experience counts the most. Chet understood about these sort of things so when I suggested to him I should step in to clean these up he agreed right away, even though it meant he'd have to shoulder some of the project leader responsibilities I wouldn't have time to tend to while working on this. I also wouldn't have time to deal with the last few details of the '08 power supply as we got it ready for production prototype, and that's how Marla came to join the '08 team.

The core of what was new about the '08 supply was the preregulator circuit, and the core of this circuit centered on two devices called 'transductors.' The transductor, which is also known as a 'saturable reactor,' is actually a very old device. It was used in radio amplifiers at least as far back as 1916 before the invention of the vacuum tube made it largely obsolete. It looks like a regular transformer in every way but it's not a transformer and the design rules are different. HP at that time did all the company's transformer design in Palo Alto at a place called the Manufacturing Division. Normal transformer design can be reduced to a set of formulas and at Manufacturing Division this design was done by technicians using a computer program.

But, like I said, transductors aren't transformers no matter how much alike they look. The guys down in Palo Alto didn't have a canned computer program to design them and the designs they did send back to us were completely unsuitable. Transductors hadn't been used – except perhaps in a very few places here and there – since the 1950s and the design technique for them had long been forgotten. Marla jumped in and rediscovered on her own how to design them. She did an outstanding job and her design worked perfectly. I don't think Chet really understood what it took to get this particular job done and, unfortunately, he and Marla didn't get along very well. Marla was a competitor – she was an athlete who competed in gymnastics in college – and just as un-inclined as I am to sit back passively and be told to do things. You might say she was a feminist at a time when most men neither knew nor understood feminists nor understood that the old female gender stereotypes had gone the way of the dodo. If Marla had been a man Chet would have understood her, but she wasn't and you could say he was 'gender baffled.' I tried to act as moderator between them, but as a diplomat I'm afraid I made a better parking valet. Still, when all is said and done, Marla was an excellent engineer and, I'm sorry to say, she didn't get the credit she deserved. I wasn't able to prevent this and to this day I count it as one of my failures as a project leader.

The other person I need to mention was a guy named Jerry, who was the manager in charge of production engineering for the products in Ken's section. DMD's production engineering staff was woefully undermanned, which was mostly because of a certain ivory tower hubris coming out of the R&D lab. A lot of lab people actually went around saying our products would practically build themselves and so production engineering wasn't really necessary. Well, this is just total bunkum. There's a million practical reasons for why things go wrong in a factory and production engineers are the folks who fix these problems and keep products shipping out the back door. If you want your manufacturing business to fail, all you have to do is underestimate how important your production engineering staff is. And that's what DMD had done.

When the '08 finally went downstairs to the factory in 1981 most of our R&D team went downstairs with it to function as a 'transition team' during the handoff from lab to factory. As transition team leader I wasn't in charge of what went on engineering-wise in the factory. Jerry was responsible for that. With the inadequate staffing he had been given plus the enormous pressure he felt coming down from up above to get shipments ramped up to the level where the plan said they needed to be, he was one stressed out guy. It turned him into a micromanager, which immediately brought back unpleasant memories for me. To add to Jerry's stress levels, he wasn't actually my boss. I worked for the lab, he couldn't really *order* me to do anything, and he reminded me so much of John at Delcon Division that he and I ended up getting along about as well as India and Pakistan.

For my part, I was shocked and horrified by the chaos that reigned throughout our factory line as they tried to deal with the many, many problems that always crop up during a new product introduction. At one point, production had parts from twenty-four different production-run work orders strewn around all over the place trying to build *one* production run. Production was deep in fire-fighting mode and as a result wasn't managing to fix *any* of the problems keeping them from being successful. But, just as Jerry couldn't order me to do anything, I couldn't tell production to change what they were doing either. The situation got worse and worse by the day.

Finally things got so bad that Jerry called a joint meeting of the production engineering and transition team staffs. There he announced that until shipments reached the target level my lab engineers and I were going to work as production line technicians to help the line make their shipments. I'd have been okay with that if that would have really fixed things, but it wasn't going to. The problems we were having weren't random accidents or the result of a divine curse. Every one of them had a root cause and the only way to get production ramped up *and keep it there* was to find these root causes and fix *them*.

"Jerry," I said after he finished telling us his plan, "that's the stupidest idea I've ever heard." At that time I was kind of notorious for making undiplomatic remarks like this and Jerry took it just exactly as you'd probably think he would. He lost his temper. A short spat of shouting went back and forth between us as everyone else in the room cringed and tried to turn invisible. Finally Jerry shouted at me, *"If you think YOU can do better, why don't YOU take charge of this?"*

I was hoping he'd say that. *"Okay,"* I snarled right back at him, *"I will."* From that point on I had a free hand on our line. I'm pretty sure Jerry was expecting – and maybe even hoping – I'd fall flat on my face, but it had been pretty obvious to me for some time by then what had to be done to get things back under control and make real progress. I set up a Failure Analysis Lab, staffed by two very good production technicians, and we began managing our way through the problem solving process. I took the 'meet shipments at all costs' pressure off the production line manager and we started working closely together to come up with real solutions to the problems we were having. My transition team did what we were supposed to do: *engineer* the solutions to these problems and get these solutions out to the line. It took two months but by the end of that time we were ramped up and the line could operate without us any more. The HP 7908 was finally in production. □

The years 1979 through 1981 weren't any easier for the folks working on the other lab projects than they were for those of us who had been on the '08. By the end of '81 quite a few of us were showing

some signs of combat fatigue. The number of private weekend parties had dropped off pretty sharply by then, those who were married had started to have kids and settle into a more usual home life routine, and the main socializing – not counting beer busts or Ken's section parties – had started to become more centered around smaller activities and recreational sports.


HP co-ed softball league

Slow pitch softball is very popular in Boise. There is a city league with various divisions and we also had a co-ed 'HP League' that played its games on HP's large, park-like campus. Softball was one of Steve Lieske's passions, along with mountain climbing, and when he formed an HP League team in 1980 both Vern and I joined it. Vern played shortstop and I usually played first base, sometimes played catcher, and once in awhile pitched. More than anything else, it was softball where I came to know Steve and his wife Chris, Keith Whitaker, and more of the folks in the Controller Group, especially Bob Pentecost – who was a software engineer – and his wife Vicki, who was an accountant in DMD's finance department. A softball doesn't came at you anywhere near as fast as a baseball does so even I was able to get some hits. I loved playing softball and participated in the HP League for the next seven years until my over-thirty knees started giving me too much trouble to be able to play well enough to have fun. One year our team even managed to win the league championship.

Soccer is also pretty big in Boise. It's not a game I've ever liked, but Vern was and is a huge soccer fan. HP also had a soccer league and, although I never took part in it, Vern did and every once in a great while I'd stroll out to watch some of his games. He played goalie, which seemed to me the most sensible position to play if one was going to play soccer at all until Vern broke his leg during one of the soccer games. I should probably say he had his leg broken because what happened was he got kicked in the leg while breaking up a run at his goal. I wasn't at that particular game, but I heard about it pretty soon afterwards and went down to visit him in the hospital. His leg was wrapped up in a huge cast and he was hooked up to a morphine IV with a little button he could push whenever the pain got to be too much. Hospitals under the best of circumstances don't tend to care about the dignity of their inmates. He'd been brought in straight from the field all sweaty from the game and nobody at the hospital had thought that maybe it would be a good idea to help him get cleaned up after setting his leg. Consequently, when I got there he smelled a lot like a barnyard goat. After he finally got to go home he was on crutches for quite awhile and had to wrap that big cast in a plastic bag when he took a shower. I never heard him complain, but I bet that cast had to itch like the dickens after awhile. We held the poker game at his place while he was hobbled up on crutches.

I'd have hung up soccer for good after that if it'd been me, but Vern loves the game and kept playing. After breaking his leg he outfitted himself with shin guards and various other forms of plastic armor to prevent another repetition of the accident. It turned out that a few years later he broke his other leg anyway in a similar soccer field collision, despite being armored up. That one convinced him it was time to retire from soccer. It convinced me football was far safer than soccer.

Chic, Vern and I started playing golf fairly regularly on the weekends with different guys making up

the other slot in our foursome. Boise has a lot of nice golf courses; the three we played most often were Shadow Valley, Eagle Hills, and Indian Lake. Until the '08 project ended, Vern, Craig Walker, Larry Copp, and I also sometimes took off a little early from work to get in nine holes at Eagle Hills. We were out there one afternoon when Idaho Governor John Evans and his party happened to be just in front of us. Being ever the good politician, the Governor insisted we go ahead of his group and that led to what we came to call 'the Governor's Curse.' Every time Governor Evans was in sight of us, none of us could hit the ball worth a darn. There were muffed shots going all over the place. Every time he was out of sight we'd get off our shots and play well. It wasn't that we were nervous about the Governor; that wasn't it at all. But every time somebody muffed a shot I'd turn around and look behind us and, sure enough, there was Governor Evans. After that round we joked that he'd lost our votes for ruining our golf game. But this was just a joke; I liked Governor Evans and always supported him. He was a moderate and an important counterbalance to the tribe of Bible-beating, ultra-right-wing troglodytes known as the Idaho Republican Party. My support for Governor and then President Reagan in no way extended to the Idaho Republicans who dominated the state legislature.

Not surprisingly, politics tended to dominate our lunch time conversations during 1980. President Carter's reinstitution of registration for the draft gave the handful of us who were old enough to have gone through the draft lotteries during the Vietnam era a chance to tease young Rick Hilton, who was one of the young men now required to register. Even though the draft itself didn't come back, and never looked like there was any chance it would, we'd 'congratulate' Rick on his new status as 'cannon fodder' for his country. Rick somehow failed to see any humor in this at all; he wasn't any happier about the possibility of being drafted than I had been back in '71.

Most, but by no means all, of my friends and colleagues wanted Governor Reagan to win the 1980 election. Those who did not tended to be against Governor Reagan rather than for President Carter. They saw him, like most of the country did, as being a right-wing conservative and, in fact, his campaign speeches that year *did* tilt more to the right than they had in 1976. This was something I found quietly disturbing, but I was still convinced he wasn't really as right-wing as people thought he was. There was no doubt that the guys running the national Republican Party were tilted strongly in this direction, but I was hoping *President* Reagan would be able to moderate that influence and keep things more to the center. Vern, on the other hand, very much opposed both Reagan and Carter. He threw his support to the liberal independent candidate, John Anderson. When November 4th finally arrived, Governor Reagan received just under forty-four million votes – slightly above 50% of the popular vote – and took all but six states and the District of Columbia in the electoral college. The Republicans also managed to pick up a majority in the Senate, the first time that had happened in many years, and the Democrats retained control of the House of Representatives. The stumbling, bumbling Carter Years were over at last. □

VII. The Reagan Years

The Reagan Years were almost over before they began. Like the rest of the country, I was appalled on March 30th, 1981, by John Hinckley, Jr.'s attempted assassination of President Reagan and hugely relieved when the President recovered from it. Once again a fruit loop with a gun had almost changed the course of American history. I had been working in Cupertino when a Bible-beating fruit loop, Dan White, had gunned down San Francisco's Mayor Mosconi and city supervisor Harvey Milk inside City Hall. There had been two back to back attempts to assassinate President Ford in California in 1975, one by one of Charles Manson's deluded followers and another by a nut case named Sara Jane Moore. Also while I'd been living in California, there had been a massacre at the Golden Dragon restaurant in San Francisco's Chinatown by a Chinatown street gang. I've often wondered why the he-man gun nuts of the NRA, who oppose every measure of common sense gun control, never seem to mention the fact that Wyatt Earp – who I assume would have to be one of their heroes – didn't allow guns to be worn in Dodge City or in Tombstone. Maybe the NRA just isn't a supporter of law and order.

Whatever else anyone can say about President Reagan's first term, it certainly wasn't dull. There were

many things he accomplished in that term I was very happy about and many things that disappointed me. On the day he took office the inflation rate was 11.8% and unemployment was at 7%. The prime rate had peaked at a staggering 21.5% in December of 1980, the highest in U.S. history. The U.S. economy was a train wreck in progress. On Wall Street the gloom in the bond market had gotten so deep there was actually talk to the effect that the bond market was dead, that it would never recover. AAA corporate bonds issued by some of America's strongest companies were trading for fifty-five to sixty-five cents on the dollar with yields of 15% and even higher.

The way I saw it, if these companies went down and defaulted on their bonds, everybody else was going to go with them and it wouldn't much matter where you put your money. If they didn't, it meant they were giving away free money on Wall Street. I started buying up these AAA bonds, as many as I could scrape up the cash to get. It was the only time I violated my own rule about not injecting new money into my stock market account. The interest I'd be making was tremendously more than my savings at the CU were earning. I didn't worry about the bond market going even lower because I don't trade bonds. When I get my fingers wrapped around one, by golly it's a prisoner. If the bond market had continued downward, I'd have just bought some more. But, as it turned out, this period was the low point for bonds and I've never seen anything remotely like it since. Our economy was in bad shape, but I ended up making a lot of money on these bonds.

President Reagan's economic moves succeeded in finally pulling the economy out of the toilet and the new monetary policy by the Fed did succeed in finally beating the inflation spiral even though we had to go through two years of recession to get there, with unemployment peaking at 9.7% in 1982. The recession hit Maquoketa pretty hard, and when I went back there to visit I was shocked by how many empty stores there were along Main Street. Businesses I'd known since I was a little boy were gone. President Reagan's popularity in Maquoketa never fully recovered from that. Maquoketa hadn't gone through a recession; they went through a full blown depression in those years.

I think we probably had to have the recession to finally break inflation but I've never been too sure how big a role President Reagan's enormous increases in defense spending contributed to eventually ending the recession and putting the economy back on a growth path. I was fairly skeptical of the notion of 'trickle down economics.' I thought it was more likely the rich guys who benefited the most from this policy would just put the money in their pockets, and I think that is what largely happened. The defense spending along with the tax cuts – which took the top income tax bracket down from 70% to 35% over the next seven years – led to a huge increase in the national debt, which I didn't like one bit. I thought the tax cuts and the tighter monetary policy were good moves, even though I think there's something basically wrong with the idea that my bracket ended up at 35% while billionaires only forked over 28%. But I was not too happy with the defense build up. Some say it was their attempt to match this that eventually led to the collapse of communism and the Soviet Union, but I'm not so sure that wouldn't have happened anyway. Communism is a bankrupt system all on its own, probably the worst idea any economist (Karl Marx in this case) ever had. The only thing that remotely compares to it as a formula for disaster is the program the liberals set up in this country, which they modeled along the lines of Britain's policies (which likewise ravaged the economy of Great Britain).

HP was not a direct beneficiary of the defense buildup; HP isn't a defense contractor. But we were probably an indirect beneficiary of it because HP continued to grow at a healthy clip and DMD really kept growing. Ken and Chet must have thought highly of my work because my own income started rising very rapidly after the '08 as well. They might have been giving me more credit than I deserved, but I wasn't about to argue with them over that or turn down the money. No, sir. From 1982 on my income exceeded the living expenses I needed for a life style I was comfortable with and the excess went into savings and investments. The only person or entity I've ever completely trusted to look after me in my old age is me, and I had no intention of ever being one of those senior citizens of whom stories were told – urban legends? Maybe not – about their having to eat cat food. HP in those days did take very good care of their retirees, but I had a lot of years to go before retirement and things can change in the course of a few

decades. Bill and Dave didn't run HP anymore.

I was disappointed that there were a lot of changes President Reagan had proposed in his book back in '76 that his administration never put into effect. How much of this might have been due to Congress vs. how much of this just wasn't part of the conservative Republican agenda I don't know. I certainly believed then, and I still believe now, that rescuing America's economy was the single most important thing that had to be done and President Reagan's first term did accomplish that. But my hopes that we would see a better, workable, *practical* Great Society never did come to pass during his presidency nor is there any sign of it today. Either President Reagan really wasn't the moderate I thought he was or else he wasn't able to dislodge the conservative fringe and deliver on the moderate 'big tent' Republican Party he promised when he ran against President Ford in 1976. Either way the outcome is just the same.

I'm not sorry for being a Reagan Republican. I'm just sorry the Reagan revolution *I* joined never came to be and didn't live past his first term. It is true that government can be the problem, either by having too much *or* too little of it. But government is *never* the problem when it properly takes care of the only six things the American experiment assigns to it: to form a more perfect union; to establish justice; to ensure domestic tranquility; to provide for the common defense; to promote the general welfare; and to secure the blessings of liberty for *all* of us. They are all equally vital and government has to do *all six* well. That is why conservatives and liberals *both* give us bad government. They have forgotten, if indeed they ever knew, what government is for. It isn't the Praetorian Guard for the rich nor is it the Salvation Army. Americans do not have to accept as our only choices being either serf or ward of the State. □

Late in the summer of 1981 John Stedman stopped me in the hallway one afternoon and asked me if I'd like to teach a class for the EE Department at the University of Idaho up in Moscow. Ever since HP had come to Boise the company had been providing philanthropic support to the U of I, mostly in the form of equipment donations. But this year he was thinking about doing a little extra something. If somebody volunteered, the company was going to 'loan' him to the university for a semester. The idea greatly appealed to me so I volunteered to be the 'loaned professor.' John passed the word along and the next thing I knew the EE Department gave me an appointment as 'Affiliate Professor of Electrical Engineering.'

There is a university of sorts in Boise itself. It is named Boise State University (BSU) and not all that many years earlier it had been Boise Junior College. BSU had no engineering program at all and is pretty much a fourth rate university. HP in those days gave BSU almost no support at all. The University of Idaho, on the other hand, is Idaho's land grant university and had been established in 1889 by the 15th territorial legislature. It became a 'state' university when Idaho was admitted to the union in 1890.

When I first moved to Boise I had assumed the U of I was just some little cow college tucked away up in the Palouse region of Idaho's panhandle. I was, after all, a Stanford alum and how could Idaho of all places have a quality university? That turned out to be a fairly colossal bit of conceit. HP employees in Boise could work on their master's degrees via remote education either from Stanford or from the U of I. Both schools provided video taped classes that could be watched on site or an HP employee could take a year off at 75% pay and go live at either university to attend classes. Both Vern and Rick Hilton ended up electing to relocate to Stanford for a year to get their M.S. degrees. Most of our engineers on the Boise site elected the video taped 'outreach' classes instead. One of the things the HP Boise site did to support continuing education for its engineers was to provide local tutors who knew the subject matter and could answer questions for our people. I had by then been serving as one of these tutors for some time, both for Stanford classes and for U of I classes, and had discovered – to my surprise – that the U of I did in fact deliver a high quality graduate education in engineering. The only real difference I could spot was that Stanford was loaded to the gills with big name, world famous professors and the U of I was not. But a difference in the quality of education? No. I couldn't see one. On top of that, we hired a lot of graduates from the U of I – and not just for the Boise site either. I knew a lot of them and without exception they were excellent engineers. So when John asked me if I'd volunteer, I knew I would be working with

people I could respect in a place I wasn't ashamed to be associated with.

The only thing was I didn't want to live full time in Moscow for a whole semester. Moscow is three hundred miles north of Boise up in the lower part of the Idaho panhandle and it's a five and a half to six hour drive. I didn't want to sacrifice my social life for this and, besides, I had my extracurricular research I wanted to get back to. The big push to get the '08 out had interrupted my brain work from plain old exhaustion. No problem, John said. I ended up commuting by air three times a week using Cascade Airlines, a local puddle hopper that flew between Boise and the Moscow-Pullman Airport. I'd fly up Monday, Wednesday, and Friday morning, meet with students in the morning and early afternoon, teach my class in mid-afternoon, talk to the students some more, and fly back to Boise that evening. HP paid for the whole thing. It was a splendid example of HP's commitment to the seventh corporate objective: Citizenship.

The arrangement also let me pitch in and help a little bit on the 7911/12 project, which was going through its production ramp during this time. I was partnering with Jan Skurzynski, one of our bright and talented women in the R&D lab, a triathlon competitor, and a pretty amazing person in general. Project leader wasn't a permanent rank; we only had project leaders when there were projects to lead. If HP had had a dual career ladder at that time – manager or technical contributor – project leader would have belonged to the technical contributor ladder. I was assisting Jan by doing some analytical work on error rate testing.

I loved being back in the academic setting. The students were great kids and the faculty members were warm, friendly, and very dedicated teachers. If there was one thing to criticize about the EE Department at that time, it was that they were, I felt, too light on research. At that time the U of I wasn't a Carnegie Research Intensive University, although it would become one later. This doesn't mean they neglected research entirely. They had a strong Systems group there and one of the more interesting research projects going on at the time was aimed at solving the problem of detecting and correcting instrument failures in nuclear power plants. This work was to prevent the kind of failure that had caused the near disaster at Three Mile Island in 1979. They also had some interesting work going on there in artificial intelligence, which naturally attracted my interest.

My office in the EE Department was right next door to a young new professor named John Purviance. Johnny's area, like mine, was in systems theory and, on top of that, he was pretty curious about what R&D at a company like HP was like. We became fast friends and I got to know him and his wife pretty well that semester.

The fall '81 semester ended just before Christmas and I took some vacation time over Christmas and New Years '82 before heading back to saddle up full time at DMD again. There must have been something about being back in the academic world that got to me though. On Monday morning of January 4th, I was just about to shave before going to work when the switch broke on my electric shaver. Muttering about the poor product quality of electric shavers, I got out my shaving cream and regular razor. I'd just finished lathering up my face and had just lifted the razor to my chin when the sight in my mirror made me stop. Why was I doing this? I started wondering. I stood there for about a minute looking at myself in the mirror and couldn't come up with a good reason. Then I washed off the shaving cream, dressed and went to work. I've never shaved since that day; just a monthly beard trim at the barbershop when I get my hair cut. By Wednesday of that week people passing me in the hallways would stop me and ask, "Are you growing a beard?" I told Vern about that and he just laughed.

Toward the beginning of spring in '82 I was asked to do some research work having to do with read-write design for the brand new metallic thin film disks we were planning to use in our next batch of products. A lot of people, including IBM, had been working on thin film disk technology for quite awhile by then, but it was HP's research team that was first to solve the set of technical problems that had been preventing this from becoming a viable commercial technology. We were building an entire factory to produce thin film disks for our own products. The R&D for this belonged to our Technology Section,

which was under the third of our R&D lab's section managers. As I got deeper and deeper into this work, it dawned on me that this was the kind of research work people got Ph.D. degrees for doing. It was also the kind of work that dovetailed nicely with the Systems expertise at the U of I. The problem was that while HP supported its engineers in obtaining their masters degree, there was no comparable program by which a person could get his doctorate.

I went and talked with John Stedman about this and he immediately agreed my going after a doctorate was something he would support. There were a few conditions that would have to be met, but they weren't particularly restrictive. Next I called Johnny up in Moscow and asked him what he thought of the idea and if he'd be interested in being my major professor. He was delighted with the idea and also agreed right away. My program would be a bit out of the ordinary; all the major research equipment I needed to carry out this work was at HP down in Boise. But if I'd agree to spend another semester *full time* on the Moscow campus at some point and make regular trips up there the rest of the time to talk to people, I could do the bulk of my work down in Boise and the university would go along with it. We were, in effect, pioneering a way to offer doctoral level graduate study throughout the state of Idaho. I went back and told the other John what Johnny had worked out up there and he agreed to it without hesitation. The way John saw it, we were pilot running a new educational opportunity for HP's engineers. So it was that by summer of '82 I was admitted to the doctoral program at the U of I and in the fall I became a student again. John saw to it that my work assignment at HP was identical to my doctoral research. There were important problems DMD needed to have solved that my research work would solve – assuming that I succeeded – and so my doctoral studies and my job became one and the same thing. It was the sweetest deal on earth and it did lead to a new educational benefit open to my fellow engineers if any chose to take advantage of it. That was corporate objective number five: Employees. □

On Mt. Regan in the Sawtooth Wilderness Area (1984)

By the summer of 1982 I had lived in Idaho for three and a half years but had not experienced the splendor of Idaho's scenic backcountry. I had just been too busy all during that time and, to tell the truth, I only half believed the stories I'd heard of it. That summer Steve and Chris Lieske saw to it that changed when they invited Vern and me to come along on a backpacking trip to Alice Lake in the Sawtooth Wilderness Area near the tiny town of Stanley.

Stanley sits about an hour from Sun Valley. I'd heard of it already even though I'd never been there. In the winter the TV news would report the coldest spot in the nation and its temperature. Then they'd say what the temperature in Stanley was. Stanley was always colder than the official coldest spot in the nation, which was not something that made me want to pay it a visit. But one hot summer weekend the four of us piled into two vehicles and off we went. It was an unforgettable trip. When I got home from it I recorded my impressions in a letter to Mom and Dad. The letter read in part:

> I spent the weekend backpacking in the Sawtooth Mountains over near Stanley with some friends. What an experience that was! I have never been in country as beautiful as the places I walked through this weekend. We camped out on the shore of Alice Lake in the Sawtooth Wilderness Area. Alice is six miles deep in the back country and you climb 1600 feet in elevation from the transfer camp at the base of the mountains to reach it. You would have loved it. No motorized vehicles are allowed in the wilderness area and you are alone with nature and a handful of other hikers.
>
> The first two and a half miles of the trip go through a heavily forested area that is truly primeval. There are thousands of trees of all kinds including pine, aspens at higher levels, and

some trees like Iowa has. Some odd looking yellow flowers grew wild along the trail and their heavy scent permeated everything. The path is narrow and skirts Pettit Lake before following a mountain stream into the woods. About two miles into the woods we came upon a roaring rapids fed by a small waterfall. The trail was about 100 feet above the stream bed and the water was white capped where it broke over the rocks. We could hear the rushing water for a quarter of a mile before we came to the spot.

The woods were as dense and wild as the forests in a fairy tale and I half expected us to stumble on a band of elves smoking their pipes on a log in a clearing or else to come upon a rock nymph combing her hair on one of the rocky cliffs that overlooked the trail.

After we broke out of the lower woods the trail rose very quickly along a narrow path up the side of the mountain. Here the trail became very rocky with thousands of loose stones forming the foundation of the path. The rocks here were white granite for the most part and were so polished by the wind and rain that they were perfectly smooth. The smallest rocks on the trail were the size of flat baseballs. The trail circled up the mountains and we walked along the edge of a cliff for over a mile. The mountains rose above us like a great white wall for a thousand feet. Great black birds nested near the mountain top and clear blue water poured from crevices in the cliff wall. I've never worked as hard as I did climbing up that mountain trail with a twenty-five pound pack on my back.

At the top of the mountain trail we could stand beside a clear blue and white rapids and water-fall and look back down into the valley below. Pine trees made a green carpet on the mountain sides and covered the valley. White clouds wisped among the taller peaks, and the mountains below were purple majestics in the tapestry of the earth. A small lake far below us appeared to have green veins where the underwater plant growth was very thick.

At the top of the mountain trail I felt that I had reached my maximum walking range. However, Alice Lake was still another mile back into the woods so after a short rest we pushed on into the forest. Up here the plant growth was not as thick as below but was still dense. The trees were all pine trees at this level and the bushes thinned out. The bushes on the trail below bore red berries but these bushes up here bore no fruit.

Alice Lake was calm, blue, majestic, and large. The wind made intricate ripple patterns on its surface. It was bounded on all sides by pine trees or by the steep walls of high mountain peaks. These peaks were nearly barren of trees and still bore snow in places. Directly across the lake from our camp was a forbidding peak called El Capitan Mountain. This cliff rose at a sixty degree angle from the lake and its last four hundred feet to the peak went straight up. Loose rocks were strewn about for one hundred feet up from its base. The lake-ward side of El Capitan has never been climbed, although its back side has.

This weekend in the mountains was fantastic and gave me an appreciation for the conservationists that I never had before. James Watt can do any darn thing he wants with the desert, but he'd better leave my mountains alone. I wish you could have been here with me. At every step along the trail I saw and felt the majesty of nature and the grandeur of God. I intend to go backpacking again over the Labor Day weekend.

God has another special place and it's called Idaho. And the most special part of this special place is the land they call the Sawtooth Mountain Wilderness.

The Alice Lake hike lit a passion in me and for the next several years every summer from July through early September I'd get back into the mountains for the weekend as often as I could. Sometimes Steve and I and another friend or two would go. More often I'd go with Vern, either with or without the company of other friends. He loved those mountains as much as I did.

The Sawtooths aren't the only beautiful and special place, of course, but they are my favorite. Unlike places like the Seven Devils, the hike into the Sawtooth Wilderness is pretty much uphill all the way, which means the hike out is downhill. That was something I appreciated a lot, especially on very long hikes further in than Alice.

Alpine Lake in the Sawtooth Mountains.

The wilderness areas are peppered with countless small, pristine lakes nestled in the arms of surrounding mountains. Trees often ring the lakes like a green necklace. Because there are no motorized vehicles allowed in these areas, you come across occasional small groups of other hikers and, once in awhile, a pack train of horses carrying the camping gear for some larger party. But most of the time you're all alone with only your companions by your side. Utter quiet lies over everything here in nature's cathedral.

A hidden Sawtooth meadow along the trail.

Everything is awash in colors. Not just green and brown, but purple and red and pink and yellow and blue and pure, pure white. If I hadn't seen the glory of these places for myself, I never would have believed anyone who told what was to be seen out there. On an unfamiliar trail you never can predict what you'll see next. You can be walking through a thick wood and suddenly a spectacular meadow will open out before you, as if you had just walked through a doorway into a completely different land.

Vern, Karen, and Liz in the Seven Devils.

Although there are many places where day hikes – in and out on the same day – are possible, the most beautiful places are usually far enough back into the wilderness that it is better to camp overnight. If we did any fishing on a trip or just wanted hot food we'd build a campfire. I had a concoction of fish and rice I particularly liked to make. However, that had to be done very carefully because of the danger of forest fires. A lot of the time we'd run a cold camp, especially when the fire danger was high.

On the trailhead with Scotty Carter (age 7). This picture was taken by Scotty's mom, Mary.

The Idaho backcountry is dotted with countless hot springs. Especially after a strenuous hike in, these are absolutely wonderful for relaxing and letting the cares of the world take care of themselves. Quite a few of them are *very* hot and I always eased into them kind of gradual like. If it was an overnight trip we'd always set up camp before enjoying nature's hot tub because after soaking in one ambition levels were kind of low.

Mount Heyburn. Upper left: The mountain seen from a distance. Upper right: The bench lake that lies at the base of the summit climb. Lower left: When the sun falls on the mountain at just the right angle it glows as if Heyburn were a mountain of gold. Lower right: View looking down from Heyburn's saddle.

Whenever I went hiking with Steve it was a good bet that mountain climbing was going to figure into things sooner or later on the trip. I'm not a climber but I was perfectly happy to go along as high as I could get by scrambling. But when the ropes, pitons, and other serious climbing gear came out I'd find a nice comfortable place to sit and turn spectator.

One of my favorite trips with Steve was to Mount Heyburn. Heyburn is about ten thousand feet high. It's not the tallest mountain in Idaho; that distinction goes to Borah Peak with its elevation of twelve thousand six hundred and sixty-two feet. But Heyburn's still an impressive little mountain. Craig Raese, another friend who was also a climber, came along and he and Steve aimed to reach Heyburn's summit. We had hiked about two miles from the trailhead when all at once the trail came to a dead end. Steve turned around with a grin and said to me, "Did I tell you about the off-trail part?" No. Steve usually had a little surprise or two like this up his sleeve. We labored on through the woods for a few more miles passing a series of bench lakes as we slowly gained altitude. The fifth bench lake, six and a half miles in and a bit over two thousand feet up from the trailhead, was at the base where some serious scrambling up the mountain side began. But that was for the next day. We pitched camp, relaxed, and watched a couple of guys who were skiing down one of the big snow fields that decorated Heyburn even during high summer. There was no ski lift there of course. They'd ski down, managing to turn and stop before they plunged into the lake, then take off their skis and climb back up to the top again. Definitely they were a pair of serious skiers.

We began Steve's and Craig's assault on the summit the next morning. They wanted to approach from the back side of Heyburn, which meant we had to first skirt the lake until we came to a saddle in the mountain that provided a pass to the other side. The ground around the lake was pretty steep and covered

with thousands and thousands of small, loose rocks. Every step we took caused these rocks to begin trickling downward and pretty much right away we had a bunch of tiny little rock slides splashing into the water of the lake. We were about halfway around when I noticed my steps were now causing even more little rocks to start avalanching down from up above as the ones below them started falling. One of these little rivers of rock snaked up the mountain side straight into a three foot granite boulder up above. It started coming down, too, and the little rock slide made a perfect railroad track for it to follow. Right at me.

There really wasn't any way to move quickly or run to try to get out of its way. I was standing on a slope covered with marbles and I knew if I tried to move too quickly I'd find myself riding a rockslide right down into the lake. But you can bet that boulder had my undivided attention. I went into a slight crouch and waited for it. Just as it got to me I did a Fosbury as high as I could over it and to one side. It went by beneath me and I landed on my bottom and took a short sleigh ride toward the lake. Fortunately, enough rocks had cleared out when the boulder came down that I skidded to a stop after only about four or five feet. Whew! Then I got back up and resumed following Steve and Craig.

They reached the start of the snow field and waited for me to catch up. The footing was actually better on the snow and we made our way up and over the saddle to the back side. From there Heyburn got progressively steeper and what little vegetation there was started quickly thinning out. Pretty soon I had to use my hands as well as my feet to get up the mountain. All during this clouds began rolling in around us and we actually climbed through the clouds until we could look down at them from above. A bit more scrambling and we reached the point where the cliff face went practically straight up. Steve and Craig began getting their climbing tools out. I found a nice comfortable rock and had a seat.

It took the two of them quite awhile to get up that cliff face. Watching them creeping up that wall, I decided I definitely had the best seat in the house. What they were doing didn't look fun at all to me. They were maybe a hundred to a hundred and fifty feet from the summit when I noticed the clouds down below were being joined by their big brothers, and these new ones were coming in at and above our altitude. It looked like in just a little while we were going to get a real close up look at a rain storm.

I guess Steve and Craig had the same thought. They couldn't have seen the ones sneaking around the corner that I was looking at, but they could sure see the even higher ones coming over the top of the mountain. From where I was sitting I could see that common sense was prevailing up there because they were getting out their repelling harnesses. It was time for a nice, fast exit from Heyburn. Steve came down first and made it look easy. Then Craig started down. About halfway down the cliff face his gear jammed and there he was, stuck like bug against the rock wall. He hung there for quite awhile trying to get unjammed. There was absolutely nothing Steve or I could do to help. I don't know what he finally did to shake loose, but it looked to me like he came down the low tech way. It was a tense moment.

The assault on Heyburn. Left: looking back down at the clouds below and some new ones coming in. Right: Steve (center) and Craig (directly above him on the ledge) repelling back down.

He did get down safely though, without using the Wells technique, and we started hustling back down the mountain. We managed to get down and back to our campsite before the rain started coming down. Rather than hunch down inside our tents and listen to the rain coming down, we voted 3-0 to pack up and get our buns out of there. Mount Heyburn won that day.

Whitewater rafting. In front, left to right, are Vern and Brian Breckinridge. Behind them are Chris and Steve. I'm the guy in the green hat.

Another great outdoor activity I was introduced to by Chris and Steve was whitewater rafting. Chris especially loves water sports and she sort of took on the role of sports director for our rafting outings. Idaho is crisscrossed by countless small streams of various whitewater classes. I discovered I didn't care much for class 3 rapids and below; they don't pack the punch, thrill-wise, of the class 4 and 5 streams. With some streams there are stretches where we would have to put ashore and carry the raft around impassable barriers such as waterfalls. It turns out rafts don't deal with waterfalls well.

The first time I went rafting, which was the outing shown in the picture above, we were gathered along the banks of the river suited up in our life jackets and waiting for our river guide to turn up. He walked up to our group from behind me without me hearing him. The first sign I had of him was a hard, friendly thump on back. "Alright!" he greeted me happily. "We've got some *beef!"* Apparently he thought I had all the qualifications necessary to make a good rower.

Rafting isn't too hard to do unless you're the guy manning the tiller. In calm stretches you just basically kick back and enjoy the float. When you come to whitewater you really only have to do two things: paddle hard and stay in the raft. The tiller is the skill position in navigating the rapids. Everybody else just supplies muscle power. The rafts come with a rope that runs all the way around the outside. This is the safety rope and it's there for you to grab if you get bucked out. You grab that rope, stay with the raft, and then your friends can pull you back in, if they're so inclined.

That happened to me once. Before setting out our guide and tiller man had remarked with pride that he'd never 'lost' a rafter – by which he meant none of his charges had ever been bucked out of the raft. Of course, he was a young man and he didn't know the whitewater god was listening. Part way down the river I guess we didn't supply enough muscle power because, despite the guide's best efforts, we got caught up in some pretty bumpy water. The raft gave a heave and the next thing I knew I was airborne. I came down in the water right beside the raft and grabbed that safety rope with my left hand, keeping my paddle firmly clutched in my right. I leaned back in the water and stretched my legs out in front of me to put my feet downstream, the idea being that it's better to hit underwater rocks with your feet than with your head. The guide had been looking the other way when I went overboard – he was busy trying to navigate us through all the rocks – and didn't see me go flying out. He also didn't notice there was a missing person when he did look back since my head was hidden out of sight beside the raft. Nobody else said anything about it either, so I got to enjoy that stretch of whitewater from the water. Actually that was quite a lot of fun. I don't recommend it because there *is* always the danger of hitting rocks and it wouldn't be too hard to break a leg or worse. But I didn't hit any. When we finally cleared the whitewater and floated into a calmer stretch Rick Hilton, who had been sitting next to me, turned and asked the guide in a calm voice, "Should we pull him in?" That was the first he knew that I was in the water. He got such a shocked look on his face that I laughed out loud. *"Yes, pull him in!"* he said urgently and my pals hauled me out of the water. Once back in the raft I accused Rick of pushing me overboard, which he protested with an injured denial. He hadn't pushed me, of course; but Rick sometimes takes things so seriously I

couldn't resist teasing him. Besides, what kind of question is, "Should we pull him in?"?

Sometimes there are holes in the water. Yes, really. I'm not making this up. There are places where the water is so turbulent that whirlpools form, and while most of them are small there are some that get to be pretty gigantic. We went into one of these one time while rafting Hell's Canyon. Normally you try to avoid this, but on this particular outing I guess the guide miscalculated or something and in we went. The entire raft fell into the hole on the upstream side and I remember being amazed at the sight of swirling water all around us rising a few feet above our heads. We shot straight across the bottom of the hole and up the other side like Moby Dick breaching. As we came out the other side Chris, who had ducked down inside the raft when we went into the hole, sat straight up and cried out, *"We made it!"* Just at that very second a wave broke over the front of the raft. She had put the hood of her jacket up to keep dry and the hood made a perfect funnel for the water as the wave hit her right in the face. I laughed until the tears started rolling down my cheeks. □

Christmas in Iowa. Upper left: at Bill's house in Cedar Rapids, 1976; Dad, me, sister in law Maryann, and nephew Nick. Upper right: at Sherri's house in rural Onslow, 1979; me, Dad, Gary's mother Bonnie. Lower left: at Melody's house in rural Delmar, 1986; Sherri, Melody, me, Dad, Mom, Bill. Lower right: at Melody's house for Christmas dinner.

I mentioned before that Christmas was always a special time in my family. For many years I always flew back to Iowa over Christmas to visit my family. It was over the course of these visits that I finally came to make peace with Dad. One of the things I finally accepted was that all the things that had caused us problems when I was a boy really did only come from Dad trying as best he knew how to prepare me

for the time when I would be a man and have to make my own way in the world. I finally did come to realize that my dad had always loved me even during those years when I thought he did not. I still think he never really knew his son very well when I was growing up, but I came to forgive him for that. Now that I was on my own and was successful in my career, he quit worrying about my future and that let us come to get reacquainted – or maybe acquainted – with each other. I can't put my finger on exactly when it was that I finally gave Dad his son back, but it was sometime during President Reagan's first term. I wish it could have been much sooner.

Christmas Eve at the family settlement in Reynerville at the outskirts of Maquoketa.

A lot of things changed in Iowa over the years. Sherri got remarried in 1977. My new brother-in-law was a widowed farmer named Ronnie Reid who had a nine hundred acre farm in rural Onslow. Ronnie had three sons of his own – Mark, Dwight, and Curt – and so I now had three new nephews to get to know. After Sherri and her two boys moved out to the farm, Mom and Dad moved into her old house above the downstairs tax office. Also in 1977, after the separation, Melody had a son and she named him Aaron. The first night I met my infant nephew, I had just come in the door of Mom and Dad's house and Melody presented him to me. As I held him in my arms for the first time, little Aaron drooled all over my suit jacket. In May of 1986 Melody also remarried. I made a special trip to come back for the wedding. Sherri, who thought I didn't know how to dance, thought she'd get me out on the dance floor and embarrass me. She had a surprise coming. I had learned how to dance while I was still in junior high and had gotten a lot of practice in since then. I twirled her around on that dance floor and enjoyed every astonished squawk she made when I'd spin her around. My newest brother-in-law, Dan Witt, is a *very* big man, full of laughter, who has a very tender heart. He formally adopted Aaron as his own son. I hadn't liked Kenny, but I loved my two new brothers-in-law.

Bill was also back in Iowa for good. He had left IBM before I moved to Boise to become a vice president with a small Cedar Rapids company called Norand. It was a change that surprised the entire family, and no one more than me. Bill was with them only for a short time and then he left them to start up his own business in CR.

Glen and me at my folks' house in Maquoketa

Glen had graduated and first lived in the little eastern Iowa town of Monticello. Later he took a job as a civil engineer for the city of Davenport. With Glen living right there in eastern Iowa only a short drive from Maquoketa, I'd see him every time I came back for a visit, too. My brother Al Welch had become a pharmacist and had a Snow White's up in Wisconsin, again not all that far away from Maquoketa. If Lyle had also still lived around there somewhere that would have made things perfect, but he and his whole family had moved sometime after I had left for college and I was never able to find out where. It's been more than thirty years – soon it will be forty – since the last time I got to see him, but he's still my brother, they are still my extended family, and I think of them often. Brotherhood forged in the crucible of living is for a lifetime.

Aunt Hazel at her house during one of my Christmas visits in the early 1980s.

No visit was complete without seeing Aunt Hazel and Uncle Wayne. Mom, Dad, Wayne, and Hazel used to play bid euchre fairly regularly, the men against the women. When I came back I'd take Dad's place in the game. Dad and Uncle Wayne used to cheat, mostly because if they didn't Mom and Aunt Hazel would regularly clean their clocks. The two of them over the years had worked out an elaborate set of signals they would use – which Mom and Hazel came to know just as well as they did. Naturally Dad and Wayne loudly denied that they had signals whenever Mom or Hazel would accuse them of cheating, but Dad did confess to me one time that they really did signal to each other. I didn't know the system they used and so when it was Wayne and me vs. Mom and Hazel at least the game was honest. As it happened, I was a lot bolder card player than Dad or Wayne and we held our own pretty good against the women because I'd get the bid more often than Dad did when he played. We'd play cards late into the night until Dad couldn't stay awake any longer and insisted it was time to go home. If it had been up to me, we'd have played until the sun came up. Most people have only one set of parents; I had two.

Mom (left) and Aunt Sylvie (right) in the early 1980s.

I also loved seeing Aunt Sylvie when I came back. Sometime after I left Iowa she had become a lay deacon in her church, the Reorganized Church of Jesus Christ of Latter Day Saints. When the LDS church had split in two in the nineteenth century, after the murder of Joseph Smith, the Brigham Young group that moved to Utah had claimed the name 'Mormon Church" and they're the ones who are known as the LDS church. The RLDS stayed in the Midwest and they are not the Mormons. I suspect Martin Luther and his Lutherans got along with the Catholics about a thousand times more amicably than the RLDS and LDS churches get along. When I first moved to Boise, Addie Jensen happened to ask me what church I belonged to. Rather than get into a long theological discussion I just said I had been "brought up" in "the Reorganized Church of Jesus Christ of Latter Day Saints, which is *not* the Mormons." Addie cheerfully responded, "Oh, we have that here. They call them 'Jack' Mormons." Addie didn't know 'Jack Mormon' is what the LDS call people who have fallen away from the LDS church. My Mormon friends always got a big laugh out of that story.

Sylvie was Mom's older sister and when I was little I learned a lot about God from her, although maybe not in a way she would have entirely approved of. Even when I was little I never bought into the RLDS dogma and I never agreed to be baptized because I think when you accept baptism you're promising to go along with the doctrine, which was not a promise I could have kept. But dogma isn't what Aunt Sylvie taught me. You see, Sylvie taught me through the example of her life. Aunt Hazel was my second mom but Aunt Sylvie was my first aunt. Latter day or not, I think my Aunt Sylvie *was* a saint.

Christmas dinners were usually held at either Sherri's house or at Melody's. I love both my sisters, but I preferred the dinners at Melody's simply because Melody had turned out to be a fabulous cook. If Mom was still alive I couldn't say this, but Melody is a better cook than Mom. That is just another amazing talent my little sister has that no one had ever suspected. Nobody in the family knows when, where, or

how Melody learned how to cook. I know Mom didn't teach her.

One Christmas at Melody's somebody got out one of those games where one person draws a card with a question on it and another is supposed to answer it. I don't remember the name of that particular game, but it was something like 'Ethics' or 'Morals' or something. It's a game designed to cause trouble. One question I remember being asked was, 'You have just found out your sister's husband is having an affair. Do you tell her?' There we all were sitting around the table. I looked at Sherri and Melody. They were both leaning forward, ready to pounce on me whatever my answer was. I looked at Ronnie and Dan. They were both sitting there, pictures of innocence, examining the ceiling with sort of an 'Oh, this has nothing to do with *me*' look on their faces. I looked at Mom. She was giving me Mom's Warning Look: *you better be careful what you say, Buster.* Maryann, my sister-in-law, was leaning back with a big grin on her face, waiting for the fireworks to start.

"Which sister?" I asked.

Sherri gave a squawk. *"What do you mean, 'which sister'?"* she demanded. Sherri, Melody, and Maryann got into a noisy discussion about my obvious lack of ethics and whether or not 'situational' ethics was ethics, and so on. Mom gave me an approving smile and a nod. Ronnie and Dan both relaxed. In all the uproar they all forgot that I hadn't actually answered the question, and when after a minute or two I drew the next card and asked the next question I got away with it. That question was a question I wasn't about to answer for the sake of some silly game. No, sir. □

A lot of changes took place at DMD in the first years of President Reagan's administration. Division manager Dick Hackborn was promoted to a vice president while the '08 was still in the lab prototype stage. It was at this time when HP's disk drive and printer divisions were placed in their own business unit, which meant Dick replaced Paul Ely at the top of our part of HP. Dick was replaced as division manager by manufacturing manager Doug Spreng, the same guy I'd traded elbows with on the dance floor after a beer bust one time. A lot of the guys in the lab didn't like Doug very much, but I got along with him quite well. Like me, he had a 'Driver' interpersonal relations style and neither of us needed a decoder ring for us to understand each other. While I was working on fixing our read-write bugs in the '08 he'd drop by each morning to see if I was done yet. Usually I'd have my face buried in an oscilloscope hood when he'd drop by and my clue he was there would come when I'd smell the smoke of the long, skinny cigars he smoked. I'd get a whiff of the odor and just say, "No, not yet, Doug." I wouldn't even have to take my face out of the scope hood. He'd say something like, "Keep at it," and leave until the next morning.

The BFD finally made it into manufacturing, where it became known as the HP 7933. It came out well behind schedule and only after enormous cost overruns in its development. For a time it had a certain notoriety within the company for representing one of the biggest R&D cost overruns in the history of the company, a distinction that ended the management career of its section manager at HP. He was recruited away from HP by Digital Equipment Corporation, who thought they were conducting a successful raid on DMD's management personnel. Not long after it was introduced, we started getting complaints about its performance being too slow and a follow-up 'performance improvement project' had to be mounted. The prediction I'd made back in 1978 had come true.

We also had our own local version of Paul Ely's failed 'silicon on sapphire technology' venture. In our case the new technology was called 'the magnetoresistive head,' or 'MR head' for short. The magnetic head in a disk drive is the transducer that writes data onto the disks and reads it back. It is a key technology component that determines how many bits per square inch of disk surface can be reliably stored and retrieved. The idea of using MR technology had been proposed by researchers at IBM as far back as the very early 1970s but no one had yet been able to produce a viable one suitable for commercial use in disk drives. DMD had had a very large section, known as 'the technology section,' working on this when I first moved to Boise.

One of the potential benefits of MR head technology was supposed to be the ability to write thinner tracks of data on the disk. The ’08, for example, recorded data at a density of three hundred tracks per inch. Nickel, Vern’s project, was supposed to be able to record at one thousand tracks per inch. A big part of the sales pitch put out by the section manager for the MR head team was that only MR head technology could meet the requirements of our planned next generation of disk drives. At his urging, John had taken a big gamble and ordered the MR head to be incorporated into the Nickel design.

The reason this was a big gamble is that brand new technology is very, very hard to make work and the probability of a new technology failing is very high. In Bob Allen’s words, brand new technologies are ‘blue sky’ technologies. DMD’s MR head was, unfortunately, one of those technologies that eventually did not succeed. Its incorporation into the Nickel project created huge technical problems for that design team, and a lot of them, though by no means all, fell squarely on Vern.

John had decided to place me and my research project snugly inside our next top-of-the-line disk drive project, which was code named ‘Eagle’ and would later be known as the HP 7937. My new boss was Greg Spohn, who had started out, like me, as a design engineer and had been made a project leader on the HP 7911/12 project at about the same time I became one for the ’08. Greg had always had his sights set on a career in management and after the ‘11/12 came out he was promoted to project manager for Eagle’s electronics team. Although he and I were pretty good pals, he was a little nervous about this new workplace relationship that my being placed under him produced. Would it be a problem for me to work for him? He carefully raised this concern with me at our first meeting after I was assigned to the Eagle section. “Greg,” I said cheerfully, “I’d *never* question your god-like powers.” Somehow that answer failed to reassure him, but it turned out we never had any serious problems with each other in all the years I ended up working for him. All in all he was my boss for eight years – longer than I ever worked for any other single person – and he was the best boss I ever had, bar none.

I had no direct design responsibilities on Eagle, although I did act as a kind of technical consultant on questions involving magnetic heads, disks, and the read-write process. At the time these areas were at the center of some of the division’s most expensive production problems in disk drives. One of my coworkers dubbed me ‘the theoretical malingerer’ and for awhile that nickname stuck. One of the earliest things my research established was that our MR head was *not* the crucial technology for meeting our need to pack more data into a disk drive. It turned out that our thin film disk was the key for this. Nickel, like Eagle, would have been able to meet its goals without using the high risk and unproven MR head.

Saying so, however, was kind of a delicate matter. We had some upper level managers who had pretty much bet their careers on the MR head and DMD had poured millions of dollars into its development. Speaking against it was treated more or less like popes and bishops treated heresy in the Middle Ages. The Eagle management team had been watching all the problems the MR head had been producing for the Nickel design team and somehow or other were able to avoid having Eagle be ordered to also use the MR head. I suspect that outside the technology section a nasty case of reality had begun creeping in among DMD’s other managers. Eagle would be the big breadwinner product when it came out, and it was seen as a project that could not be allowed to fail under any circumstances. But, in the face of years of claims that the MR head was mission critical, it had to be an uncomfortable decision to not use it in Eagle. Here there was one tiny bit of comfort I was able to provide. I built a breadboard, known as a ‘spin stand’ because it consisted of a spinning disk and magnetic head, with which I proceeded to demonstrate that recording data at Nickel and Eagle densities without the MR head did work and worked just fine. In the business this is known as a ‘feasibility demonstration.’ I even used some of the electronics Rick Hilton had designed for Nickel when I built this spin stand.

When the Nickel team found out Eagle wasn’t going to use the MR head they immediately began lobbying for its removal from their project. Vern even had a private meeting with John to try to get the MR head decision changed. Unfortunately, he got the same ‘we have to do this for important business reasons and you just have to make it work’ answer from John that I’d gotten a few years before on the

microprocessor issue. Vern's a pretty quiet guy, but there for awhile he was furious with John about this. In fact, I've never seen him madder about anything than he was about this. Problems with the MR head continued to plague Nickel like a degenerative disease and eventually the project was cancelled at the end of its production prototype stage, which is probably the most expensive point in the product life cycle for a project to fail. The back-breaking straw came about when somebody – I don't remember who – demonstrated that among its many problems the MR head suffered from an extreme sensitivity to static electricity. Gruesome pictures of dead MR heads, taken under a microscope, revealed the terrific damage being done to the head by very minute amounts of static discharge. Doug Spreng, who was well acquainted with what was and was not practical in controlling static electricity in a factory, took one look at this evidence and immediately cancelled both the MR head and the Nickel project. In the process this also ended up damaging the management career prospects at DMD of the technology section's section manager. Doug's decision was a good, if long overdue, call. The guys on Nickel were reassigned to do another five-and-a-quarter disk drive, which was code named 'Coyote.' Coyote went on to be a very successful product and it gave birth to HP's entire five-and-a-quarter inch product line.

Not too long after this decision, while Eagle was in its lab prototype phase, Doug was recruited away from HP by the offer of an executive position in a California high tech company. DMD's manufacturing manager, a big guy named Don Curtis, was tapped to be DMD's new division manager. I know John was also considered for this promotion, and I've often wondered if the combination of BFD's cost overrun and the MR head-Nickel train wreck didn't have a lot to do with Don getting the division manager job. Not too long after Don took over the division, John accepted an opportunity to go to Bristol, England, to start up a 'sister division' over there that would manufacture disk drives in Europe and would also work on developing HP's line of tape drives. Steve signed up to go with him and so for a few years Steve and Chris moved to England. Instead of replacing John as R&D manager, the decision was made – for reasons I never really understood – to split DMD's lab into a 'high performance lab' (Eagle) and a 'low cost lab' (Coyote) with separate lab managers for each. Eagle's section manager, Scott Anderson, became my new lab manager. I'd expected Ken to get the other lab manager job but instead this went to a guy who came to Boise from one of HP's Colorado divisions. His name was Doug Clifford. Why this particular decision was made I never did find out. One of Eagle's project managers – a guy named Winston Mitchell, who had been the project manager for the 7911/12 – was tapped as our new section manager. Mitch's part of Eagle was moved under Greg and so, just like that, Greg found himself with about double the management responsibility he'd had more or less overnight. I sure didn't envy him for that. But he handled it with flying colors which, more than anything else I can think of, proved how good he was.

DMD continued to grow but at a more manageable pace. We still weren't overflowing with 'old' people, but by now we did have more experienced people than inexperienced ones. The new projects were considerably less frantic than the previous ones had been and the new leadership seemed to be more realistic in their expectations. I generally had the impression that the stress of working here was much less now than it had been, although DMD never did become what anyone could call a 'stress-free work place.' There was a pronounced difference between how Mitch ran our section and how Ken ran his. Mitch had the attitude that problems were normal, to be expected, to be found and brought out into the light and fixed. I liked this attitude a lot. Ken on the other hand, while I'm sure he also knew problems were to be expected, tended to emphasize the positive. A visitor to our section would be told about all the things that were currently wrong and were being worked on. A visitor to Ken's would be told about all the things that were going right and all the progress that was being made. The two sections developed rather different engineering cultures. Outsiders tended to see our section as being kind of 'gloom and doom' although in fact we weren't. Folks outside the Coyote section tended to see it as 'never is heard a discouraging word,' and this, too, was an exaggeration. As it happened, both leadership styles worked, both sections were successful, and both took about the same amount of time to develop the new products.

Eagle and Coyote were not the only products under development, of course. DMD also started into what became known as 'the box business,' which was an outgrowth of one of the basic ideas of the '08

and '11/12. A 'box' was an integrated storage product. While both Eagle and Coyote involved the invention and development of new disk drives, a 'box' would buy disk and tape drives as components, supply an 'integrated storage controller,' power supply, and package, and the end result was a standalone mass storage system. In the long run this turned out to be a very lucrative business. I don't know who had the idea to enter this business, but whoever it was made an excellent call.

After the MR head was canceled, a lot of the people who had been working on it were reassigned to improving the quality and manufacturing volumes of HP's new thin film disk technology. The disks had been second fiddle to the MR head when that was going on, and as a result they had a lot of nagging quality and process problems at the time Eagle and Coyote started. As I mentioned earlier, HP was the first company to commercialize this new technology, and like all new technologies the manufacturing process had a lot of initial bugs that had to be worked through. The technology section people worked hand in hand with the disk drive projects to improve our thin film disk technology.

Because I was working on my own project and Greg pretty much let me handle it however I wanted to, this period was for me the lowest-stress time I ever experienced at DMD. As Greg came to understand what my research was about, he became enthusiastic about the potential practical benefits it could have down the road. Basically, he saw that what I was doing could eventually be turned into a computer-aided design and analysis tool that would improve the manufacturability of our products, and this did in fact happen later. Greg was always a very practical, level-headed guy.

As for me, in addition to acquiring a great deal of specialized expertise in magnetic recording theory, I was also acquiring a great deal of expertise in system theory and, in particular, what I have since come to call 'general modeling theory.' What I mean by this term is the art and science of making precise quantitative theories ('models') of complicated systems and the development of efficient computer-aided methods for precisely describing how these complicated systems behave. This turned out to be vital for my work on electronic brains and also ended up being vital when I entered the field of neuroscience. Model theory is a mathematical science and it is interdisciplinary in the sense that it can be used in any technical field. Any branch of engineering, any part of brain science, economics, psychology, you name it. All fields of science use models. Model theory is the science of *how* to model things. It isn't a very widely recognized discipline, but I made of it a discipline in its own right, so much so that today I think of my academic specialty as 'model maker.' When I need a more blue-nosed description to tell people what it is that I do, I tell them I am a 'system theorist.' Today when I'm speaking to other neuroscientists, I tell them my field is 'computational neuroscience.' But, basically, I'm a model maker. I take the diverse pieces of different specialized sciences and put them together to understand the bigger systems of which they are the pieces.

Although I spent most of my time doing my research, I was embedded – as the current saying goes – right in the middle of the Eagle section and not at all isolated off in some corner somewhere. My desk and Greg's were in the same two-man cubicle so I got to overhear pretty much everything that was going on when my section mates came to talk with Greg. I also worked pretty closely with a lot of the folks in the technology section since my research involved both disk and magnetic head devices. They were the people with the detailed knowledge of the specific 'pieces' of this part of my research. They, in turn, were quite interested in my computer models and they made me a kind of unofficial member of their section. Through them I got to know the people at HP Labs down in Palo Alto who had originally developed the basic ideas of our thin film disk. From these contacts I was able to better understand how the basic electrochemical 'recipe' for making disks fit into the bigger picture of the read-write process. Finally, many of my friends – including Vern and Rick Hilton – were working on Coyote and I often dropped by their part of the lab to visit and to see what they were doing. After all, what I was doing wasn't just for Eagle. For my work to be broadly useful, it had to be applicable to all our disk drive projects. All in all, this was an exciting, fun, and very cosmopolitan time for me. Looking back, I never had a better time at HP than I did during my doctoral research.

There was only one part of my project for which Greg and I didn't see eye to eye. In complicated systems it turns out to be critical to be able divide up the theory into different levels of understanding. In science this hierarchy of knowledge is called 'scientific reduction.' For example, the bridge you might have driven over on your way to work this morning is made of atoms. Physicists tell us that if we understand atoms we understand everything. In one sense there is a lot of truth to this, but in a more important sense this is just romanticism. The guy who designed the bridge you drove over doesn't design a bridge by thinking about atoms. Between atoms and bridges there is a vast prairie of knowledge rising up from atoms to bridge design. The different levels of understanding make up what can be thought of as rungs on a ladder describing levels of scientific reduction. Scientific specialists spend their careers working on just one of the rungs and different specialists work on different rungs. Modeling theory, as an interdisciplinary science, can be thought of as working on the rails of the ladder that connect these rungs.

In my research project there were three rungs involved. One, the lowest rung on my particular ladder, was the physics of magnetic heads and disks. Next was the 'signal processing' rung, which is concerned with the electric and magnetic signals produced by heads and disks. Finally there was the read-write rung, which is concerned with things like achieving low rates of errors in storing and recovering information. Knowledge at all three levels had to be obtained and integrated in order for what I was doing to be useful. Greg understood the top two rungs – signal processing and read-write – very well and he knew how these rungs are used in disk drive development. However, the lowest rung – the physics rung – is more remote from everyday disk drive engineering and I'm afraid I didn't explain its importance to him very well. My explanation made him think the work I wanted to do at this level was too far removed from the basic objectives of the project. It wasn't, but as I said, I didn't explain it well enough. In truth, I hadn't yet developed the vocabulary that would have made a clear explanation possible.

The part where we didn't see eye to eye involved a very specialized technique called micromagnetics. I didn't invent this discipline. That had been done all the way back in the 1950s by a physicist named William Fuller Brown, Jr. Researchers at IBM and elsewhere had developed some basic techniques for doing micromagnetic modeling, although there were what I regarded as some glaring holes in the technique. The most important *practical* hole was that micromagnetic modeling at the time was very expensive to calculate on a computer. 'Expensive' here means it takes too long for the computer to crunch the numbers and give back an answer. (Time is money). It takes so long that a micromagnetic model is impractical to use at the level of the signal processing rung on the ladder. What I wanted to do was find a way to merge the outcomes of modeling at the micromagnetic level with the type of modeling used at the signal processing level. At the time no one had published anything about this problem and, in fact, it wasn't known how or even if this could even be done in a practical and accurate way. I wanted to find a way to solve this problem, but to do so I would first have to build a micromagnetic model of our disks. Greg quickly understood that a micromagnetic model was impractical to directly use as a computer tool for read-write engineers and so he saw developing this model as a waste of time. Since I hadn't done the work needed to solve the problem – indeed, I didn't yet know if the problem *could* be solved – I wasn't able to explain it well enough to justify doing it.

As a result, Greg wouldn't let me make the micromagnetic model part of my work objectives. From where he sat, this was an entirely reasonable decision. I didn't agree with it, but I didn't argue with him about it either. I had plenty of experimental lab work I still needed to do and this work could only be done using our research facilities in Boise. I also knew that the time was rapidly coming up when I'd have to go up to Moscow and fulfill my on-campus residency requirement that was part of our deal with the university. And I knew that while I was up there I wouldn't have to review what I was doing with Greg. I'd just do the micromagnetic part of the work up in Moscow, where John Purviance was very excited about it. After all, while I was on campus Johnny was my boss.

And that is what happened. I moved up to Moscow in the spring semester of 1984 and finished work on the micromagnetics rung while I was up there. I was able to find a property of the disk's micromagnetic behavior that I could exploit in making a model at the next rung up on the ladder and this

property provided the 'railing' needed to integrate the two rungs of the ladder.

The way this works is by developing ways to make abstractions in going from one rung on the ladder to the next rung. At the lower level there is a whole host of details that are necessary in obtaining an accurate description of the phenomenon. But these details are not used at the next rung up the ladder; only a mathematical description of the final outcome is needed there plus a theory by which measurable physical quantities are to be used in setting the higher-level model parameters. The technical term for this in system theory is 'generalized model order reduction.' It means finding a good but approximate mathematical description that is practical to compute but still retains everything necessary about what one knows from studying the lower rung. In a real sense, modeling theory is the art and science of balancing scientific reduction (higher rung to lower rung) with model order reduction (lower rung to higher rung). Finding a way to do this for magnetic recording was one of my original contributions to knowledge from my doctoral research project.

All scientists in all scientific disciplines make and use models. In a way, learning the models that became the 'standard models' in a given field plus learning how to use them constitutes the bulk of a science education in college. But learning how to *make* models tends to be treated more as an art than as a science. Physicists often call their models 'theories.' Biologists and psychologists tend to call their models 'hypotheses.' A model is really nothing more and nothing less than a reasonably accurate and practical description of our knowledge of the natural world. How accurate it is depends on how much we know. The models at any one rung on the ladder of scientific knowledge are, of necessity, reasonably simple because to be useful they have to be practically computable. I wasn't making any real contributions to models of this sort. What I was doing was developing a scientific approach to *integrating* models across different levels. The currently popular term for this is 'interdisciplinary science.' I wasn't the first to recognize the need for this type of science. Two books I bought at the Stanford Bookstore when I lived in California talked about the problem and these books had a big influence on me. One was by a physicist named Henry Margenau; it was entitled *The Nature of Physical Reality*. The other was by Gerald Weinberg and was entitled *An Introduction to General Systems Thinking.* These were my guides in turning modeling theory from a need into a practical science.

To make a long story short, my work up in Moscow turned out to be very successful and when I came back to Boise in May of 1984 my research was done. My new model gave predictions that agreed perfectly with the experimental data I had measured and explained several previously unexplained phenomena that had turned up during my experimental work. All I had left to do for the project was to write my doctoral dissertation, which also served as my documentation to HP on the outcome of the project. I called it *System Theoretic Modeling of High Density Digital Magnetic Recording* and in the front of it I placed a quote from the American philosopher George Santayana: *Reflection gathers experiences together and perceives their relative worth; which is as much as to say that it expresses a new attitude of will in the presence of a world better understood and turned to some purpose.* I felt then and I feel now that Santayana had described perfectly what research really is all about: to better understand our world so human knowledge can be put to good use for the real benefit of all humankind.

The computer programs I had developed became tools we put to use in disk drive design. The model was used to make other predictions in the years that followed, and every one of them turned out to be true and accurate. I went back up to Moscow in January of 1985 to defend my dissertation, the final exam for the Ph.D. degree. After my presentation and the questions and answers that constitute the examination part of the defense, I went off to the faculty coffee room and had a cup of tea while the professors decided whether or not I had passed. A short time later Johnny came to the coffee room to fetch me back down to the room where my committee was gathered. As he walked into the coffee room his first words to me were "Congratulations, Dr. Wells." I thought of my old advisor from Iowa State, Dr. Triska. I now had the 'union card' I would need to someday have a job like his: college professor. I'd completed one of my life objectives. □

In previous presidential election years there had always been a lot of political discussions at lunch over the summer and fall leading into November. 1984 was different. Aside from a few Orwell wisecracks and occasional references to 'Ronald Ray Gun' – a reference to the 'Star Wars' program – there was hardly any talk about the upcoming election at all. The Democrats put up Walter Mondale as their candidate. Former Vice President Mondale was a liberal's liberal and I didn't like him at all. He had opposed the space program when he was in Congress and he was in favor of all the things I saw as the worst parts of the liberals' ruling agenda. So it was that, even though I was becoming disappointed by and uncomfortable with the noticeably right-wing shift that had taken place in President Reagan's administration, there was no question but that I was going to support President Reagan once more. I had plenty of company. President Reagan got fifty-four million votes that November, almost 59% of the total, vs. thirty-seven million for Vice President Mondale, and he carried every state but Minnesota and the District of Columbia. It was the biggest landslide in U.S. history.

Vice President Bush visited HP's Boise site and made a speech one day. All in all that was a pretty interesting event. A few days prior to the speech the Secret Service descended on the site to prepare for his arrival and beef up security. For most of us it was our first look at what *real* site security looked like. They took over all the guard posts from HP's own security people and handed our site management a list of names of employees who were to be told to take the day off when Vice President Bush was there. One of the names on that list belonged to the project manager of the Eagle disk controller team. Peter's grandparents had been Communists back before World War II and even though Peter was anything but a Communist – he *was* a liberal – his name was still on their watch list two generations later.

The speech took place outdoors in an enclosed courtyard surrounded on all four sides by HP's buildings. Everyone had to pass through a metal detector to get to it and listen to the speech. Secret Service agents were scattered all throughout the crowd and were also posted on top of the buildings. One of the guys perched up there wore this very odd looking, wide-brimmed hat that didn't go with his suit. He was the only guy there wearing a hat. Keith Whitaker and I were looking up at him and speculating on what the purpose of that hat might be. We decided that if he took it off we were going to hit the deck and hug the ground.

I couldn't resist trying to talk to the Secret Service agent nearest me. I kind of drifted over beside him, and he gave me a pretty thorough looking over as I approached. I guess he decided I was harmless because he then resumed sweeping his gaze across the crowd around us. "This is pretty good security," I said to him.

"You ought to see it if Reagan was here," he replied, his head never ceasing to turn back and forth.

I didn't want him to get the idea I was trying to distract him, so I stood there beside him and listened to the rest of Vice President Bush's speech. When it was over I said to the Secret Service man, "That was a pretty good speech."

"Try listening to it twenty-seven times," he replied. □

Eagle had been preparing to enter the production prototype stage when I took my trip up to Moscow to defend my dissertation. When I got back to Boise, a newly minted Ph.D., my first job was to help move our lab furniture from Building 83 Upper down to the transition team area next to the factory floor in Building 82 Lower. It occurred to me as I was moving desks, workbenches, and so on that there's nothing like a little manual labor to remind a person that HP was a classless society.

At Delcon and on the '08 project we had done the production prototype phase in the R&D lab. But Mitch believed the best and fastest way to get Eagle ready for its release to manufacturing was to embed us as soon as possible right down with the production people. He was right about this, too. The whole idea of a production prototype is that it can be *produced.* By having us located in a place where we had daily contact with the production line we found out about problems almost as soon as they popped up. In a product as complicated as a disk drive there are always nagging little problems that don't show up until

you start trying to produce the product in greater volumes. Production proto phase is where you wring the last of the bugs out of the design.

Since I hadn't had any direct design responsibility on Eagle, Greg decided to use me as a kind of staff scientist/engineer helping to analyze and understand the last of the major problems we knew were still in the design. The biggest one we knew about was 'servo margins.' In engineering terminology, 'margin' refers to how much parameters can vary from the ideal design center and how sensitive or insensitive the design is to such variations. The servo system of a disk drive is supposed to achieve proper mechanical alignment between the heads and the tracks of data stored on the disk. There are a great many mechanical and electrical parameters that affect how well a disk drive can do this and the final design had to be able to handle the entire range of normal parametric variations that were going to happen in production. Our servo margins weren't good enough yet and there were two problems that were responsible for this.

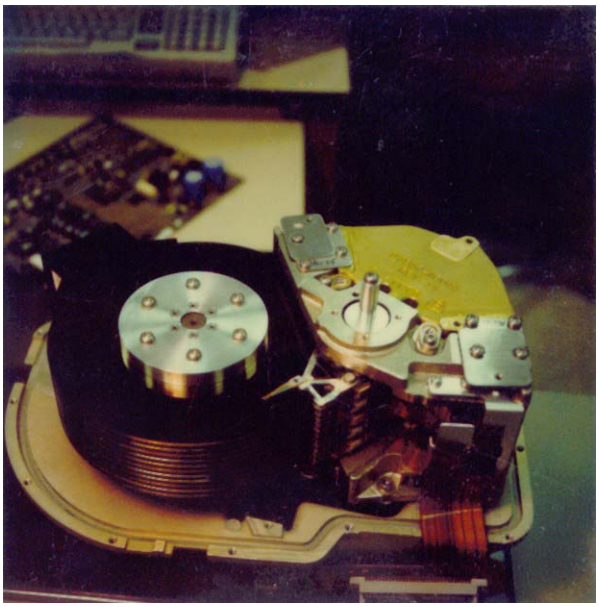
The first problem was called 'servo gain variation.' The electrical signals coming back from the heads that the servo system uses are tiny, less than one one-thousandth of a volt. This signal has to be greatly amplified – roughly by a factor of about one thousand times – in order for the servo system to be able to use this signal. How the final voltage is related to the head position relative to the data track is called the servo gain. Keith Whitaker, who had been given the task of evaluating our servo gain, had documented a very strange fact. Almost every time an Eagle wrote a sector of data the servo gain would change by a small and apparently random amount. This was the first time any of us had ever seen this effect and its cause was completely unknown. Because Keith was the guy who had measured and characterized the effect, we dubbed it 'the Whitaker effect,' which was a tag Keith wasn't thrilled about.

The measured variations in servo gain that he'd seen weren't large but the fact that the root cause of the variation was unknown was very scary because none of us had any idea of how big it *could* get when production began cranking out Eagles by the thousands. One of the things Keith was able to do was to narrow down the possibilities for where the problem might be originating and had managed to show that the effect was coming from either the heads or the disks. Because of the way servo gain variation behaved the odds heavily favored the heads being the source of the problem. My research work had made me HP's foremost authority on how magnetic heads and disks produce signals so Greg assigned the task of understanding and explaining the Whitaker effect to me.

Keith briefed me on what his experiments had uncovered and showed me his data. That helped narrow down the possibilities for what kind of physics was at work here. As it turned out, there *was* a property of magnetic heads I already knew about that might contain the explanation. Basically magnetic heads have an 'effective magnetic width' that is not the same as their physical width. This is caused by certain properties inherent in the material from which heads are made. Furthermore, the nature of the physics was such that this 'magnetic width' could be expected to change every time the head was used to record data. I already knew from my own earlier experimental work the range of parametric variation due to this factor. The question was: Was the magnitude of this effect capable of explaining the total gain variation Keith had measured? The total impact of magnetic width variation on the servo system was more complicated than just being a matter of how much magnetic width variation took place in the head itself but nobody had ever presented any technical papers addressing the overall problem and no one had ever presented a quantitative model for analyzing it.

The model I had developed for read-write wasn't capable of doing this either, and so I set to work extending this model in order to be able to apply it to servo system design. This turned out to be easier to do than I had expected because not many years before an academic researcher had published a paper on the mathematics that were necessary to analyze this particular situation. I merely had to incorporate his mathematics into my model and conduct a few experiments verifying that this did in fact provide an accurate model of the situation. The other guy's theory worked and so I was able to then carry out a complete analysis of servo gain variation in disk drives. The results were in outstanding agreement with Keith's data and, as a necessary additional benefit, my extended model let us calculate the worst case

amount of variation production would see in high volumes. There wasn't any practical way to remove the source of the variation itself – the source was an inherent property of the way magnetic heads were made – but at least we knew now how much variation the servo system would have to withstand. The margin loss we suffered from this effect had to be made up by reducing margin loss elsewhere in the design. After the model was proved to be correct and accurate I was even allowed to publish a paper on the general theory of servo gain variations – although not of any Eagle specifics – in the technical literature.



The Eagle Mechanism. The actuator is the gold-and-silver-looking thing to the right and disk spindle is the silver and brown thing to the left. The disks are eight inches in diameter.

This brought the second big remaining problem into the picture. This second problem was called 'the actuator resonance problem.' Real mechanical parts aren't perfectly rigid bodies. Think of a tuning fork, for example. Everyone knows if you lightly tap on a metal tuning fork it vibrates; you can even hear the sound this makes because the vibrations set up pressure waves in the surrounding air. A tuning fork will vibrate at a particular vibration frequency and this frequency is called 'the resonant frequency' of the tuning fork. The actuator resonance problem was basically the same thing except that different parts of the Eagle mechanism vibrated at different resonant frequencies. There was one frequency in particular that was our real problem and the question was: What part of the actuator was causing this resonant frequency? If we could identify what was vibrating then we could fix it. Until then we were in big trouble.

The resonance problem had been around for quite awhile by then and the mechanical engineers, especially one of my friends named Dave Woito, had been working very hard on it but without sufficient progress. Dave was still a relatively young engineer, although not a rookie by any means, and when the problem had first popped up Eagle's mechanical engineering staff had consulted with the division's oldest and most experienced mechanical engineer, a guy named Roger Sleger. After listening to the description of the problem, he offered the opinion that it was probably a 'bearing resonance.' The actuator is a rotating motor and uses two rings of steel ball bearings. The idea was that if these ball bearings were undergoing compression and decompression the result could be the resonance phenomenon Eagle was seeing. Dave and our other mechanical guys had been working empirically on that premise since then.

Mechanical engineers do receive some introductory training in system theory as undergraduates, but unless they go on to graduate school and specialize in it, they don't really receive enough training in the theory or the specialized tricks of the trade to effectively deal with systems as complicated as the Eagle actuator. That was why our guys' work on the problem had been based on experiment and hypothesis. By the time the Eagle team moved downstairs to the factory, the resonance problem was becoming mission critical to finishing up the project. Greg was getting worried and he asked me to see if I could make a model of Eagle's actuator and see if I could find the root cause of the problem. Now that I was a 'Doc' this kind of problem was supposed to be right up my alley. And, of course, he was right.

I sat down with the mechanical guys and they gave me some fast technical training on how the Eagle actuator was built and many of the fine details of how it worked. Dave provided me with copies of his measured data characterizing the resonance problem, and I got to work. It took me a couple of weeks to put together a basic mathematical description of the actuator and figure out what the key physical parameters were. For many of them I was able to get approximate numerical values from the mechanical engineers, but there were a lot of other parameters that were completely unknown. However, using the

data Dave had gathered I was able to come up with numerical estimates of their values by forcing the model to agree with Dave's data. This took another two or three weeks to accomplish and it wouldn't have been possible without the work Dave had done previously. Finally, though, my model was done and was providing an accurate description of the resonance dynamics. It was time to identify the root cause.

It turned out that the bearings actually had very little to do with the resonance problem. The real cause was a plastic coil form around which the coil of motor wires was wrapped. This coil form wasn't stiff enough and, under the very large forces being produced in the motor, it was bending. This was the source of vibration responsible for the actuator resonance problem. I reported my finding to Dave.

Dave was pretty skeptical at first, and with good reason. During any project everyone always has a lot of things to do, and both electrical and mechanical engineers often try to get each other to take ownership for accomplishing different tasks. However, since everybody is always very busy, people are naturally reluctant to take on 'someone else's problem.' I might go over to Dave and say, "Dave, could you do this?" He'd respond, "That's an electrical problem. Do it yourself." If he came to me with something, I'd say, "That's a mechanical problem. Do it yourself."

I was no different in all this from anybody else, and my eventual solution was to give all the mechanical engineers the idea that I was a total klutz at all things mechanical. I would build these Rube Goldberg mechanical contraptions and then insist on public exhibitions of them, at which I would always be overtly proud of the awful gizmos I'd throw together. I also bought a one dollar book published early in the twentieth century entitled *Teach Yourself Mechanical Engineering* and had boasted to Dave that with this I, too, could be a mechanical engineer. The book was about things like anvils and hammers. It worked and I'd convinced all the mechanical guys that, regardless of how good an electrical engineer I might be, when it came to anything mechanical I was a complete moron. The ruse was so successful that any time one of them saw me pick up a screwdriver, he'd rush over and take whatever I was going to build away from me with a paternal, "Here, I'll do that." I was a walking embarrassment to the mechanical engineering profession.

Consequently, it was completely natural for Dave to doubt that I, of all people, could possibly be able to tell anyone anything about the resonance problem. But things were getting kind of desperate, nobody had thought of looking at the coil form before, and basically the guys were running out of ideas. Dave was too good an engineer to just dismiss what I'd told him, even considering the source. He checked it out and quickly found out my analysis had been correct. Once he knew where to focus his effort, he solved the resonance problem in almost no time at all. All I did was point out where to look; I couldn't have actually solved the design problem myself. That took Dave's skills to accomplish.

My actuator model was really a pretty nice little model and I would have liked to publish a paper on it. But once the model had proved itself on the resonance problem, it was pretty clear to me and to Greg that the model was going to make a good computer-aided design tool for use in our next disk drive project. It would give us a competitive design edge – especially over the big Japanese companies who were our major competitors in the disk drive business – and so we decided this model should be classified as a trade secret. I never published it and we did put it to good use on the next project in doing the servo design.

One other really nasty problem came to light during Eagle's production prototype phase. It was the 'head shift' problem. Almost all materials, the notable exception being water, expand when they heat up and contract when they get cold. In the Eagle mechanism we had different parts made out of different materials, most notably magnesium and stainless steel. Different materials expand and contract by different amounts as temperature changes and each material is characterized by a physical parameter called the 'coefficient of thermal expansion.' It was discovered that as Eagle underwent wide swings in temperature the magnetic heads would shift – each one by a different amount – and ruin the precise alignment needed to keep the heads reliably over the top of the recorded data tracks. Some of this shift was elastic, which means it went away when the temperature came back to normal. Some of it was

plastic, which means that even after the temperature came back to normal some residual head shift still remained. At the least head shift hurt the performance of the disk drive. At the worst it could cause the disk drive to fail to work at all. Head shift was such a serious problem that it threatened the success of the entire project. It absolutely had to be fixed.

When the seriousness of this problem was recognized the Eagle disk drive controller was in pretty good shape, very close in fact to being done. Mitch therefore assigned Peter, the controller's project manager, to take charge of solving the head shift problem. Since my 'theoretical malingering' days were now over, Mitch assigned me as the engineer who was supposed to solve the problem. I was aghast. "I don't know anything about head shift," I protested to Mitch.

"Neither does Peter," he replied. *Ooookay,* I thought.

Well, you can't fix it if you don't know what's broken. I set to work and designed a series of experiments to find out what the characteristics of our head shift problem looked like. It took several weeks to figure out what experiments to do and how to do them. After carrying them out, we had a much better idea of how the actuator and heads were deforming under temperature, and this pointed towards particular areas within the mechanism that were being affected by temperature. Once I had this data I was in a pretty good position to admire the problem. But, "I don't have the first clue how to solve this," I said to Peter. The problem went right to the heart of machine design, which is something mechanical engineers are trained to do but electrical engineers are not.

Peter, now armed with the facts, went back to Mitch and told him we needed a mechanical engineer to work on fixing the problem. Mitch agreed – thank goodness! – and assigned Joe Wood, a very good mechanical engineer, to take over the design of the solution. Joe is a very practical, down to earth, no nonsense engineer who knows how to get the job done. He also has a pretty good if somewhat earthy sense of humor. Now that I was no longer 'the theoretical malingerer' most people called me Rick again, a few called me Doc, but Joe tagged me with the nickname Elmer. If you phonetically pronounce 'Ph.D.' it comes out 'Fudd.' I was Elmer Fudd, the hapless rabbit hunter from the Bugs Bunny cartoons.

Happily for me, this nickname never really caught on. Happily for everybody, Joe knew how to go about solving the head shift problem. He would make changes to the design, I'd re-run my experiments to test how close we were coming to the solution, and I'd report these back to Joe. I couldn't begin to tell you all the things he had to do to finally fix the problem, but fix it he did. Eagle had cleared the last major technical hurdle it had to get over before it could go into production. □

Bristol, England (1985)

By the summer of 1985 I was ready for a major vacation. Chris and Steve had been living in Bristol, England for a bit over a year by then and Chris had come up with a great idea for one: sailing the Dodecanese Islands of Greece in the Aegean Sea. She made arrangements for us to charter a sailboat out of the Turkish resort town of Bodrum and in mid-July I boarded a plane and set out to join them in Bristol.

Except for that long-ago fishing trip to Red Lake, this was the first time I'd been out of the United States. It was a long flight and as the plane descended for its landing in London I was enthralled by the beauty of the English countryside passing below. England was a lush, green, grassy land with small rolling hills speckled with small woods and dotted with numerous small towns. For all the world it reminded me of Iowa in the summer. We landed at Gatwick and from there I took the train to Bristol where Chris and Steve would meet me.

The English countryside seen from the windows of the train was every bit as pretty as it had looked from the air. I would have liked to have seen every second of it but I was having a hard time keeping my eyes open on the train trip. I'd heard of jet lag but this was the first time I'd experienced it. It was a beautiful morning in England, but to my body it was the middle of the night and I was very tired. There was a woman with her little boy sitting in the seat across the aisle of the train car next to me, and I was enchanted by her British accent as she talked softly with her child. Even though I was a foreigner in this land, there was something that seemed to permeate the very air of England that made me feel very much at home. It reminded me that my own ancestors on Dad's side of the family had come from this land very long ago and I couldn't help but have this strange feeling that somehow or other their ghosts lingered in the air, come to welcome their long lost descendent back to his native land. After returning from Greece and Turkey I planned to spend an additional two weeks in England, and I was looking forward to seeing and exploring much more of this ancient island.

I stayed in Bristol with Chris and Steve in their flat for the next couple of days. This gave me some time to get over the jet lag before we all departed for Asia. They had recently had their first son, Timmy, and Chris' mom had come to Bristol to look after him while the rest of us were away. He was a beautiful baby and I was a little amused, although not surprised, by the way Steve couldn't seem to get enough of cradling him in his arms.

One bit of news greeted me when I arrived in Bristol. Back in America the country was undergoing an economic downturn and while I was somewhere over the middle of the Atlantic HP had announced the company was going on what we called 'the nine-day fortnight.' The company needed to reduce its payroll by ten percent. Rather than laying off ten percent of us, though, the company instead went to a schedule where all of us worked only nine days out of every ten and everyone took a corresponding temporary cut in pay. Bill and Dave had first instituted this policy as an alternative to layoffs during the recession of the 1970s. When the economy emerged from the recession, HP's workforce was intact, ready to respond to the opportunities when business recovered, and we went back to a full work schedule. The nine-day fortnight didn't come as a big surprise. I'd been expecting it for some time. Back home, I'm pretty sure my colleagues in the R&D lab were probably voluntarily coming in on the tenth day anyway. New products were the lifeblood of the company and because the company's management was so loyal to all of us, that loyalty was reciprocated by HP's people when the company was in need. I've always thought the nine-day fortnight was a brilliant policy. Layoffs over the short term are short-sighted and downsizing is the symptom of a dying, badly-managed company. HP in those days was a growing, vibrant company and the nine-day fortnight was a symptom of our underlying corporate health. As for the across-the-board ten percent pay reduction, it wasn't going to present any real hardship to me. My main reason for always making sure I put money into savings and investments was retirement, but a second important reason was to make sure I'd always have a 'rainy day' cushion against the unexpected. For that reason, the fact that I landed in England making less money than I was making when I boarded the plane in Boise didn't dampen the prospects for fun on this vacation in the slightest.

After a couple days in Bristol, which let me start to recover from the jet lag, we all journeyed back to London and boarded the plane for Turkey. It ended up being a long flight. For some reason we were never told, the plane had a long delay before takeoff and by the time we were finally airborne we had missed the 'window' during which the plane was allowed to fly over the Iron Curtain countries of Europe. Instead we had to make a longer flight over France and down the west side of the boot of Italy. From there the plane turned east. We also had to make a detour to stay out of Greek airspace. This was because we were bound for Izmir in western Turkey and the Greeks wouldn't allow any plane going to Turkey to use Greek air-space. The two countries just don't like each other very much.

As a result of the delay and all the extra air miles, by the time we landed in Izmir there were a lot of people on that plane who very badly needed to use the john. One of the things about the airport at Izmir is that the airport facilities do not include western-style toilets. Instead they have a little flat porcelain gizmo about two inches deep that is set flush to the floor. What you have to do is crouch down and let fly

without sitting down. I watched a big herd of British women go stampeding into the women's john at the airport. A couple of minutes later they all came flooding back out again with looks on their faces of varying degrees of disappointment and distress. I got quite a chuckle out of that. I don't like these Asian sanitary facilities either, but I didn't have to go just then and could afford to feel humorous about it.

I got my first hint at how laid back the Turks are when we went through customs. We had a tourist's guidebook that said, among other things, that you are only allowed to bring one camera and only up to ten rolls of film into Turkey duty free. I had two camera bodies and considerably more than ten rolls of film in my camera bag, so I got into the 'something to declare' line at customs. When I finally got to the customs agent, he opened my camera bag, looked in, and then looked at me with a puzzled expression. He didn't speak English and I don't speak Turkish, but I smiled, held up two fingers, and pointed to the two camera bodies. "Two cameras," I said. He just rolled his eyes and waved at me to go on. I was holding up the line. I didn't have to pay so much as a lira.

In the States you always hear all these horror stories about how hard-nosed the Turks are, so all of us naturally felt more than a little leery about what kind of a people we'd meet when we got to Turkey. It turned out all those stories are grossly exaggerated. It was true that the Turks were all pretty dour looking when I'd first meet them, but I also found out that if I smiled first every one of them would beam right back; it was like the sun coming out from behind a cloud. By the time we left to go back to England two weeks later, I'd come to greatly like the Turkish people and their land. Every one of them I met was a warm, hospitable person, very friendly, and hugely likeable. Forget everything you might have heard about Turkey. It's a wonderful country of marvelous, marvelous just-plain-folks people.

Bodrum seen from atop Bodrum Castle

From Izmir we boarded a bus for the three hour bus trip south to Bodrum, where we would meet the English owner of the sailboat, a man named John. I sat near the back of the bus, just in front of the big piles of luggage, next to one of the Turkish guys who worked for the bus line. Neither of us spoke the other's language, but by using signs and gestures we still managed to have a great conversation all the way to Bodrum. He was able to make me understand what it was I was seeing out the windows of the bus and even managed to teach me a few Turkish words, such as the words for 'water' and 'mosque.'

One of the things I noticed during the bus ride was that if there were any traffic laws at all in Turkey, they were considerably looser than in America. The roads were two-lane roads but several times we met pairs of cars or a car and a truck when one was passing the other. Whenever this happened, our bus and the car being passed simply moved over to the road side and the passing vehicle would just go in between us so that we passed three vehicles abreast. Nobody except us westerners paid the slightest attention to this; it was normal. After the first four or five times I stopped paying attention to it as well.

Western Turkey is desert country, much like southwest Idaho. It is not the kind of sandy wasteland such as was depicted in the *Lawrence of Arabia* movie. It has a rugged beauty all its own and was sprinkled with numerous towns and villages, each of which had its mosque easily identifiable by its tall and slender tower rising to a point at the top. At sundown the rays of the setting sun painted the countryside in spectacular red light streaked in shades and shadows. It was beautiful.

It was after dark by the time we arrived in Bodrum and the bus dropped our party off in front of what turned out to be the marina. The bus continued on taking everyone else to one of the local hotels and we found ourselves alone in the dark on the deserted street. John, the boat owner and our captain for the charter, had expected us to get off at the hotel and had gone down there to greet us. Not knowing what

else to do or where he was, we just milled about for awhile trying to figure out where we were and whether there was some place we needed to walk to. That short interval was the first and only time during the trip where it really came home to me that I was in someone else's country, a foreigner not even able to speak the language. It was an eerie feeling but, fortunately, it didn't last very long. After we failed to get off the bus at the hotel, John came looking for us and, since we were already right there at the marina, we were soon aboard his boat, the *Dark Star,* and got ourselves settled in. The *Dark Star* would be our floating hotel for the entire trip.

Bodrum marina. The *Dark Star* is the brown trimmed yacht in the center of the picture with her bow pointing outward.

Counting John, there were seven of us aboard: Myself, Steve and Chris, another American husband-and-wife couple named Rick and Karen who lived in Bristol, John, and an adventurous young English girl named Jane. The *Dark Star* slept five below decks. Steve and Chris took the stern accommodation, Rick and Karen took the forward accommodation, and I took the bunk amidships. John and Jane slept on deck where, among other things, it was cooler at night than it got below deck. The boat carried its own bathroom complete with western style commode and a shower. This came in handy more than once when the authorities turned off the water supply ashore. Being desert country, water shortages were common in the summer and when the Turks needed to conserve it they'd simply turn it off. No prior warning would be given; that would defeat the whole purpose because people would have rushed to fill bottles and canteens. You'd just wake up in the morning and discover there was no water. That, however, never bothered us on the *Dark Star;* our commode and shower drew water from the Aegean and so our facilities never got shut down when all ashore was bone dry. We carried bottled drinking water with us.

The next morning John collected all our passports and took them down to the local port authority. Our plan was to spend a couple days seeing the sights in Bodrum itself. The three women took charge of the food and we breakfasted on yogurt. At first this was pretty tasty but by the time our two weeks on the boat were over with I'd come to heartily detest yogurt and have never eaten any since. Bodrum is a very picturesque town catering heavily to tourists. Its streets are narrow and most of the local shops set up their wares outside with big cloth sheets stretched overhead between the buildings on either side to provide shade. Leather goods were very inexpensive; I bought a pretty nice leather bag for the equivalent of about two dollars fifty cents in American money. My guess is that this price was probably pretty expensive by the standards of the Turkish people, but compared to America Turkey is a poor country and while none of us were rich back home, we certainly were rich so far as the Turks were concerned. I bought a number of leather goods there as well as a small water pipe, commonly known as a hookah although this is not the Turkish word for it. If you're wondering, I smoke tobacco with it. Nothing else.

In ancient times Bodrum was called Halicarnassus and had been the capital of the region. It was the birthplace of Herodotus, the Greek father of modern history who lived in the fifth century B.C. The region is rich in ancient history, having passed back and forth between Greek and Persian hands a number of times. Easily its most visible and attractive feature today is Bodrum Castle, a great fortress built starting around 1402 A.D. by the Knights of Rhodes. Today it is a museum featuring many ancient artifacts on display there.

Bodrum was where I got my first taste of real Turkish cuisine. That evening John took us to a local restaurant next to the sea. Turkish food is one of only three truly distinct cuisines, the other two being French and Chinese. People who know all about food say everything else is a mere derivative of these three. I have pretty close to no idea what I ate there that evening – although I know octopus was part of it

– but I've never eaten better. Words can't really describe it, but absolutely everything was delicious. Even the octopus. It was accompanied by sweet Turkish tea and, despite the fact Turkey is a Moslem country, some very fine wine. Like everything else in Turkey, the service was very laid back and they took their time about bringing out our first course. So long, in fact, that we started to wonder if they'd forgotten our order. But when we signaled to the Turkish head waiter, who was lounging casually in a doorway keeping an eye on his domain, he just gave us a hand gesture that in any language says, "Be cool," and a few minutes later dinner started coming. Once it started coming it seemed like it was never going to stop either. There's no concept of 'fast food' in Bodrum. Dining out isn't just for eating. It's for making a whole evening with friends, food, and conversation under a beautiful star-lit sky. By comparison the best restaurants in America are like little more than hamburger joints. Except for that Cajun restaurant in Louisiana where I ate during my interview trip to Dupont so many years earlier. That's the only one I've ever known that can compare with the little seaside restaurant in Bodrum.


Under sail. Left: John, Karen, Chris, Jane at the wheel. Right: from left to right, Karen, Jane, John, Steve, Chris.

Dark Star was built to sail the open waters of the ocean and after a couple of fun days in Bodrum we got underway to visit the Greek islands. The summer waters of the Aegean were a little choppy but not too bad and were a gorgeous blue color with occasional whitecaps. The wind was brisk, blowing out of the northeast most of the time, and we made good way. Only once during our trip did the wind rise to near gale force, which provided a terrific and exciting sail that day. Usually we weren't entirely out of sight of land, but the Aegean's a big place and every once in awhile we'd find ourselves in open water with no land in sight. We flew the British Union Jack on our stern along with either a small Turkish or a small Greek flag, depending on whose waters we were in. John told us that the Greeks especially were picky about this flag and it was a huge mistake to sail into any Greek port flying the Turkish pennant. We did in fact see a number of Greek naval vessels, mostly patrol-torpedo boats, frequently when we were in Greek territorial waters. Bodrum, in contrast, had no military presence whatsoever that I saw.

Ancient ruins on Kos

Our first stop was at the Greek island of Kos, which was the birthplace of Hippocrates (fifth and fourth centuries B.C.), the father of medicine. Kos town was very much a tourist spot and picturesque enough. I thought the most interesting sight there was the ancient ruin nestled within the modern town itself.

Like the Turks, the Greeks of Kos were pretty dour when I first met them. Unlike the Turks, they were unimpressed by Yankee overtures of friendliness. I rather quickly got the impression

the folks on Kos didn't care too much for Americans. I didn't see any police officers on Kos but I did see a number of soldiers patrolling the streets casually carrying submachine guns under their arms. 'Laid back' was not a description I'd say applied to Kos. No one there was overtly unfriendly, but I didn't meet anyone there I'd say was friendly either. It made an interesting contrast with Bodrum. The morning we were set to sail two uniformed Turkish officials came to the boat with our passports, ostensibly to make sure each passport matched up with its owner. In fact, all they did was go down below decks with John long enough to sneak a beer apiece before coming back up and wishing us a pleasant journey. They just left our passports on the table below and didn't even count us, much less match us to our passports. I had a distinct impression Kos was not quite as informal about such things.

About the first order of business I had as soon as we came ashore in Kos was to visit one of the local banks to exchange some British pounds for drachmas. Given the hostility the Greeks felt toward the Turks it was obvious without anyone having to tell me that it would have been useless and probably stupid to try to exchange Turkish lira for Greek drachmas. I figured the less the Greeks knew about our travel itinerary the better for all concerned.

The first thing I noticed was the British pound didn't go as far in Greece as it did in Turkey. When I'd exchanged a few hundred pound notes for lira in London before boarding the plane, the bank teller proceeded to count out a big pile of twenty thousand lira notes. These turned out to be useless everywhere in Turkey except at banks and Turkish rug merchant shops. Nobody else could even make change for that much Turkish money. In contrast, the exchange rate in Greece was closer to about four drachmas for each one pound note if I remember correctly. At the same time, prices for goods when expressed in native currency were more or less comparable in Greece and Turkey so while we were 'well off' in Greece, we weren't 'rich' there like we were in Turkey.

After getting some Greek money my next stop was at a small shop where I bought some postcards. I thought Mom and Dad would enjoy hearing from me at different stopping points on the trip. Both of them had been more than a little unhappy when they learned I was visiting that part of the world. I guess they thought it was too close to Israel and Palestine, which was at that time as it is today a pretty dangerous part of the world. I'd had to explain to them that western Turkey and the Dodecanese islands were hundreds and hundreds of miles away. Even then they were nervous. Getting regular postcards would, I hoped, ease their minds. I'm really not a reckless person but Mom, Dad, and Sherri all tended to think I am and that it would be just like me to walk straight into some dangerous situation and tug the lion's whiskers.

After mailing my first postcard I set out on foot to have a look at Kos town. It was a nice, clean place although not especially exotic. The dominant church I noticed was Eastern Orthodox Christian although I did see what looked like it might be a church belonging to some other Christian sect. I didn't have any set plan for where I was going. I figured I'd just wander around and see what I came across. I wasn't worried about getting lost because I could see the sea from just about everywhere and wherever I might get off to, I knew it wouldn't be hard to find my way back to the harbor and the boat. Kos town isn't tiny, but it isn't all that big either.

I was just meandering around taking in the sights when I turned a corner and all of a sudden found myself standing at the edge of some ancient ruins. *That* really gave me a pick-me-up because it was just exactly the sort of sight I most wanted to see on this trip. I was surprised at how deserted it was. The only other person I saw there was a small boy who was playing by himself at the edge of the ruins. I spent a pleasant hour or so wandering among them, soaking in all the history and admiring the marble work. Even though the site was in ruins, it was easy to imagine how grand it must have looked in its day.

As far as I could tell, one day was about all it took to catch the sights in Kos town. Kos was green and pleasant, decorated with palm trees and nice, well manicured gardens. As evening approached I made my way back to the harbor and the boat. As the sun began to set John introduced us to a fine British tradition: the sundowner. We sat on deck sipping our drinks and watched the shadows lengthen without a care in

the world. In Turkey we were pretty careful about not flaunting alcohol in front of the Turks. Islam forbids alcoholic beverages and we wanted to be polite guests in the places we visited. Greece, on the other hand, had no fundamental objection to drinking and the sundowner became a regular and relaxing part of the end of each day while we were in Greek waters. Only Rick and Karen, who were Mormons, didn't participate in this aspect although they did keep us company and drank some kind of fruit juice.

My turn at the wheel. Chris and me bound for our next port of call at Kalimnos.

Only about a dozen statute miles separates Kos and Bodrum so the first day's sail had been quick and easy. After spending one day on Kos we talked it over and decided to leave the next morning to visit the island of Kalimnos, which was about twenty statute miles north and west of Kos.

It was a perfect day for sailing and John had no objections at all to having us take turns piloting his boat. He was, naturally, the most experienced sailor among us. Jane turned out to be a pretty good sailor, too. Among the rest of us, I was the only one who had done any sailing previously and I couldn't wait to try my hand at piloting *Dark Star*. She was a fine craft although I thought she didn't have as much rudder as I would have liked. It made her sluggish in turning with several seconds of delay between the time the wheel was turned and the time she responded. John was entirely used to this, but it did give me some trouble and took a lot of getting used to. By the end of the trip we had all gotten to take our turns piloting the boat, mostly in open water well away from rocks and land where if mistakes were made they wouldn't be catastrophic.

We had a long, pleasant sail to Kalimnos and put in at a tiny fishing port. There were no signs to identify the name of the town, only some graffiti in Greek letters painted on a little outhouse building on the pier. The town was made up of numerous small white houses that spaced themselves out into a lush valley of orange trees. My best guess is it might have been the town of Vathis, but I have no way to know for sure and I didn't think to ask John.

Kalimnos was a mountainous island, although I wouldn't say the mountain was very big, and above the valley it was sparsely vegetated. Steve, Rick, and I decided to hike the road that wound along the side of the mountain and so we set off after arranging for the boat to pick us up again farther down the coast. It was a hot hike made interesting by our discovery of many small, ruined stone walls and houses scattered about in the valley along our route. We also saw several small little Eastern Orthodox churches built from white stone. Steve and I guessed that the ruins probably dated back to sometime during the Byzantine empire but we had no way to know for sure and our guide book hadn't mentioned them at all. None of us thought to bring along any water or anything else to drink so by the time we finally met up with the boat again I was pretty thirsty.

After being picked up again by the boat we sailed on around the island to Kalimnos town. It was a surprisingly big city, very bustling and modern. Originally the main enterprises on Kalimnos were the orange groves and the numerous sponge fishermen before tourism became big business for the island.

Kalimnos town at the main harbor

Kalimnos town was spread out for a very long way in a narrow strip along the coast. The harbor was packed with boats moored side by side. There were local fishing boats, a number of sailing yachts, and many power boats. Near where we moored there was a British guy who owned a small and, I thought, rather modest power yacht. I didn't think it really looked very seaworthy but it must have been good enough to get him to Kalimnos across the open water of the Aegean.

It soon became clear that this Brit wasn't exactly a descendent of Lord Nelson. Not long after we tied up, he powered up his boat and began backing away from the wharf. I hadn't been paying any attention to him until a little Greek fisherman began shouting at him frantically. The only word he was saying that I could make out was 'propeller.' I looked and, sure enough, the guy was backing his boat right into the fisherman's anchor rope. The Brit was just looking at the fisherman, neither saying a word nor looking around to see what the warning might have been about. Uh-oh, I thought. Sure enough, he backed right into the anchor rope and fouled it around his propeller.

I thought the fisherman was going to have a fit right there on the spot. The guy in the motorboat didn't say a word all during this although he did power down once his propeller got entangled. John went over and spoke with the fisherman; he also informed his fellow countryman what it was he had just done. There was no expression I could read on the guy's face at all. He made no offer to help fix the mess he'd just caused. After making sure the guy wasn't going to power up again, John jumped into the water and dived down to try to untangle the anchor rope. This turned out to be hopeless and in the end he had no choice but to tell the fisherman he'd have to cut the rope. The fisherman was plenty mad about it but he didn't have much choice. He nodded and John dived down there again with a knife. Soon enough he'd freed the rope from the propeller, losing the fisherman's anchor in the process. The guy with the motor-boat fired her up again and got himself out of there and away from the fisherman as fast as he could, still without offering one word of apology to the fisherman. I watched him. He motored down to the far end of the wharf, came about it, and ended up tying up again on the opposite side probably not even two hundred yards from where he'd been.

I thought it was probably best not to point him out to the Greek guy but I did point him out to John. "I wonder what the sense in that was?" I commented. As far as I could tell, one spot here was just as good as any other.

"He's a twit," John replied. It was clear John thought this guy had no business operating a boat at all.

Kalimnos was a lively town at night. There was no rolling up the sidewalks here. We went out to dinner later that evening to a cafe that had sidewalk tables. For some reason I wasn't very hungry that night and decided a salad would fit the bill for me. There was something on the menu called a 'Greek salad' so I ordered one of them. When it came Chris started laughing. The 'Greek salad' was nothing else but an enormous bowl full of sliced tomatoes. Chris knew perfectly well that I hate tomatoes and the look on my face must have told the whole story. As far as I'm concerned, the three uses for tomatoes in this world are tomato soup, pizza sauce, and ketchup. How a bowl full of tomatoes qualifies as a 'salad' is something I've never figured out to this day.

Although Kalimnos was, by local standards, a pretty 'happening' town we decided not to spend too much time there. Nightclubs weren't rare back home and we had come to see things we couldn't see at home. Chris was in favor of pushing on to Patmos. It was a long haul but we figured we could make it in a good day's sailing. So it was that we bid Kalimnos farewell and set out for the Biblical isle of Patmos.

Leros.

Patmos was about thirty-five statute miles north by northwest of Kalimnos and under ideal circumstances would take the better part of the daylight hours to reach. Unfortunately, conditions that day weren't ideal. The wind had shifted a little and we found ourselves having to sail directly into it on the straight course from Kalimnos to Patmos. As a result we had to make a series of very long tacks, which more than doubled the sailing distance to the island. By late afternoon we were only about halfway to our destination. We talked about pushing on through the night to reach it but none of us thought the urgency was so great as to require that, especially when the island of Leros was near at hand.

We hadn't planned to stop at Leros. The guidebook basically said it wasn't a very interesting place. But it did have a harbor and one restaurant in the main port of Lakki, so we decided to put in there for the night. As we approached we could see that Leros was lush and green with many trees, altogether different from the more barren looking landscape of Kalimnos. Even from out to sea it was a pretty island. To enter the main harbor we had to sail between two tall cliffs, atop each of which was an enormous statue. The two statues were placed facing each other and overlooking the harbor mouth. Once through the narrow opening between the cliffs Leros opened up into a wide, pretty bay. Off to our starboard side we could see a collection of buildings and houses that John said was the Greek naval base at Leros. Pearl Harbor it wasn't, but the harbor was busy with a few PT boats.

We tied up at a pier just across from the Restaurant Pizzeria, which the guidebook said was the most 'prominent' restaurant on the island. The buildings and architectures on Leros had a look more Italian than Greek and the town wasn't exactly overflowing with tourists. Leros itself had been under control of Italy from 1912 until World War II. It was most well known for being a battleground during the war when the British occupied it after Italy's capitulation and then the Germans invaded it using paratroops and decimated the five thousand man British garrison.

We docked not long before sunset and decided to check out the cuisine of Restaurant Pizzeria. The idea of eating pizza in Greece struck us as kind of an irony and we were actually curious how pizza here would compare with pizza back home. Back in Boise we had a tradition of following up our softball games with pizza and beer at the Round Table Pizza. Our expectations here weren't very high, which turned out to be just as well. The local pizza was thin as a tortilla shell and came without any meat items at all. Steve didn't mind that; he always ate cheese-only pizza anyway. But my own more carnivorous taste buds thought this Greek – or perhaps Italian? – style of pizza left a lot to be desired. Still, though, it was food and there weren't any huge bowls of tomatoes anywhere in sight.

I slept pretty soundly that night. It had been a long day. I'm not so sure my companions slept as well as I did. You see, I snore a bit, especially when I'm tired, and the others were constantly ribbing me about it. Even John joined in the fun, saying that I made it necessary to sleep up topside. Steve described the noise as being like having a bear trapped in the bilges and so I became known as the Bilge Bear for the rest of the trip. The kidding was all good natured fun, which was just as well since there wasn't anything I could do about my snoring anyway. Besides, *I* couldn't hear it. It didn't bother me in the slightest.

However lacking in city slicker attractions Leros was, I thought it more than made up for it in the natural beauty of the place. I wasn't ready to leave it until I'd had a chance to do a bit of hiking around the island to take in the scenery. I also wanted to get some pictures of those two giant statues guarding the harbor mouth. Nobody else was interested in this expedition so I set off by myself along the little coast road that ringed the island.

Trees rimmed both sides of the road and I hadn't gone too far out of town when I noticed there were a series of antiaircraft guns placed at intervals between the road and the water. They were fairly well hidden from the sight of passersby on the road but not *that* well hidden. None of the guns were manned that day and I thought about taking a picture or two of them from the roadside since the idea struck me as ridiculous that somebody thought these things were necessary in case the peaceful Turks were suddenly to attack Leros. But after thinking about it a little, I decided against it. I was a foreigner in this land, too, and didn't have any trouble imagining how the Greek navy guys might react if they found out I'd been taking pictures of their gun emplacements. The thought of being jailed as a Turkish spy didn't appeal to me at all. No, sir. I kept my camera in my camera bag and kept walking.

As I hiked I kept looking for a good place from which to get my photos of those harbor mouth statues. After a bit of a long walk I finally found a spot that looked like it would do very well. I left the road to go into the trees on the shoreward side and got to work setting up my camera tripod. It was going to be a pretty long shot and I didn't want the camera to wiggle at all as I took the picture. I'd just gotten set up and ready to take the shot when I heard the noise of a little motor scooter on the road behind me. It was a uniformed Greek Navy shore patrolman. He saw me back in the trees, stopped, and walked over to where I was. "No picture," he curtly informed me.

I gave him my most winning smile and pointed to those harbor statues. "I'm just taking a picture of those statues," I reassured him.

He didn't speak English. "No picture!" he repeated.

Although I figured it was probably futile, I tried again to reassure him I wasn't taking pictures of his naval base, just those statues. He didn't understand a word I said and decided I probably hadn't understood him either. *"Deutsche?"* he asked me. He wanted to know if I was a German.

"Nein," I replied. *"Amerikaner."* No, American.

He rolled his eyes at heaven and I didn't need a translator to read the expression on his face. Geez, he was thinking, a bloody idiot American. *"NO PICTURE!"* he said, with feeling and emphasis. Okay, no picture. He stood there and watched me while I took my camera mount down and put it all away. Once he was satisfied I wasn't going to take any pictures he got back on his scooter and left. I was tempted to continue my hike and maybe find another spot to shoot from, but I figured if I was stopped again with my camera out by this guy or another shore patrolman it was probably going to be hard to talk my way out of an unpleasant situation. So I gave up my hike and headed back to the boat.

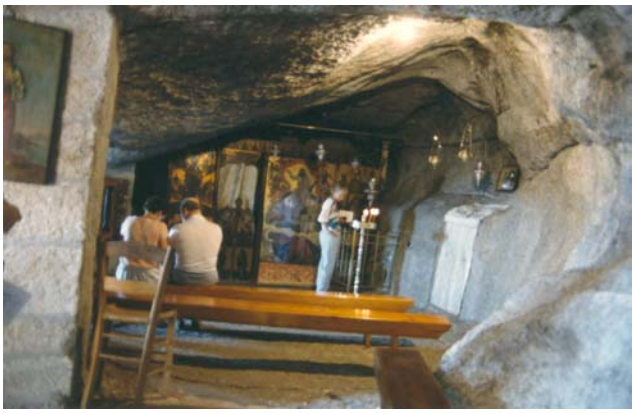
Skala, the monastery of St. John the Divine (brown castle-like building on the hill top) and Chora town (on top of the hill) from across the harbor on the island of Patmos.

When we set out for Patmos the wind was still blowing in our face and so we had another long day of sailing. While the island was still many miles away we could make out the imposing brown outline of the castle-like monastery of St. John the Divine perched prominently atop the island at nearly its highest point. It wasn't until we were very close that we could make out the white houses and buildings of the town of Chora, the old town that surrounds the monastery. St. John the Divine is – or was – who you think: the guy who wrote the Book of Revelations after being exiled to Patmos by the Romans near the end of the first century A.D. Our guidebook said the main specialty of Patmos was 'religion' but that turns out to not quite be true.

Patmos has one harbor, the town of Skala, and we finally reached the island and docked in the late

afternoon. Patmos is a popular tourist destination and the Port of Skala consequently was a pretty busy place every day. After tying up our first order of business was to get something to eat at one of the little outdoor restaurants.

The place we chose is worth describing a little. The dining area consisted of outdoor tables set in a pleasant little garden. There was a small building where the food was cooked, after which they brought it out to the table. There were no menus. Inside the restaurant building was a row of several white cafeteria-like food cases with glass fronts so you can see what was on display. The way it worked was you walked along and pointed to what you wanted to order. Literally. Whatever you pointed out to the proprietor and his helpers was taken right out of the case and that's what you were going to end up eating just as soon as they cooked it. No imagination required. You don't even need language, although there are two words I recommend as being very useful. I developed a real fondness for authentic Greek calamari (squid) and pretty much anything cooked 'soovlahki' (spit-roasted). Yum, yum. A little wine to wash it down with and I was one contented tourist. If you're wondering, 'calamari' in most non-Greek restaurants in the States bears a closer resemblance to onion rings than it does to real Greek calamari. Yuck. We ate well on Patmos. A man could live happy there. As the natives liked to say, 'No problem on Patmos.'



The Grotto of St. John on Patmos

Being the only one in our party who knew the Greek alphabet – a fringe benefit from my frat days – I was the designated sign reader and we needed one on Patmos. Our first full day there we hiked the road running up the hill to Chora to visit the monastery. On the way, just down the hill a ways from the monastery itself, we came to the Grotto of St. John, which was the cave where he lived on Patmos and where, presumably, he would have had his revelation. The church folks have turned it into a regular shrine complete with works of art, benches to sit on, electric lighting and so forth. A small white building has been built around the cave entrance. St. John didn't have it so good in his day. Along one wall there are two indents in the stone which they claim are John's hand marks from where he'd do all his praying. I'm pretty skeptical about that. There *are* two dents in the stone and they *are* about hand-sized. But it's not a limestone nor a sandstone cave and I have a hard time seeing how human hands could have possibly dented that rock no matter how much praying the guy did. Instead I suspect real estate developers aren't an exclusively modern phenomenon.

Inside the Monastery of St. John the Divine. The person waving is Chris.

The monastery itself is a magnificent and imposing building. From a distance it looks like a medieval castle but once you get up close it becomes obvious that it isn't. There are too many wooden doors in its walls and any competent feudal army would have no trouble breaking into it. It would, on the other hand, prove pretty effective at keeping out less militant unwanted visitors. Only a small part of the monastery is open to the public and I noticed the monks kept altogether out of sight from the visitors. Personally I thought the seventy drachma admission fee ought to have been worth at least a fleeting glimpse of a monk or two.

Skala and the harbor seen from the top of the Monastery of St. John the Divine

The public entrance to the monastery opened into a small and vaguely Spanish style courtyard. Numerous arched passages and doorways led off to the other areas within the monastery. We explored every nook and cranny we were allowed into. The monastery housed a small museum where interesting artifacts were on display. Fine paintings decorated the walls everywhere I went and there was a glittering gold-leafed alter in one room. The roof of the monastery offered a panoramic view looking down on Skala and the harbor below. While I was up there I saw one of the huge cruise liners steam into the harbor. It docked and disgorged a horde of passengers onto the streets of Skala.

The guidebook had warned us of the monastery's dress code. Shirts and long-legged pants were required. No shorts. No bare chests. Forewarned is forearmed, so before leaving Skala I had stuffed a pair of hiking rain pants in my backpack. When I got to the monastery I simply unslung my backpack, pulled out the rain pants, and slipped them on right over my hiking shorts. As I did peels of cackling laughter filled the air. A short distance away there was an old Greek woman – the very picture of an old crone – who had a souvenir stand. Apparently she thought my putting my pants on was pretty funny and she was laughing uproariously at me, complete with thigh slapping and the whole works. I'm not sure what it was she found so funny. Maybe she thought my hiking shorts were underpants or something. Technically I suppose they were since they were now under my long-legged pants. Whatever the reason, she waved mirthfully at me and I gave her a grin and waved back before going inside the monastery.

She was still there when I came back out. It was a hot day and I didn't want to walk around with long pants on, so I stripped them off and put them back in my backpack. Peels of cackling laughter erupted from the old woman again and she waved at me to come over. Truth be told, I thought it was pretty funny that she thought *I* was funny, so I walked over to her wearing a big grin.

It turned out she sold these pretty little stones that were naturally decorated by colored veins ringing a solid colored background. They were all natural, you understand. No painting. She handed me a very nice one, all chocolate-brown in color with purplish veins decorating it like necklaces. I offered to pay for it but she wasn't having any of that. She just waved my money away and wouldn't take whatever the Greek equivalent of a nickel is for it. It was a present from her to me for giving her such a nice laugh. I still have it today.

Typical street in Chora. This particular one is lined with souvenir shops.

This friendliness was typical of the people of Patmos and a great contrast to the glum and more or less unfriendly people I'd encountered on Kos. Of course, most of the people I met on Patmos were trying to sell me something and that might have had a little bit to do with it. But there is no doubt the people here were friendly to us.

The streets of Chora were narrow and winding. It didn't seem possible to get a car down many of them although the Greek taxi drivers looked and acted like they were apt to try almost anything. Many small souvenir shops lined what I came to think of

as Chora's 'business district' and I loaded up on souvenirs to send home to Boise. These included several small statues – including a bust of Socrates – some porcelain coffee cup coasters hand painted with images of ancient Greece, a very nice painting, and my Greek fisherman's cap. I like hats and on that trip I started a little tradition of buying a local hat when I visited a foreign country. I did make an exception in the case of Turkey, though. Somehow I thought I just didn't look right wearing a fez. I now have a lot of hats at home, but my Patmos cap is the pride of the collection.

My usual sail boarding posture

I thought it was interesting and more than a little ironic that Patmos, of all places, also featured the best nude beach we saw anywhere on that trip. It was located a bit farther up the coast in one of the many little inlets all along the island's coast and we sailed over there and dropped anchor in the middle of the inlet. *Dark Star* had a small rubber dingy we used to go back and forth from boat to shore. These memoirs being a family-rated work, I won't show any pictures from that beach other than the one to the left here. If you're wondering, yes, I'm wearing swimming trunks in that picture. The beach was situated well outside Skala and the only natives I saw there were the vendors renting sail boards or selling snacks and beverages. Most of the tourists lounging on the beach, with the exception of the Germans, chose not to go bottomless. The German goddesses lining that beach provided a different sort of Revelation. In a word, *Wunderbar!*

We all tried our hand at sail boarding while we were anchored at the nude beach. Of the lot of us only John was any good at it. It was a bit of a comfort that our captain knew how to master a sail board. The rest of us were pretty lubberly. I'd say Jane was better at it than any of us (except John, of course). Must have been that British seafaring tradition; maybe it gets into the blood. I couldn't get the hang of it at all. I'd manage ten or twenty yards and then *splash!* over I'd go headfirst into the warm, salty water of the bay. When I'd come back up to the surface Chris remarked that I looked a little like Poseidon rising from the deep. All I needed was a trident. It was easy to swim in that water because all the salt made it really buoyant. Tailor made for a Bilge Bear.

One twice-daily entertainment at the beach was the running of the goats. Just around breakfast time we'd hear the jingling of a bell coming up the nearby road and the next thing we'd see was this big herd of goats coming around the bend and running like mad. A local Greek boy – I'd say he was maybe twelve or thirteen – ran with them, switching them along with a slender little stick. Up over the hill they'd go, their small hooves pounding on the road, as they went off to what I presume was their daytime pasture. Just around dinner time we'd hear the bell around the neck of the bell goat coming back and the herd would explode into sight from over the hill. Down the road and around the bend they'd go with the boy still running with them. The Return of the Goats would signal that it was time for sundowners.

Coming into Güllück, Turkey

We lingered for three full days on Patmos and it wasn't without reluctance that we finally bade farewell to that idyllic place. But our time in the Aegean was coming to a close and we had to start making our way back to Bodrum. From Patmos we decided to make our next stop back in Turkey at the seaport town of Güllück. Güllück was a little over fifty-five miles from Patmos, almost due east and a little to the south. The same wind that had impeded

us in sailing north now aided us and we made the crossing very rapidly. Not far out of Patmos a school of dolphins discovered us and playfully kept us company for many miles on route. I tried to get some pictures of them as they'd come leaping out of the water, but I didn't have an auto-shutter with me and it proved to be nearly impossible to catch them in flight before they dropped back into the water.

We made Güllück harbor just as the sun was starting to set, having carefully remembered to switch our Greek pennant back to the Turkish crescent before entering it. As we came up to the dock we passed a big freighter that was moored there and was taking on cargo. The Turkish sailors aboard her lined the deck to stare down at Jane, who was wearing a bikini. I couldn't blame them for staring. I'd been doing as much staring at her as politeness allowed all through our crossing. But it did remind us that we weren't in Greece anymore and Turkey is a Moslem country. Jane blushed and went below to put on some less revealing clothes.

Because of the freighters that came in and out of Güllück we anchored offshore a ways out in the harbor and used the dingy for going to and coming from the shore. There were several other yachts anchored out there, one of which belonged to a French party. The French, despite being where we all were, unconcernedly entertained themselves by diving off the stern of their boat and doing a little topless swimming. The young French women were pretty gorgeous and I noticed they were drawing a bit of an audience from the teenage Turkish boys on shore who were watching from the tree line while trying at the same time to look like they *weren't* watching. Tsk, tsk, boys. What would your *imam* say?

Ancient ruins near Güllück. Left: ruins of what appeared to be an ancient Greek temple. Right: me having a seat in the ruins of an old Greek theater. The stone wall in the background probably dates from the Byzantine empire. The older ruins were often marble. The Byzantine ones were cruder stone work.

Güllück itself didn't have a whole lot to recommend it. Perhaps that's why our guidebook didn't even mention it. But the hills around it were richly littered by many ancient ruins, some dating back to the ancient Greeks, others which were more recent and came from the age of the Byzantine empire. Once we got back into those hills we found ourselves practically stumbling over one ancient site after another. The best ruins we saw on the whole trip were at Güllück. I was a little surprised there weren't more tourists wandering around there. The only other person I saw besides my friends was a German guy who was taking in a little sun at one of the sites. I guess he thought he had the place to himself because he'd stripped down naked and was sitting on the remains of one of the old marble walls. I never saw a more startled look on anyone's face than on his when I suddenly walked out of the trees. I don't think I could possibly be mistaken for a Turk, but this was after all a Moslem country and the sun worshipper wasn't taking any chances. He hurriedly pulled on his clothes and made a quick exit from the site. I'd always figured the French would be the big fans of going *au naturel* but the French had nothing on the Germans on that trip as far as I could tell.

We spent one day exploring the region around Güllück and then it was time to head back to Bodrum. We made the trip hugging the Turkish coast and it was a long sail, slightly over fifty miles. Again, though, the wind was in our favor and we made good time, passing several small Turkish towns en route.

Bodrum marketplace

We had only two days remaining in Bodrum until we had to return to Izmir for the flight back to England. This was when we really threw ourselves into souvenir purchasing. Chris wanted to buy a Turkish carpet and so we made the rounds of the local carpet dealers.

These were interesting guys. One dealer whose shop we visited was typical of the breed. Alone among all the Turks I met, the carpet dealers were the only heavyset men. When we walked into his store, the proprietor greeted us like we were long-lost relatives. “Ah! Come in! Come in, my friends!” He was sharply dressed and wore a Rolex watch on his left wrist and gold rings on his fingers. He exuded friendliness and warmth, although there was something kind of predatory in his wide, toothy smile. I was told the Turkish word for ‘carpet dealer’ translates literally into English as ‘the hunter.’ He did everything but give us a hug. “Please! Sit! Be comfortable! Tea?” He clapped his hands and a skinny Turk materialized almost from out of nowhere bearing a tea tray.

After we were seated and served the carpet show began. A whole procession of skinny Turks began to parade before us, each one bearing a rolled up carpet in his arms. He’d unroll it with a *snap!* hold it up briefly, and then drop it onto the growing pile of carpets at Chris’ feet. Apparently the louder the *snap!* was, the better the carpet was supposed to be. In less than ten minutes the carpet pile on the floor was three feet high. All the first ones we were shown were cloth carpets and Chris asked our new ‘friend’ if there were any silk ones. “Of course! Of course!” he cried, acting like he should have thought of this himself without being asked. He clapped his hands again and the rug bearers began bringing silk carpets out and adding them to the pile.

I have to admit they were beautiful carpets. One of them caught Chris’ eye and she asked how much it was. “Normally two million lira,” our host replied, then he bent down and softened his voice like a conspirator, “but for *you,* my friend, we make a special deal. One million five hundred thousand.” I could practically see the word ‘bargain’ light up in Chris’ eye and she asked how much that was in pounds. “Five thousand pounds.” Steve winced and turned pale. Well, I thought, that would explain the Rolex.

Fortunately for Steve and unfortunately for Chris, it turned out we didn’t have time to buy a carpet. What we didn’t know was that the process of buying a Turkish carpet takes three days. The first day you’re supposed to visit all the carpet dealers just to see what’s available and to decide on which one you want. The second day you’re supposed to go back to the dealer whose carpet you’ve decided on and start bargaining. That’s supposed to take all day and it’s supposed to end with no deal being made. If you buy the carpet on the second day even the dealer thinks you’re stupid. On the third day you come back and strike a bargain. We only had two days so Chris didn’t get her silk carpet. I have no idea how much she might have been able to dicker him down, but back in England later I saw almost exactly the same silk carpet in a London shop. It’s price tag was ten thousand pounds. So our ‘friend’ in Bodrum really did offer the better deal even on the first day.

It wasn’t without regret when the time to go finally came. Back in Izmir we went through all the normal routines of boarding an international flight to return to London. The Turks didn’t have any sophisticated x-ray machines or other western airport security paraphernalia. Instead a skinny young customs official would open our bags and hand search them. All the suitcases and other luggage were deposited on the tarmac next to the plane and as you walked by you were supposed to point to which baggage was yours. Only then would the Turkish baggage handler load it on the plane. Any unclaimed or unidentified bags were left sitting right there on the ground. My guess is that those were the ones where the bombs would be if anybody was trying to bomb the plane. I pointed out my stuff, boarded, and all too

soon we were back in England once again, my brief stint as a 'rich American abroad' now over. □

While my role as 'rich American abroad' was ended, I was still an 'American abroad' and my vacation wasn't over yet. I still had two more weeks reserved to see the sights of Great Britain. The day after we got back to Bristol Vern flew over and joined us. He had declined the sailing trip because he is pretty susceptible to motion sickness and somehow the thought of sailing, sailing over the bounding main hadn't appealed to him very much. He and I overlapped in Britain for two weeks, then he was going off with Steve to do some climbing.

One of the first things I noticed about England was basic staples of life were reasonably priced and anything beyond that was pretty high priced. I'm not entirely sure why that was so, but I was told it had to do with the taxes in Britain, which were still very high at that time. Britain had emerged from World War II victorious and bankrupt, and after Attlee and his Labor Party came into office Britain had embarked on the course of socialism. Whether or not that improved life for the average Brit I can't say. I can say the Brits I met complained just as heartily about their taxes as the average American complains about his and with better reason since their tax brackets were much higher than ours. Our own liberals patterned many of their ideas after the British examples.

Stonehenge

Chris was our tour guide during the weekdays while Steve was working but on the weekends the four of us would visit as many of the interesting places as we possibly could. Although it was August the weather in Britain was chilly and cloudy most of the time and light jackets were the dress code of the day.

One of our first stops was Stonehenge on the Salisbury plain. Stonehenge is by far the oldest man-made thing I've ever seen. It was kind of awesome to stand there looking upon it while knowing that this place was where the Romans had come to see ancient ruins. They had the place roped off when we visited so we weren't able to walk around within the stone circles themselves, but it was still very impressive. Many of the stones were gigantic and all of them come from places pretty far away from the site itself. How prehistoric man managed to transport these huge stones to the site and then erect the stone structures is a complete mystery. It is likewise a complete mystery why they did it. No one knows why Stonehenge was built.

A typical English village. The two people are Chris and Vern.

There were quite a few other ancient stone circles scattered about the countryside near Stonehenge. They weren't as immediately impressive as Stonehenge itself and the stones used were not nearly as large. These old stone circles are also prehistoric in origin and, again, no one is too sure what their purpose was. We passed through many very charming small English villages having very old houses. Many of them had grass-thatched roofs. I thought this was very interesting but also very odd. Why would anyone want a grass roof? And what was under all that grass? I never did find out the answer to either question, but it must work well enough because I saw an awful lot of them and I wouldn't say the people who lived there were poor.

The Roman bath at Bath, England

Another stop we made was at the old Roman bath works in, where else?, Bath. One thing I like very much about the British is how practical they are. What else would you name the town where the bath works are other than Bath? The baths no longer work, of course, and the water was this strange green color. I'd be in no hurry to jump in that water. No, sir. But the site, both above ground and below, was very interesting. A lot of civil engineering went into it and the technology they used back in the days when Rome ruled England is very impressive even in its ruined state. I think today most of us very much underestimate just how advanced classical civilization really was in ancient times. The bath works at Bath were built centuries before the fabled time of King Arthur.

One of the things about England I found hard – impossible, really – to get used to was driving on the left side of the road. Almost every time we got in the car I'd start to get in on what in the U.S. would be the passenger side, only to catch myself as I reached for the door handle and saw the steering wheel. I even found it tricky to cross the streets because I'd automatically look the wrong way first. A couple of times I almost managed to become a hood ornament because I'd look to the left for traffic and the traffic would come from the right instead. It wasn't just that my instincts were wrong; they were exactly the opposite of right. I wouldn't dare try to drive a car in Britain; I'd be an accident looking for a place to happen. One of the most amusing things I saw over there were these strange little three-wheeled cars that seemed to be everywhere. Not four wheels, mind you; three wheels. They were the real version of my old tricycle-car I had when we lived on Anderson St. Why someone would want to build a car like that I don't know, but they must have been reasonably good cars because I saw them everywhere I went.

We often took lunch in one of the numerous pubs that could be found everywhere. Beef was fairly expensive in England but was very tasty. I also enjoyed British fish and chips. It wasn't too clear to me why chips were called 'chips'; the name always made me think 'potato chips' but in reality British chips are indistinguishable from American French fries. British beer was fabulous, too. They serve it at room temperature, which I was a bit leery of before I tasted it. After all, nothing in this world tastes worse than a room temperature American beer like Budweiser or Pabst or any of the older pre-microbrewery brands of American beer. But British beer was completely another story altogether. After I came home from Britain I rarely drank any of the older brands of American beer again. I still enjoy a good micro-brewery beer, either a good stout or a good ale, but the brands of beer I used to drink in college taste like horse urine to me now. The word 'pub' is short for 'public house' and the small pubs we went to were congenial, friendly places where we could rub elbows with the locals. Sometimes it was hard to understand what they were saying; British English and American English parted ways long ago. I imagine many of my American idioms were just as strange sounding to the Brits. But the Brits I met, one and all, were delightful people and I liked them very much.

Naturally, London was one of our must-see spots. We took an early morning train from Bristol to London for a full day of sight-seeing. We left early enough that we took breakfast in the train's dining car. I asked the waiter there for some milk to go with my breakfast and a sad, apologetic look spread across his face. "I don't have any proper milk, sir," he said. "All I've got is this." He held up a pint box of milk no different from what you find in any American grocery store. "It's been ′omogenized," he said. "It's got a funny taste."

I couldn't bring myself to tell him it was no different from American milk. I guess by British standards there must not be any proper milk across the length and breadth of the USA.

The Tower of London. Left: approaching the gateway to enter the Tower. Right: view coming in with the White Tower visible in the center background.

One of our first stops in London was the fabulous fortress and Royal Palace of the Tower of London. The original stone tower, the White Tower, had been built by William the Conqueror after the Norman conquest of Anglo-Saxon England. Over the centuries that followed the fortress was enlarged until it had grown to a huge size and now covers about eighteen acres of ground. From the outside the surrounding walls are huge and I could easily imagine how intimidating they would have been to any soldiers in an army from the Middle Ages that might have wanted to attack this place. The Tower definitely serves as an example of the real meaning of the word 'fortress.'

The Tower is very much a living place, housing a complement of British soldiers popularly known as the Beefeaters but officially known as the Yeoman Warders. A Yeoman Warder is seen in the center of the left-hand photo above. The Yeoman Warders are the custodians of the Tower and the Crown Jewels that are kept there. A Beefeater gave us a very nice tour talk when we first entered the Tower, explaining much of the history of the place. Housed within the White Tower was a fabulous museum displaying old, highly polished suits of armor and countless numbers of historical artifacts. Within the outer walls there are many inside buildings and numerous other towers. The Beefeaters live inside the tower in the many apartments it contains. The site of the Tower had been occupied during Roman times and the remnants of old Roman walls still can be found there. If you ever get a chance to visit Her Majesty's Tower of London, give yourself a lot of time to see it. It will be worth it.

'Bustling' is a good word to use to describe the streets of London. We used the 'underground' – the Brits' name for their subway – to get around in the city. One thing I noticed was that even the panhandlers in the parts of London where we encountered them were nicely dressed and not as pushy as panhandlers in San Francisco were. One of them, a young woman, approached Vern as we were passing. "Do you speak English, love?" she asked him. "No," Vern replied and she went off to panhandle someone else.

St. Paul's Cathedral, London

After visiting Parliament, the Tower Bridge – which many Americans mistakenly think is the London Bridge – Big Ben, Trafalgar Square, and Buckingham Palace we went to see St. Paul's Cathedral. St. Paul's is a seriously immense church, very beautiful, and a mammoth work of art in stone. Its rotunda is called the 'whispering gallery' because it has a profoundly unique acoustic property Steve showed me. He and I stood on opposite sides of the rotunda next to the outer wall, and Steve started whispering. I could hear everything he said perfectly from all the

way across on the other side because the sound waves carried along the wall. It was an amazing phenomenon of physics built right into the structure of the building.

Westminster Abbey

We also visited Westminster Cathedral and Westminster Abbey, two more seriously beautiful churches. Some of the most famous people in the history of the West are entombed in these churches including Lord Admiral Horatio Nelson (St. Paul's) and Queen Elizabeth I, King James I, Mary Stuart, and Sir Isaac Newton (Westminster Abbey).

Like me, Steve reads a lot and since we were in London Chris also wanted to hit some shops; and so we also visited a number of downtown London stores. Aside from one where I saw a silk carpet similar to the one that had caught Chris' eye in Bodrum, the only thing I remember from that little excursion was a place that billed itself as 'the world's largest bookstore.' It may well have been just that. The place was five stories tall and packed with books on every conceivable topic. I had to restrain myself; it would have been too easy for me to go nuts in that place and spend a small fortune. But I limited myself to picking up just a few books on non-linear system theory, which I was studying at the time as part of my brain research project.

Caerphilly Castle

My vacation in Britain could not have been complete without going castle-hopping. There are numerous old castles, many of which are in ruins now, dating back from the Middle Ages after the Norman conquest in Wales and Scotland. We set out to visit as many of these as time allowed. The majority of these are fairly small as castles go, limited to one tall stone tower. But there are some very industrial-strength castles, too. The two most impressive ones we visited were Caerphilly castle and Caernarfon castle.

Construction of Caerphilly began in 1268. It is an enormous fortress occupying thirty acres of ground. Three rings of stone walls protect the innermost part of the castle complex. At one time the inner two rings were protected by a moat. Each wall gets progressively higher as you move inward toward the center of the castle, and so any attacking army that breached the first wall would find itself an easy target for archers stationed on the next as well as those still occupying the wall behind. I tried to imagine what it would have been like to be a foot soldier in a thirteenth or fourteenth century army trying to storm this place. Not fun at all, I decided. Without the technology of cannons, I couldn't imagine any practical way to conquer this place other than trying to starve out the defenders.

Caernarfon Castle

Caernarfon was just as impressive. It was built with an hourglass shape that divides the inner grounds into two wards. It has only a single massive wall with ten towers spaced around its periphery. A lot of restoration work has gone into this castle because in addition to being a fortress it was built originally to be the official residence of the Prince of Wales. It no longer serves that function, but it was the site of the investiture of Prince Charles as Prince of Wales in 1969. The castle houses a museum, the Royal Welch Fusiliers Museum, an arms exhibit, and a 'Princes of Wales' exhibit.

None of the other castles we visited, excepting of course the Tower of London, were in as good a state of restoration of Caernarfon. Most were like Caerphilly or worse. The wooden floors and living quarters of these castles have long since rotted away and the great towers have only a big hole right down through the middle flanked with stonework on all sides. Still it was, naturally, irresistible to me to climb the long spiraling stone stairs of the towers to see the view from their very tops. Most now have rope banisters to hang on to during the climb, but in their day these stairways did not have this safety feature. The stone steps were small and it's hard to see how an armor clad man could bound up them all that quickly. By the time I would get to the top I'd be feeling pretty winded from the climb. At one stop I was huffing and puffing after climbing to the top of a sixty foot tower and wondering a bit if I was getting old or something. Just then a British family with a little boy, who was probably eleven or twelve, came up the stairway from behind me. On reaching the top, the boy turned to his 'mummy' and gasped out, *"I'm shattered!"* which is the Brits' slang for saying 'I'm exhausted.' I felt better after hearing this.

I really loved England and Wales, and the tiny piece of Scotland I had time to see, and my days in Great Britain passed all too quickly. I would have dearly loved to have seen Ireland as well, but there just wasn't time to go everywhere I wanted to go and see everything I wanted to see. Even after all these years I keep telling myself I have to go back there some day. But by mid-August I'd been away from home for a month and it was time to come back to Boise. So ended the greatest vacation I've ever had. □

In January of 1986 we were still putting the finishing touches on Eagle. On January 28th I was on my way back to my desk from one of our analytical laboratories when Mitch's secretary stopped me in the hallway. She was upset and distressed. "Did you hear about the space shuttle?" she asked. That was how I learned *Challenger* had exploded barely a minute after launch, killing all seven astronauts.

Like millions of people, I was mesmerized watching the news replays of the launch and the explosion. To this day I can't find adequate words to describe my feelings. Shock, yes. Depression, yes. A deep inner sadness, yes. A sense of anger that continued to grow in the weeks that followed as more details about the accident came to light, yes. But none of these words really do justice to how I felt inside. I could remember the overwhelming pride in my profession – engineering – and in my country I had felt when Craig and I watched *Columbia's* first landing in April of 1981. Even in the midst of all the many problems and troubles with which America has to come to grips, the grand and inspiring accomplishments of NASA and the space program had always served as a most splendid example of what America can do when we put our collective efforts as a free people together to work for a common goal.

Now in a devastating instant came the worst possible failure imaginable. When the Apollo 1 fire had claimed the lives of Gus Grissom, Ed White, and Roger Chaffee it had been an awful tragedy but it had,

after all, happened at a time when Apollo was little more than a very dangerous and experimental vehicle and it had been caused by a cascade of small, individual mistakes and errors that had avalanched in the worst way possible. When the oxygen tank had exploded during the moon flight of Apollo 13 the incredible and heroic efforts of all the NASA people in bringing the astronauts safely home seemed to me and to many others a confirmation of the skill, care, and professionalism of America's space program. It really made it seem to me and to many others that something like *Challenger* simply could not happen to us. Not this way. Not during a launch. Not in the way it had happened. Not from what was so obviously a fundamental design flaw and, as we all learned later, culpable negligence on the part of NASA and NASA contractor administrators and managers. When the latter came to light six months later after the report of the Rogers' Commission was published I was shocked and very, very angry.

I thought it was clear from the very beginning, in watching those news replays, that something in the solid rocket booster was the root cause of the disaster. You don't have to be Wernher von Braun to know flames aren't supposed to spurt out of the sides of a rocket engine. The pictures of this happening were particularly hard on my friend Jan. Her father – who was also my friend – worked at Morton Thiokol, the contractor who designed and built the solid rocket boosters. As everyone now knows, the accident was caused by the rubber O-rings placed in the rocket motor specifically to prevent flaming gas – 'blow by' as NASA euphemistically called it – from escaping through the joints. When Nobel laureate Richard Feynman staged his dramatic demonstration during the Commission hearings that the O-ring material would fail to do its job when it got cold, the physics of the failure was suddenly exposed to be something so fundamental and obvious that the magnitude of the design failure defied comprehension.

When it came to light that 'blow-by' had been observed on earlier shuttle flights, that the decision makers were aware of it, and that NASA and its contractors had been gambling all along with the lives of the shuttle astronauts, I was baffled and utterly furious. Why no one went to jail because of this is something I fail to understand right up to today. If a drunk gets behind the wheel of a car and kills somebody, he gets charged with vehicular homicide – murder. The people who knew about this design failure before January of 1986 weren't drunk. They knew the danger in the light of cold sobriety. Despite what the press claimed, there are no heroes in this tragedy other than the seven people who lost their lives. There was only ethical bankruptcy all down the line from the top officials at NASA to the engineers who knew about the danger and failed to act effectively to stop the inevitable from happening. Jobs and careers – no matter whose – are not more important than lives.

You see, there are *always* social consequences in the work engineers do. It isn't often the case that lives are on the line in what most engineers do, but the social consequences are always there. Consider the comparatively tame nature of my own work for HP. Disk drives like those we manufactured are not sold into marketplaces where a disk drive failure puts lives at risk. The possibility of financial loss, yes; the possibility of great inconvenience, yes. But not the possibility of loss of lives. *Those* applications are – or should be – very special and even more reliability assurance precautions to mitigate against a single disk drive failure are taken. But social consequences of what I did for a living were there nonetheless.

I was always keenly aware, for example, that the jobs and livelihoods of our production workers depended a great deal on the work my colleagues and I did. New products were the lifeblood of our company and if I failed to do my job with complete professionalism the people who would ultimately pay the biggest price would be the people who worked in the factory. I never once forgot what things had been like in Maquoketa when the Clinton Engines factory went bankrupt. I never once doubted the same thing could happen to *any* company. A company – especially a publicly-held stock corporation – doesn't *just* belong to the shareholders, despite the avaricious and self-serving slogans of those predators we call investment bankers. It belongs also to the people who work there, without whom no company can be successful or survive. That's what the word 'company' *means.* The word 'incorporated' means 'united in a body.' There is a social and moral contract implicit in every business organization and this contract is binding on everyone from owner to the guy who sweeps up at closing time. I know most business people today would deny this, but all such denials are self-serving and merely excuses. Bill Hewlett and Dave

Packard knew the truth of this fact keenly. That was why under them HP was the best managed company in the world. □

By spring of 1986 Eagle, now the HP 7937, was in full production and we were back in the R&D lab in Building 83 Upper once more. Our section was working simultaneously on two projects. One was the 'Eagle Cost Reduction' project. It was aimed at reducing the manufacturing cost of the HP 7937 by developing what are known as 'application specific integrated circuits' – ASICs – to replace the older and more conventional technology with which Eagle had been designed. New technology ICs would be used to perform a number of functions carried out by dozens of older chips. Some of the mechanical engineers were set to work reducing the costs of the actuator assembly. This project was never given a code name.

The other project was Eagle II, the next generation Eagle, and this is the one to which I was assigned. It was an interesting assignment in a number of ways. HP – or at least DMD – had gone away from the old title of 'project leader'; instead I was designated the 'architect' for the Eagle II electronics. In this role I was responsible for coming up with what is called the 'Engineering Reference Specification' or ERS, the lengthy document that defines all the technical specifications the heads, disks, and electronics were to be designed to meet. Dave, the mechanical engineer with whom I had worked on the resonance problem, had the same role for the mechanical ERS and the two of us jointly partnered to define what Eagle II would be. We also had responsibility for planning the technical schedule of the project, known as a PERT chart. PERT was a technical project management tool that had been developed by NASA for the space program and most US companies had adopted it as part of the process of doing development engineering.

'Doing the architecture' is a full-time job at the beginning of a project but once it is done and the ERS is published to the team it is not a job that takes very much time. Looking after the PERT, making tactical changes to the development plan, and occasionally revising the ERS is about all there is to it. Therefore both Dave and I had design responsibilities too once things got rolling. In my case I was responsible for doing the Eagle II servo system, the part of the disk drive that positions the heads over the data tracks. We planned to replace the older analog electronics method of designing the servo system by using digital signal processing technology. This was based on new microcomputer chips that had come out and had been specially designed for digital signal processing, commonly referred to as 'DSP.'

My friend Larry Ritchie on one of our hiking trips.

I wasn't the only engineer working on the servo. There were two other guys who had design responsibilities for it as well. But the DSP aspect was mine to do. It was kind of a coveted sub-assignment within the overall servo system design and one I was very eager to do, in part because the nature of this DSP design also dovetailed nicely with my own electronic brain research I did at home. You see, a digital signal processor – called a 'DSP chip' for short – is also capable of implementing what is known as an 'artificial neural network' or ANN, and neural networks are fundamental in mathematical theories of higher-level brain functions. Consequently, my day job and my after-hours electronic brain avocation complemented each other very nicely. By 1986 I wasn't the only guy with the technical training and experience to do the DSP part of our servo, but as 'architect' – which was basically just another name for 'project leader' – I was in a position to cherry pick this part of the job for myself and that's what I did. Rank has its privileges.

Our servo design objective was not to make the servo '100% digital'; that isn't possible. The design specs called for some very high-precision analog electronics right in the front end, and the design of this crucial element went to my very good friend Larry Ritchie. I had met Larry and his beautiful wife, Susan,

at one of the parties I attended not long after first moving to Boise. Larry has an 'Amiable' interpersonal style – the same classification as Rich Smith was in – and so our friendship always had a kind of 'odd couple' flavor to it inasmuch as I'm a 'Driver' style personality. But since he never actually worked for me and I never worked for him, we didn't have the kind of problems I had had with Rich. We both shared a love of music, especially for polkas. Larry played the accordion and he was the one who originally urged me to learn how to play a musical instrument. I'd never owned an instrument; we couldn't afford that when I was a kid, although Melody did try her hand at playing a clarinet when she was little. It was the only thing I ever saw her try that she wasn't very good at – and, of course, I didn't let the opportunity to tease her about a shortcoming go by since I always came out on the losing side compared to her on pretty much everything else.

But Larry suggested and urged me to give learning to play an instrument a try. He said he thought I could learn how to play an electronic keyboard and under his encouragement I agreed to give it a try. He even helped me pick one out, one that was well suited to a raw – and, admittedly, impatient – beginner like myself. He was right, too. I did manage to teach myself how to play it reasonably well in just the space of a few years. Now I could do more than just sing, and I owe that to Larry. I never did learn how to read sheet music 'in real time' the way Larry can, so all my playing has always been by ear. But he and I had a lot of fun playing together, he on his accordion and me on my keyboard. He's unquestionably the better musician and that gave me some extra incentive to practice and improve so I wouldn't mess us up when we played together.

High precision analog design takes great skill and Larry had it. This was no surprise to me; I'd seen what he'd accomplished over the years even though Eagle II was the first time we were actually paired up on the same project. I always thought Larry was greatly underappreciated at DMD. He's a gentle man, he really hates confrontations and he tended to give way to more aggressive personalities. When he had first come to DMD his boss was Mitch, who could easily serve as the poster boy for a rough, gruff, tough driving Driver personality style. Mitch loves to argue about technical matters and people who don't know him very well tend to overwhelmed by his blunt in-your-face style of arguing. I'm sure Larry didn't find working for Mitch an unalloyed pleasure. No, sir. I, on the other hand, tend to meet confrontation with confrontation and wouldn't ever back down from Mitch if I thought I was right and he was wrong. The first technical argument I ever had with Mitch was one of these high-volume, right-in-the-middle-of-the-lab confrontations, and when it turned out that my technical argument was the better of the two Mitch immediately conceded the issue, no hard feelings. That's how I knew Mitch didn't take these things personally. But not many people knew that about Mitch. Greg did. Maybe a few others. But not many.

I have no doubt that starting off by working for Mitch was probably the main reason why Larry's skills were always so underappreciated at DMD. Mitch is kind of a force of nature and I don't remember ever hearing him pay someone a compliment. But engineers aren't hired to argue; they're hired to solve problems and I've always held the opinion that this and the ability to work as part of a team are what count at the end of the day. Larry is a team player and he solved problems and he solved them so well and so quietly people just didn't give him the credit he deserved. The Eagle II design he did was perfect. Even Bill Hewlett would have said so if he'd still been around. I know Greg knew how good Larry's design was; I know because I told him how good it was. Larry never, ever tooted his own horn so I did it for him.

There was one idea I'd gotten from Larry that I wanted to explore for Eagle II. Larry already had his master's degree when he came to HP and he'd written his thesis on the topic of what is known as a 'variable structure control' system, abbreviated VSC. VSC is a highly nonlinear type of control system – vastly different from traditional disk drive servo approaches – but there were two reasons I wanted to look into it as a candidate method for Eagle II. The first, and most important, reason was that if it worked it would be highly immune to the kinds of parameter variations that ate into our servo margin. Servo margin had been a big issue for the HP 7937 during its development. The second reason, which was important to me but not to HP, was because I had made a hypothesis that various feedback systems in the brain, especially those involving motor control, might well turn out to be VSC types of neural network systems.

It looked like an opportunity to try to kill two birds with one stone.

The problem, though, was that a VSC system is mathematically very complex because of the non-linear mathematics it involves. It is only simple for relatively simple applications and Eagle II was not one of these. In point of fact, there were theoretical reasons for thinking that a practical VSC servo for Eagle II would not work at all. On the other hand, some of the conditions that led to this mathematical theorem weren't met by Eagle II and so there was some hope that a practical system could come of this approach. We had our model of the Eagle actuator, which was easily adapted to fit Eagle II, and at that point in the project there was room in our PERT schedule to try out the idea on our simulator. The amount of time available had a definite limit to it, of course. But it was enough time to explore the feasibility.

Unfortunately, this turned out to be a very bad idea so far as Eagle II was concerned. Chet had once remarked, "You know, nonlinear systems can do anything they want to." This turned out to be an excellent description of how the VSC behaved in our simulator. It exhibited a number of astonishing – and thoroughly unpleasant – behaviors and I never was able to figure out how to tame it. I did give it 'the old college try' to my best ability, but when it still wasn't even close to working when I ran out of available time I had to drop the idea and go with the conventional approach. So much for the Eagle II bird I was aiming at. As it turns out, my VSC hypothesis about brain systems is also still unproven to this day, so I didn't get any birds with this one stone in 1986. But I'm still working on the VSC idea for brain theory and maybe one of these days I'll get it figured out. If I do it will be an important finding and the original inspiration for it will be owed to Larry. □

Because the Eagle II servo system used such a different approach from previous servo designs its development involved coming up with a number of inventions. All in all I ended up filing about a half dozen invention disclosures with HP's legal department. Although HP did not directly pay any additional bonus money to its engineers for making new inventions, the company had begun doing a nice form of recognition for new inventions. When a patent was issued the inventor received a nice wooden plaque with a copy of the first page of the patent laser engraved on it. The plaque would be presented at a coffee talk in front of everyone. For a development engineer it really was a very gratifying form of recognition. Coming up with inventions was, of course, what we were paid to do in the first place but being honored in front of one's co-workers in this way still felt good.

But as it turned out, it was the committee that reviewed invention disclosures who decided whether or not a particular disclosure would actually be filed with the U.S. Patent Office. Some inventions were seen as too important to risk competitors learning about the technique or method, which is what a patent discloses to the world. In these cases the invention disclosure could be classified as a 'trade secret.' Trade secrets being secrets, there was no public recognition whatsoever that went with that kind of invention. This was a policy I didn't particularly understand, but it was the policy nonetheless. As it turned out, the invention disclosure committee at that time was chaired by the other lab manager, Doug Clifford. Doug and I for some reason didn't along too good – the most likely reason being that I had a sense of humor that Doug didn't exactly share. He was one of those terminally serious types of managers who never fraternized with the troops and rarely smiled at work. In all the years I knew him, I never once heard him laugh or even so much as chuckle at anything. Even Mitch laughed every once in awhile, so Doug was something of an oddball in this respect.

Well, you can probably guess how tempting it was for me to tease Doug a little bit just to see if I could get him to lighten up some. Life at DMD had enough serious, stressful moments just from the nature of the business we were in without having our top leaders constantly walking around looking like what we were doing was on par with storming the beaches at Normandy. I tend to tease just about everybody I know who is overly serious about everything and I didn't even try to resist the temptation to try to humanize Doug at least a little.

As it turned out, that was probably a mistake. As far as I can tell, Doug just simply didn't have any sense of humor at all. Not in the workplace at least. That's the reason most of the R&D staff didn't like

him very much. One day I was in the men's room relieving myself when I heard a voice coming from one of the stalls, "Can you hand some toilet paper to me?" It was Doug. "Sure," I said, chuckling a little bit. I went into one of the other stalls, liberated a roll of TP, and handed it over the wall to Doug. He came out a minute or so later snarling about the janitors not doing their job. "Well, Doug," I wisecracked, "you know the first rule of engineering. Always check your assumptions first." He just glared at me and stormed out of the men's room without a word.

I couldn't help but picture in my mind the contrast between this and something that had happened once at Delcon Division. Delcon's division manager, Brian Moore, was the shortest guy in the division and Bob Allen, the lab manager, was the tallest. I was in the men's room there one day when Bob came in. "Hello, Brian," Bob said to someone sitting in the stall there. Sure enough, a minute later Brian Moore came out. "How did you know that was me?" he asked Bob. Bob flashed his big toothy grin and replied, "You're the only guy in the division whose feet don't touch the floor." Brian was a little touchy about his height, but even so he laughed. A little. Not Doug though; I guess he was preoccupied with the problems of storming Omaha Beach.

I didn't crack wise with Doug all the time, of course, but I did it often enough that I guess he became convinced I was some kind of smart aleck. I'm not so sure Doug actually liked anyone he worked with, but I'm pretty sure he didn't like me very much. Mostly that didn't matter because I didn't work in his lab. But it seems like it did matter so far as all my invention disclosures were concerned. By some strange coincidence every single one of them became a 'trade secret.' It's a pity. There are several pretty good stories that could be told about the development of those inventions, but I can't tell them. They're 'secrets.' □

While we were working on Eagle II, the HP 7937 – Eagle – was making a big splash in the market-place. The old BFD, the HP 7933, hadn't exactly taken the disk drive market by storm and while we had been developing the ′37 a number of Japanese companies had entered what is known as the 'plug compatible' business, building disk drives that could plug into HP computer systems. The BFD itself had opened the door to this as a consequence of the original decision that had been made to try to stretch the old, and now obsolete, disk drive head technology one more generation. Our competitors' entry into this market had also been abetted by a disgruntled HP employee at one of the systems divisions who had leaked the details of our computer interface – known as Command Set ′80 – to our competitors. That information was what let them develop what are known as 'plug and play' peripherals.

Not many years earlier this sort of treason by an HP employee would have well nigh been unthinkable. But by 1986 the face of business management all across the country was changing and a little bit of this had already begun to slip into the HP management culture. The changing face of management invariably leads to changing attitudes on the part of the managed and the handing over of company confidential information by a low ranking jerk at another division was just a symptom of the changing times. By 1986 the old timers – the people who had known the Great Depression and World War II first hand – were mostly retired or on the edge of retirement. I thought then and I think now that the new generation of managers – I wouldn't call very many of them 'leaders' – just wasn't in the same league either in terms of knowing the business they ran, knowing the people who made that business run, or even in just plain old fashioned common sense. Under Bill and Dave we had what I call 'an owner's attitude' toward the company; there was no possible doubt the new generation had adopted a 'manager's attitude.'

I thought HP President and CEO John Young was mostly doing a pretty good job of running the company, although knowing he made more money in one week than I made in a year didn't exactly inspire me to glory. I didn't resent the fact but it seemed disproportionate compared to, say, what a production supervisor's paycheck looked like. Of course, that wasn't exactly a new phenomenon. Robert Townsend, the former CEO of Avis, had written about this sort of thing all the way back in 1970 in his book *Up The Organization.* Of the Mount Everest of 'management' books that have been published over the years, Townsend's was the only one about effective leadership. But by 1986 it wasn't on anyone's

reading list anymore and I think that fact was starting to show within HP and elsewhere across America. What would later come to be dubbed 'The Age of Greed' and 'The Me Generation' was already starting to become visible within HP during President Reagan's second term.

In 1986 HP's disk drive business was pretty important to the company's bottom line. We were still in what I like to call 'the Golden Age of the disk drive business' when there was a mountain of profit to be made. And, just like it says in freshman Econ, those profits were attracting new competitors into the business. HP had just recently entered the laserjet printer business – and in fact that part of HP's business was also located on the Boise site – and it would grow like a wild weed over the next few years. But in 1986 our disk drive business was still a huge moneymaker – even rivaling HP's computer system divisions in terms of how much profit was coming into the company's coffers. We took the entry of competitors into this business pretty seriously.

There was at that time a big annual users' group trade show, known as Interex, that disk drive makers attended to show off their wares. After Eagle's introduction I was one of several of us who got to fly down to San Francisco to attend Interex ′86. Interex wasn't a trade show HP set up and ran, although we were obviously always a big part of it since it *was* organized by an HP users' group. There would be a lot of competitors' products on display there and one of the reasons I was sent down to it was to check out what the competition was doing and see if there was something we needed to be doing differently in order to respond to it. My basic attitude was that DMD had a God-given right to 100% of our competitors' business, and I went to San Francisco with this as my guiding aim. Don Curtis, our division manager, must have had a similar attitude because sending me to San Francisco was part of Don's LOOT campaign – Liberate Our Occupied Territories – the central focus of which was to pound our competitors into the ground by every legal and ethical competitive means possible. As a one-time linebacker, LOOT appealed to me a lot. It was the kind of management slogan I could get behind all the way.

It turned out that the HP 7937 was the runaway star of the show. Our exhibit was packed with on-lookers from the time the doors opened until the time the doors closed. As I listened to what different customers said about Eagle it was like basking in warm sunshine. Their enthusiasm was unmistakable and I was filled with pride for what our section had accomplished. For me the crowning moment came when our biggest Japanese competitor came to our booth. They were the company giving BFD the toughest time in the marketplace and I guess they had presumed Eagle would be another BFD. They had brought their own latest disk drive to the show expecting to wow the customers with its obvious superiority to the HP 7937. Instead, they quietly took down their exhibit and left town the first day. I guess they figured a side-by-side comparison between their disk drive and the ′37 wasn't in their best business interests. After Interex ′86 there was no doubt in my mind: We had come out with a world-beater. □

One thing characteristic about the job of inventing new products is a tendency to lose track of what's going on outside one's immediate day-to-day surroundings. The simple fact is that design work is fun and easily can become all-absorbing. That might have something to do with the high divorce rate I noticed among my coworkers. Divorce often takes product development engineers more or less completely by surprise. One guy I knew was divorced by his wife on grounds which, translated from lawyer-speak, amounted to saying that he was boring. What tends to happen with a development engineer during the early part of a new design is that he carries the design problems he is working on in his head wherever he goes and thinks about them constantly. I used to keep a notepad on the nightstand beside my bed in case I'd wake up in the middle of the night with an idea for solving some design or research problem.

The Eagle II project was in this stage of intensive creativity in 1986 and 1987. Even so, outside there were events going on in the world that breached the walls of my concentration and couldn't be ignored. President Reagan's punitive air strike against Libya in April of '86, which was done in retaliation for Libya's terrorist role in the bombing of a West Berlin disco that had killed two Americans, was one of these events. I had mixed feelings about this event. Libya, like Iran, was a sponsor of terrorist activities and I certainly didn't feel the least bit sorry for Libya when our planes came in. Not one bit. In that sense

it was like the brief dogfight that had happened in March when Libyan planes attacked U.S. Navy fighters in the Gulf of Sidra and learned it wasn't a good idea to take on graduates of Top Gun. In my book Libya was an outlaw state and was just asking for a good old fashioned beating. I didn't have any problem with giving them one. I felt completely the same way about Iran.

What I didn't like was the idea of the President ordering this kind of military action without Congress being in the loop. Presumably there must have been at least some congressmen involved in the decision process through one or more of the 'oversight' committees that had been set up after Vietnam, but I don't think that is a sufficient safeguard for guaranteeing civilian control of the military. You see, the Armed Forces of the United States isn't a police force and the President of the United States isn't the Chief of Police. The President is the 'Commander-in-Chief of the Army and Navy of the United States, and of the militia of the several States when called into the actual service of the United States.' Today, of course, this responsibility also clearly takes in the Air Force, Marines, and Coast Guard. But what exactly does being 'Commander-in-Chief' empower a President to do? It's a gray area in the Constitution even if the Founding Fathers didn't think there could be any confusion about it. In *The Federalist* Alexander Hamilton had written,

> The President of the United States is to be "commander in chief of the army and navy of the United States, and of the militia of the several States *when called into the actual service* of the United States." The propriety of this provision is so evident in itself, and it is, at the same time, so consonant to the precedents of the State constitutions in general, that little need be said to explain or enforce it. . . Of all the cares or concerns of government, the direction of war most peculiarly demands those qualities which distinguish the exercise of power by a single hand. The direction of war implies the direction of the common strength; and the power of directing and employing the common strength forms a usual and essential part in the definition of the executive authority.

The key word here is 'war.' Nobody with any brains would argue the President shouldn't act immediately and on his own to defend the country if Lower Slobovia invaded Florida. 'To provide for the common defense' is one of the six tasks of our federal government.

The office of the Presidency was modeled after the conduct of just one man, George Washington, and I think Washington is still the right model for the job. This is what separates the idea of a President from the ideas of a King or a dictator. But the Constitution doesn't say one word about giving any branch of our government the power to conduct so-called police actions, and that's what the Libyan raid was. That's what Vietnam had been billed as in the beginning. That's what the Korean War was billed as. If there is any organization on earth that could plausibly claim to decide upon 'police actions' between sovereign nations – and, granted, it's a big 'if' – that organization would be the United Nations. That's what the U.N. was set up to do, first among other things, in the first place.

I don't think the President has or should have the power to decide we're going to be vigilantes, and that's what I didn't like about the Libyan raid. I think if America is going to go kick the crap out of somebody, Congress should be the one who stands up and says, "We're going to go kick the crap out of these guys." If Congress lacks the conviction to stand up and say that in a loud, clear, unmistakable voice, then we shouldn't do it. If they do stand up and say it, then we shouldn't pussyfoot around in administering the crap kicking. War isn't a game. It's the most awful and deadly serious thing in the world, and *no one man should ever* have the power to potentially commit our nation to it. Once we *are* committed to it, the *only* goal should be victory, achieved as fast and as completely as the application of overwhelming deadly force can accomplish. War isn't anything else than the massive application of deadly force, and if you don't like that reality it just means you don't like war. Neither do I.

You might wonder what I mean by Congress speaking in a 'loud, clear, unmistakable voice.' It's not hard to understand. President Roosevelt framed it for Congress after Pearl Harbor: *I ask that the Congress declare that since the unprovoked and dastardly attack by Japan on Sunday, December 7th, 1941, a state of war has existed between the United States and the Japanese empire.* It doesn't get much clearer than that.

For a short time it looked as if a national debate over President Reagan's decision to bomb Libya might develop. But less than two weeks later the world had something else to pay attention to: the nuclear accident at Chernobyl. As near to deadly a thing as Three Mile Island had been in 1979, Chernobyl was the nightmare come to life: a huge radioactive cloud spreading across Europe; the complete meltdown of the nuclear core eating its way into the earth, what the movies and press had years before dubbed 'the China syndrome'; thousands of square miles rendered uninhabitable by human beings for tens of thousands of years; unreported hundreds of deaths, some immediately and many more to come later from the radiation. It was a catastrophe without parallel since the beginning of the industrial revolution, even compared to other catastrophes such as the Union Carbide gas leak in Bhopal, India in 1984 that killed two thousand people and injured one hundred fifty thousand more. Only the bravery and self sacrifice of the heroes who fought to contain the disaster prevented worse from happening and prevented the casualties from rising to or beyond the level of Bhopal. I don't know if anyone ever erected a monument to these men, but if not there should be one somewhere for all the world to see. They knew going in there was probably going to cost them their lives, and they went in anyway. They were willing to pay with their lives for the immoral negligence of those who had designed Chernobyl, those who had administered it, and those in the Soviet government responsible for it.

Then on June 4th, 1986, another outrage made the headlines, this time in America. A man named Jonathan Jay Pollard, an ex-Navy analyst, was convicted of espionage. What made this an outrage rather than just another cold war incident was who Pollard was working for. Israel. Our so-called ally. Our so-called friend. I guess most of the country wasn't as outraged by the Pollard espionage as I was. On the other hand, the story dropped out of the headlines and the news so fast that I couldn't help but think there was something dirty and political going on somewhere – either in government, in corporate boardrooms, or both. Whatever the case may have been, it disappeared before much of a political ripple could happen. But I would not forget it. Israel had spied on my country. This was not the act of a friend. This was not the act of an ally. It was the act of an unfriendly nation pretending to be our friend. It was the act of an enemy. I ceased to trust Israel on that day. I have never trusted or supported them since that day.

Still worse was yet to come. On November 4th the Democrats swept the mid-term elections and recaptured control of the Senate. Because the liberal fringe of the party still controlled it, I wasn't at all happy about the outcome, but two days later I was no longer so sure about that. Two days later the Iran-Contra scandal broke. Officials in the Reagan administration had secretly traded military arms to Iran in return for a pledge by Iran to try to get American hostages in the Middle East released by their terrorist captors. The Reagan administration had been dealing secretly with an enemy nation, a sponsor of terrorism, like a blackmail victim paying off his blackmailer. And then these same officials used the money from this disgraceful episode to funnel secret support – in violation of U.S. law – to the Contras trying to overthrow the Sandinista government in Nicaragua. During July of 1987 I listened to and read in disbelief the reports of the testimony in Congress of Oliver North, John Poindexter, George Schultz, and Casper Weinberger. It was the testimony of people I saw and still see not as patriots but as incompetents and criminals. The right wing called Oliver North a hero. He's no hero. He's another G. Gordon Liddy.

For a decade I had trusted and supported Governor and then President Reagan. I had hoped and believed in what he said he stood for back in 1976. Iran-Contra meant and could mean only one thing: the Reagan revolution I had enlisted in had failed. It is the Constitutional Duty of the President of the United States to 'take care that the laws be faithfully executed' and now we found that the Executive branch of our government had taken care to break the law. On August 12th, 1987, after previous denial, President Reagan accepted responsibility for Iran-Contra. I agreed. Whether he knew as little as he claimed or not, he was responsible. That's the way it works. I cannot describe how bleak I felt over this betrayal. But I can describe what I thought about it: The party of Reagan was turning back to Nixon. If the Reagan revolution had ever really existed at all, if the Reagan 'big tent' had ever been anything other than a hoax, it was over now. America once again had criminals in the Executive branch of government. From the first of August, 1987, and up to this day, I never gave another dime to the Republican party. □

Reunion with my brothers at the Sigma Nu house in Ames. Front row left to right: Large Al Peterson, Tom Korpela, Lorne Wazny, Tom Donovan, Jerry Pribyl, Al Welch, me. Back row left to right: a younger guy I never really knew, Steve Krabbe, Randy Ewing, an older alum I didn't know.

The Eagle II period was such a busy time for me that those years tend to blur together in my memory. Despite this I did jump at a chance to see my brothers again when someone organized a reunion back in Ames. Except for me the guys were married now and I more than half expected their wives would exert something of a restraining influence on our behavior. That, as it turned out, wasn't exactly the case. Oh, things did begin that way. But before too long it was like the Friday nights of our college days and it turned out that we hadn't forgotten how to have one heck of a party. The next morning I had all the proof I'd ever need that I wasn't as young as I used to be. We retold all the old stories of our college days – some of which we saved for when the wives weren't in earshot – and we laughed like it had all happened only yesterday. For a few golden hours we were kids again and I found I couldn't remember why I had ever been eager to see the end of my college days. If I could be frozen in time forever, I know exactly what time I'd choose. Today with each swiftly passing year I understand better and more fully something Housman once wrote,

> With rue my heart is laden
> For golden friends I had,
> For many a rose-lipped maiden
> And many a lightfoot lad.

Back at DMD the R&D lab was beginning to age a bit, right along with me, and the number of people who had yet to pursue their Master's degrees was growing smaller and smaller. At this stage in their careers most of my colleagues were interested in short courses rather than traditional college courses for continuing their education, and the company formed a Site Engineering Education Committee to look into addressing this need. My old section manager, Ken, was chair of this committee and he asked me to serve on it. After doing what basically amounted to a market survey of the engineering staff on the site we identified two particular short course needs that I became directly involved with. One was a short course on servo system design. I got in touch with John Purviance and one of my old committee members, Joe Feeley, up at the U of I and they agreed to design this short course and offer it at our site in Boise. It was heavily attended. The other short course identified was called 'EE for the Non-EE' and was aimed at members of the mechanical and other engineering disciplines needing a better basic understanding of electrical engineering in their jobs. I asked another old friend up in Moscow, Bob Rinker, if he could come down and present such a course. Bob came down during the summer of '87 and spent that time talking with numerous people who wanted this short course, finding out precisely what their needs were and figuring out how to best meet them. Officially he was working for me that summer but in fact Bob didn't need any supervising. At the end of the summer he went back to Moscow and designed this new short course, and we began running it in 1988. It turned out to be one of the most successful short courses we ever had at the Boise site and Bob ended up offering it several times.

At about this same time there was a growing clamor in the Boise area for a local degree program in electrical engineering. A lot of this clamor was coming from Micron Technology, a company that designed and produced semiconductor RAM chips; today Micron is the sole U.S. manufacturer of these chips. Micron's shareholders included the two wealthiest men in Idaho, billionaire J.R. Simplot and multimillionaire Allen Noble, as well as some other wealthy local businessmen. These guys had and have enormous political clout in Idaho and what they basically wanted was a new engineering college at Boise State University. However, the Idaho State Board of Education (SBOE for short) wasn't eager to spread

Idaho's overly modest higher education budget too thin, and setting up an entire, brand new engineering college was opposed by executives at HP, who were concerned that this would lead to severe underfunding of the college in Moscow. At the time HP nationally was getting a lot of their new hires from the U of I College of Engineering and the company didn't want the quality of the U of I program to be compromised.

As a compromise, an agreement was reached between the U of I and BSU. BSU was already a feeder school for Idaho's engineering college, teaching courses in the first two years of the engineering program. Idaho agreed to supply faculty to teach the remaining two years and also some locally-offered graduate level courses in Boise on the BSU campus. The resulting program became known as the Engineering in Boise Program and its scope was expanded to include mechanical and civil engineering – to better serve the needs of other Boise engineering firms – in addition to electrical engineering. Because Bob Rinker was spending a lot of time in Boise anyway due to the 'EE for the Non-EE' short course, the Dean of the UI College of Engineering, Dick Jacobson, asked Bob to head the new Engineering in Boise Program and move down to Boise permanently. Bob agreed and began to organize a faculty for the program. He took advantage of the fact that there were a number of professionals already in Boise who were agreeable to serving as affiliate faculty members for the new program. I was already an Affiliate Professor of EE with the UI, and I agreed to join the new program. Because the basic justification for having this program in the first place was to serve 'place-bound, non-traditional students' who already had full time jobs but wanted to enter the engineering profession, classes were held in the evenings and I would drive across town to BSU after work to teach my classes. Initially the program was quite small but it eventually grew to having around twenty juniors and twenty seniors enrolled each year in EE or in Computer Engineering. Graduates received a Bachelor's degree from the University of Idaho. Affiliate faculty members each received around three thousand dollars per semester for their teaching services.

Also right around this time one of my co-workers, Ted Barnes, decided to take advantage of HP's Ph.D. educational program I had pioneered, and he joined our section while working on his research project. His research involved figuring out how to design adaptive servo systems for disk drives, which at that time still involved a number of knotty research questions that had to be answered if the technique was to become practical for high-volume disk drive production. Because this topic was within my own field of expertise and because I was an Affiliate Professor with UI, Greg asked me to be Ted's research supervisor in addition to my other responsibilities. I only knew Ted casually at that time, but I happily agreed to do this. Because I was only an Affiliate faculty member and not a member of UI's Graduate Faculty at this time, I couldn't serve as Ted's major professor. Joe Feeley up in Moscow took that role. But I could serve on Ted's committee and I could serve as his local academic advisor and mentor. Ted and I became pretty good friends during that period. Ted's research turned out to be very, very successful and he received his Ph.D. in 1991. He and I were also issued a patent for the adaptive servo system method that came out of the research work. By that time Doug wasn't chair of the committee that evaluated invention disclosures anymore. But by the time the patent was actually issued in 1993 I was no longer with HP so I didn't get one of those nice plaques for that one either. □

The Eagle II development was coming along quite nicely in 1988 and we were getting close to the end of the lab prototype stage when suddenly the roof fell in. Our marketing people and DMD's top management had been looking at where the division wanted to go in the increasingly competitive disk drive market, and they had concluded that they wanted to take us in the direction of becoming an OEM (Original Equipment Manufacturer) business supplying what would rapidly become commodity disk drive products for what was known as 'the box business.' The idea was to sell our disk drives to other companies besides HP. Up until that time DMD had been mainly a supplier of mass storage systems that were integrated into HP's lines of computer systems. But we also had a small but growing box business of our own within DMD and it did, in fact, purchase and use some OEM five-and-a-quarter-inch disk drives made by other companies. Coyote I, Vern's project, was already in production by then and his section was working toward introducing the follow-on product, Coyote II.

In this marketplace the eight-inch disk drive was not sought after and so Eagle II was not a 'fit' to this new strategy of entering the 'jelly bean' disk drive business. Consequently, our project was abruptly cancelled and we were re-directed to begin design work on HP's third generation five-and-a-quarter drive, code-named Coyote III. The Coyote family of products were never to receive an HP 79XX name of their own. They were now 'component products,' which HP regarded as a not-mainstream business segment, and would receive product designations that began with a 'C' designation. Once Vern's section finished with the introduction of Coyote II, they would be directed to begin work on a line of three-and-a-half-inch disk drives.

There was never to be an Eagle II or any other new eight-inch HP disk drive now. For a time morale in our section hit a very low point. The cancellation of Eagle II had been preceded by a change in our management chain as well. Scott Anderson, whom we all liked very much, was replaced as our lab manager by Mitch and Greg became our section manager. My old friend Keith Whitaker became the project manager and my boss. We liked Mitch, but a lot of us suspected that office politics had had everything to do with Scott leaving us. Whether that was true or not, we thought it was and didn't like the change one bit. Most of us blamed Doug Clifford for division manager Don Curtis' decision to replace Scott. Our general opinion was that Doug was a politico who had seen Scott as a rival. Neither I nor anyone else in the section knew whether that was really true, but Doug wasn't popular with us and we were willing to believe it was true. Otherwise nothing about the management change made sense to us. A lot of us, me included, also saw in the abrupt way the change was made an ominous sign that the old HP culture – called 'the HP Way' since the days of Bill and Dave – was starting to be infected by an entirely different kind of company culture of politicos and yes-men, the kind of culture characteristic of typical, unenlightened big companies few of us would want to work for. HP was still a special company, but it didn't feel quite as special anymore. Not to me anyway.

Greg softened the blow of the cancellation about as well as anyone could have. Most engineers take it pretty personally when the company cancels a project they're working on if that project is going well. Decisions like that made by upper management really aren't personal and aren't meant to send the message 'we don't want what you've done,' but to the guys on the bench it *feels* like that's what they're saying. We had a kind of Irish wake for Eagle II right after the cancellation and each engineer in the section received a little trophy, an engraved HP eight-inch thin film disk platter bearing our Eagle Section logo and the inscription, *No matter how well you perform your job, a superior will seek to modify the results.* I still have mine. It hangs on the wall in my study.

I wouldn't say the Eagle section was like a family, but I would say we were like a kind of tribe. The section logo was one mark of this. It was a pig with wings that we called 'the Peagle.' The way this logo came about in the first place was from a little sign Mitch used to hang on the wall of his cubicle. It featured a pig wallowing in the mud with the caption, "Never try to teach a pig to sing. It wastes your time and annoys the pig." Somebody had digitized that pig and added wings to it, and from that point on we'd been putting our logo on everything – design drawings, specification documents, you name it. We even had Peagle logos hiding inside the custom integrated circuits we had developed for the HP 7937. It was a symbol of our team's *esprit de corps.* Somebody on the production line was a part time artist and she made these marvelous little porcelain statues of a pig with wings and a unicorn's horn. They sold like hotcakes to a lot of us in the Eagle section. I have one of them in my living room today.

For some reason Don Curtis took a strong dislike to our logo after he became division manager and had ordered it removed from all Eagle documents. This was an order that had made him instantly very unpopular with all of us. We had to comply with Don's order, of course. He was in charge of the division and everybody's boss of all the bosses. But it left us with the feeling he didn't like us and we reciprocated the feeling. Don was the only division manager I ever worked for who I felt I couldn't talk to and who I really didn't want to talk to. I thought he treated me and everyone else like a 'resource' instead of a member of the team. He definitely was a spoilsport. Don never knew it, but we never removed the Peagle from inside our custom chips. It was our little underground way of saying, 'Hey, Don! *Nyah!*"

I probably took the Eagle II cancellation harder than most. A big part of it was the fairly typical frustration and depression that sets in when all your work comes to nothing. Most design engineers have this reaction when a project gets cancelled for anything other than purely technical reasons. A lot of soul gets poured into bringing a new product into the world and reactions like the one I felt do not come from, as I once heard a non-engineer manager say, 'having the fun taken away.' Strictly speaking, the most fun time on Eagle II was nearly over at the time it was cancelled. The lion's share of the invention and basic design work was already over or nearly so when the cancellation came. What would have come next would have been the long, hard slugging needed to bring a prototype design into the finished state needed for its manufacture. That part is a lot less fun and a lot more stressful. But, you see, a design engineer wants to see the fruits of his labor become real and that means releasing the product into manufacturing.

But this wasn't the only reason I took it so hard. A big part of it was a sense of alarm and a deep conviction our division's strategy for the future was a terrible, terrible mistake. Eagle and its predecessors were terrific money makers in large part because of the type of marketplace they served. The new direction was going to take us straight into a marketplace of a wholly different sort, the kind economists call the 'monopolistic competition model.' Everybody who knows anything about agriculture knows what the 'perfect competition model' of economics looks like. Whether a farmer produces corn or wheat, his produce is just like that of any other farmer and there are a lot of farmers. As a result, the profit any farmer makes on his corn or his wheat is very, very slim – just enough to keep him from getting out of farming altogether. His product is a commodity and he makes what economists call a 'zero economic profit.' The term 'economic profit' means the business is making more than it could make by putting its resources into some other use. Zero economic profit means you're right at the point where you could make just as good a return by merely putting your money in a savings account at a bank.

The monopolistic competition market is similar to that of perfect competition in many ways. The main difference is that companies in such a market produce products that can be distinguished from one another by putting in features – what engineers call 'bells and whistles' – that provide customers with an excuse for preferring Brand A over Brand B. This is called 'product differentiation.' When you go to the super-market one juicy red apple is pretty much exactly the same as another and you don't really care all that much about which one you pick. They are 'exact substitutes' for each other, and that's the perfect competition case. In monopolistic competition, any one disk drive maker's product is a 'close substitute' for any of those from other disk drive makers. The result is that short run economic profit is possible but in the long run the situation is the same as under perfect competition. It is, as the saying goes, a 'buyer's market.' Not too many years after DMD went off in this direction I started hearing managers at different levels in the company starting to refer to disk drive products as 'high tech commodities' and that's pretty accurate. I had been watching 'jelly bean' disk drive companies for years in my stock market investing and had seen them come and go. One thing that could be counted on was that every few years the companies in this business would engage in bloody, take-no-prisoners price wars that put a lot of them out of business altogether and would even almost destroy the 'winners.' There was never any recovery. Once a big part of the competition was driven out of the business and prices started going back up, new competitors would flood back in and the cycle would repeat. I never invested a dime in a commodity disk drive company.

And that's where Don and his staff wanted to take us. To me two things were obvious. First, it was obvious, at least to me, that this decision went directly against the third company objective: Field of Interest. The objective was 'to concentrate our efforts, continually seeking new opportunities for growth but limiting our involvement to fields in which we have capability and can make a contribution.' What contribution were *we* going to be able to make in a jelly bean market? Second, it was clear to me that we were an organization too bloated and fat to come out a long term winner in this business. During the Golden Age of the disk drive business, DMD had added more and more support departments – what both economists and accountants called 'overhead' departments – to take care of the thousands of bits of tiny things that have to be looked after in a large manufacturing business. These departments had sprung up in

reaction to perceived needs and not as a part of any coherent strategy for organizing the business. By this time we had six large buildings on the HP site in Boise and there were entire floors in them filled with people in 'supporting' roles, many of which I would characterize as business luxuries we could afford in the Golden Age but would never be able to afford in this new marketplace. I didn't need a calculator to know we had a top-heavy overhead cost structure. All I needed was a pair of eyes.

When talk of taking this direction had started a couple of years earlier I had loudly and repeatedly tried to sound this warning but it hadn't done any good. I was 'just a lab engineer, a technical guy' and what did I know about business? It was a convenient stereotype for promoting the peculiar form of deafness you often find in people who refuse to hear anything that goes against what they think or want to be true. When I was in college I probably had enough coursework in economics – especially microeconomics – to qualify for an economics minor if there had been any such thing as a minor in a college of engineering at that time. And I wasn't unfamiliar with the kind of market we were seeking to enter. Bakeries operate in just that same environment. Even if your town has only one bakery shop, it competes with all the super-markets. Over the years I was constantly astounded about how completely ignorant of economics most of our managers were. 'The Dismal Science' it may be, but it is a science none the less.

Now, as Caesar might have put it, the die was cast. 'We are going to get our head handed to us,' I thought. There were more than three thousand people working at HP's Boise site and over half of them worked for DMD. An awful lot of people were going to pay the price for this strategic blunder. I wasn't making myself very popular by openly opposing the strategy, but oppose it I did. It was a Duty because, as Charles Eliot Norton had written in 1898,

> The voice of protest, of warning, of appeal is never more needed than when the clamor of fife and drum, echoed by the press and too often by the pulpit, is bidding all men fall in and keep step and obey in silence the tyrannous word of command. Then, more than ever, it is the duty of the good citizen not to be silent.

I did have the option, of course, of walking away from it all and I did think about it. Over the years I was always receiving calls from 'head hunters' trying to recruit me to work for other companies, and there were also academic positions at different universities as a professor I could turn to. But I couldn't do that. These opportunities existed because HP – especially John Stedman – had paid for my graduate education and invested in my professional development and had been generous in rewarding me for my work. In my heart I knew I had an *obligation* to repay the company for everything it had done for me over the years. To cut and walk now would have been the act of a dastard. I had to do *something* but what this could be I did not know.

So it was that when Greg called me in to discuss my responsibilities in the new project my spirit was at one of the lowest ebbs I had known in my time with the company. In truth, I wasn't emotionally ready for our discussion and most of it was hazy to me then and now. That I would continue in my role as the 'architect' for Coyote III was a no-brainer. We agreed on that pretty much right away. Beyond that I wouldn't have any direct design responsibilities for the new product. I honestly don't remember if that was Greg's idea or mine. I wouldn't be surprised if it was mine. A spark had gone out inside me when Eagle II died. I'm sure a design assignment would have rekindled it, but I wasn't emotionally ready just then to, as the Irish melody goes, gird on my father's sword, sling my wild harp behind me, and go off again to the next disk drive war. This Minstrel Boy was in the mood to stay home.

As it turned out, I didn't work on Coyote III for very long. At least I don't remember working on it for very long. Near the end of 1988 an opportunity opened up to become the production engineering manager for the Eagle line. I interviewed for the job and they gave it to me. My new boss would be a guy named Jim Vashro. He had recently been promoted one step up from that job although he would be wearing two hats for a time – one as my boss and another as de facto production engineering manager for our 'box' product line. I had known Vashro in passing for several years but had never had any real dealings with him up to then. I neither liked him nor disliked him. He had been just a face in the crowd until now. As it

turned out, Vashro was an 'Amiable' interpersonal relations type but he wasn't nearly as obvious an Amiable as Rich Smith had been. I didn't recognize that at the time or I might have thought twice, then thought thrice, about going to work for him. In contrast, Greg was an 'Expressive' personality type and I've always gotten along well with Expressives. Vashro could pass himself off as one when he wanted to and that's what he did when we interviewed.

My motives for abandoning the bench and stepping over the line into management were complicated and probably not really all that well thought out. One factor was that it occurred to me that product development work had seriously interfered with my ability to make progress on my private research project. By now this work had been going on for well over a decade but had still not netted anything I saw as an important breakthrough. A mound of minute accomplishments, yes, but not the Enduring Big Idea that could bring it all together. As a manager at least I wouldn't have work on inventions going on in my head day and night after day and night and I could give my brain research more attention.

But the clinching motive was the thought that, as a manager, I'd probably have more of a voice and a more credible platform from which to try to get our division's direction changed. As an engineer nobody was listening to me. As a manager maybe I could get them to listen. As it turned out, that was a terribly naive supposition on my part. In the end I think I had less influence on strategy as a 'Level 62' manager than I had had as a top-ranked 'Level 61' technical contributor. But I couldn't have known at the time this was how it would turn out.

The news that I had accepted a manager job dumbfounded my coworkers in the lab. For the next couple of days after the announcement a regular parade of my colleagues kept asking me if it was true. I had a hard time explaining why I had done it, mostly because it wasn't something I'd thought through in my usual clinical way of making decisions. I was running on feelings at the time and my heart was ruling my head. One friend, though, asked me a different question. "I hear you're going to be working for Vashro. Is that true?" he asked. It was, I replied. He shook his head and I couldn't read the expression on his face. "You watch your back," he said. He wouldn't say more than that and he left me wondering what that meant. Eventually I would find out. □

VIII. The Elder Bush Years

The elections in 1988 had a chance to be interesting but they weren't. The Democrats ran Governor Dukakis from Massachusetts, which basically only demonstrated that the liberals still held the reins of power within the Democratic Party. Because it looked like a pretty safe bet the Democrats would hold control of the Congress, I didn't see much of any option except to support Vice President Bush. Although I was pretty disappointed by President Reagan's failure to support the things he had advocated all the way back in 1976 and deeply disillusioned by how powerful the extreme right wing of the Republican Party had become, the best I could hope for was a stalemate between Congress and the Executive Branch.

I wasn't entirely sure Vice President Bush was really not involved in Iran-Contra, but I didn't know if he had been involved either. I did remember the 1980 primaries, where he had come across to me as a rather moderate Republican. Certainly his characterization of 'Reaganomics' as 'voodoo economics' seemed to be on the money. The national debt had more than doubled under the huge deficits that had characterized President Reagan's two terms in office with no evidence at all of the 'trickle down' effect that was supposedly going to prevent this from happening. Although I had personally done well in my investments during the Reagan years, I did not at all feel comfortable with the ballooning debt or with the scandals, like the Ivan Boesky and Drexel Burnham Lambert affair, which I regarded as symptoms of something Dad had always claimed about the Republicans – namely, that they never met a millionaire they didn't like or a working man they did. Dad and I had had several arguments over that, but now I wasn't so sure he hadn't been right and I hadn't been wrong about the 'new' Republican Party.

One thing I fully agreed with my liberal-leaning friends about was Vice President Bush's incredible choice of his running mate. I pretty much assumed Dan Quayle was a nod to the conservative religious

right wing of the Republicans, but I still couldn't believe this choice. It was my opinion, right along with my liberal-leaning friends, that this guy was a total moron. God help America, I thought, if Bush wins and then dies in office.

During the run-up to the election there was quite a lot of negative campaigning, which I didn't like at all, and I couldn't agree with the widespread characterization of Vice President Bush as a 'wimp.' The guy had been a naval aviator in World War II. He had run the CIA. Wimp? Not by a long shot. And who was calling him that? The lace-panty wing of the Democrats. Until the liberals were unseated from power in the Democratic Party, I saw Vice President Bush as the only possible *practical* answer to both the conservatives and the liberals. He won 53% of the popular vote and carried forty states in the electoral college on November 8th. With January of 1989 came the beginning of the Elder Bush years. □

Vashro and I got along well enough as I began my new job. Of course, one reason might have been that he and I rarely saw each other in 1989. He kept busy with the box product line and whatever else it was he did, while I kept busy managing the Eagle production engineering group. One thing I had to give up when I took up my new responsibilities was teaching for the Engineering in Boise Program across town at BSU. As production engineering manager, I was on call twenty-four hours a day and as I saw it that meant I couldn't properly serve the engineering education program because I couldn't guarantee I would always be able to show up to teach. Any emergency at the factory had to take precedence. It would not have been fair to the students if their teacher had to subordinate their needs to the calls of his day job.

As a rookie manager, I found there were several management training courses I was now required to take, and so off and on that first year I'd be away from the operation from time to time. In fairly short order I had collected a nice little stack of tissue-paper certificates certifying I had been trained in 'Managing at HP', 'Performance Evaluation & Pay', 'Finance at HP', 'Project Management', and, my personal favorite, 'Process of Management' – POM as it was popularly called. My periodic absences didn't have any ill effects on the factory or my team. I had inherited a very good team of people and a production line that was already in pretty good shape.

Which was not to say the production line was wholly free of problems. The HP 7937 – Eagle – was the division's main revenue-producing breadwinner. We shipped products out the back door that brought one million dollars *a day* into HP's coffers. Anything that stopped that flow, no matter how briefly, was a pretty big deal. At the same time, Eagle had a well earned reputation for being a highly reliable disk drive, which is something of paramount importance to people who buy disk drives. My counterpart who managed production operations for Eagle – a very cool guy named Bob Claridge – and I were from the very start in complete agreement on one very important objective: Nothing would be allowed to degrade the quality or the reliability of the HP 7937. Anything that did was a sufficient cause for shutting down the production line until the problem was fixed. A decision like that is always a technical decision and, as such, it was always my call to make. Bob never once argued with me about a decision to shut down the line. He and I always had a united front on this. Mind you, I'm not saying we 'presented' a united front. We *had* a united front.

Any problem that stops the production line is called a 'line-stopper.' We ran three shifts in the factory and that meant line-stoppers could potentially cost the company eleven dollars and fifty-seven cents for every *second* the line was shut down if the production folks couldn't make up for it after the line started again. Allowing a bit for the division's growth over the years, Ken's old '$8 per second' signs in the lab back in the HP 7908 days no longer looked as ridiculous as I had thought they were back then. My team's job was fundamentally to get that line running again after a line-stopper as soon as possible. Bob's team's job was to make up for however much production had been lost because of the line-stopper. He, I, and the production line supervisors and managers worked very closely with each other any time one of these emergencies happened.

From time to time various managers up in the R&D lab still questioned the need for having a production engineering staff at all. The kinds of things my team was occupied with on a normal

production day tended to involve making small cost improvements here and there or testing cost reduction changes to Eagle itself that would come down from upstairs from time to time. Each station and each operation on the line had a production engineer who was responsible for it. The guys on my staff each generally had several of these under their charge. Visitors from upstairs didn't come by the production line very often, so when they did these were the kinds of activities they'd see us doing. Since these things aren't very high return-on-investment activities, it wasn't any real wonder they would think production engineering wasn't a good investment. But these little day-to-day jobs weren't really why we were there. We were there to deal with line-stoppers. I explained this to different R&D managers by using an analogy. In peace time there isn't any real use for an army. But if war breaks out and you don't have a standing army, by the time you could put one together it would probably be too late. The war would already be lost and over. Production engineering was DMD's standing army. Most of the lab guys could understand this analogy and would then agree that, yes, we had to have production engineering.

Any production worker on the line who thought there might be a problem was not only empowered but *expected* to bring this problem to the attention of her supervisor and her engineer immediately. If it really was a problem, or even looked like it *might* be a real problem, the supervisor and engineer would bring it straight to my attention. If the supervisor and the engineer both agreed, they could also temporarily stop the line before coming to me. These folks were real professionals, and I can't recall one single instance where I overruled a decision by them to shut down part of the operation. Whether or not the entire line had to be shut down was always my call. This wasn't micromanagement. It was my job to make this kind of decision because of the amount of money this decision involved. And because there was always the possibility that the problem hadn't been spotted immediately, and therefore we might have bad products further downstream in the production pipeline, it was also my job to decide if stopping the line would also be accompanied by stopping shipments as well. The worst case scenario was the decision about whether or not a product recall had to be made – bringing back products we had already shipped.

All these decisions required my team to really climb on top of the problem to understand its severity, extent, how long the problem had been going on before it was noticed, and how to fix it. Because our production workers were so dedicated and committed to their jobs, there wasn't one single instance where a problem had gone on long enough to require a recall of Eagles. That was something that made my job a lot easier because ordering a product recall is never any fun. No, sir.

Eagle line-stoppers weren't frequent, but one would happen about every couple of months. One of the things I soon learned was that line-stoppers weren't caused by the 'high tech' elements of the product. I never once saw a 'high tech' line-stopper. They were always caused by low tech things. We'd receive a shipment of dirty disk clamps. Somebody would put the wrong length screw in a part bin. Somebody would drop and break a motor magnet and contaminate the clean line with airborne magnet particles. It was always stuff like this that stopped the line.

We – that is, my team – would periodically pluck out Eagles coming off the end of the line and run them over to our test facility to carry out audit testing of their reliability and their regulatory compliance. Sometimes that was where a problem would be discovered, and these were generally the scariest ones because we'd know there was a problem but we wouldn't know the cause. Audit failures were always a ground for immediately shutting down the whole factory operation until we found the root cause and assayed how long it had been going on and how extensive its effect was in recent production.

A typical line-stopper would go something like this. Somebody would find something and a few minutes later the supervisor and one of my engineers would show up at my desk. They'd give me a brief description of what had happened. I'd order the line to shut down and have the supervisor and the engineer go notify the appropriate people there would be an emergency meeting in ten or fifteen minutes to figure out what needed to be done next. While they were spreading the word, I'd go see Bob and let him know I'd shut down the line. I'd tell him what I knew at that point and he'd handle notifying the manufacturing manager and the division manager that Eagle was down. Bob never sat in on my

engineering meetings; he left that part of the problem solving process to me. Neither would the upper managers come down to it or show up anywhere on the line during the line-stopper. They trusted and expected Bob and me to do the right thing to get the problem fixed.

That first meeting was to assess the situation and figure out what else we needed to know. The engineer would brief everyone on what had happened and we'd plan what we were going to do next. Usually the first step was to do a more thorough investigation to nail down the facts we were going to need to know. Everyone – engineers, supervisors – would be asked to present their points of view and we'd figure out who was going to do what and how we were going to coordinate our efforts. My job here was to see to it we *as a team* came up with a plan everyone agreed to. If I thought there was something the others had missed bringing up, I'd ask questions. That usually stimulated more discussion and improved the plan. I'd ask how long everyone needed to accomplish the actions we'd decided on and then set the time for our next meeting, where we'd see what the facts were and be able to get a clear handle on step two, which was actually fixing the problem.

The second meeting usually had two objectives. The first was to formulate the plan for fixing the problem. The second was to decide whether any shipments could go ahead – and if so which products were 'safe' to ship – and whether or not a product recall was necessary. Like at the first meeting, everyone left this one with action items to carry out and with the knowledge of when the third meeting was going to be. The third meeting was for evaluating if we had the problem fixed and, if not, what the next actions were going to be. If the solution had been found, the supervisors would take the helm in figuring out how to bring the line back up again. Here they'd tell us what help they'd require from the production engineering staff. A big part of this plan was rework. There would be Eagles downstream in the process 'infected' by whatever the problem had been and these would need to be fixed and put right. That was usually where my folks got involved in the re-start. Most of the time we'd have a resolution at this third meeting and shortly afterwards we'd be producing again. The total down time averaged about two shifts (sixteen hours), sometimes was as brief as an hour or so, and once in awhile might take two or three days to resolve, depending on what the problem had been.

I have always been extremely proud of the Eagle folks, both mine and Bob's. They were exceptionally dedicated and conscientious. I have also always been especially proud of Bob and the production folks, to whom always fell the task of making up for the time the line had been down. Eagle never once missed its monthly production goals, and that's saying a lot for how good the production operators on the line were and how well Bob and the supervisors managed production operations. I was working with the best. □

Jan Skurzynski (left) and Gayle Chapman (right), also known as Black Diamond.

One thing I hadn't counted on when I became a manager was becoming a kind of outcast. It didn't take very long before I noticed that a lot of people I'd been chumming around with for years stopped chumming around with me. Vern, Chic, and Steve didn't do this, but a lot of other folks did.

Once I did notice this and thought about it a little, I guess it wasn't too surprising. Management at HP discouraged fraternizing between managers and non-managers, and there is a good rationale behind this. When you become a manager you are responsible, among other things, for doing performance evaluations and administering pay for the people who work for you. If those people are your close friends this can create any number of frictions and problems. This doesn't have to happen, of course, but it does happen often enough that the no fraternization rule is fairly prudent. I knew this, of course, and went along with it where the people who

worked for me were concerned. But I hadn't expected a mere title change to be important in the case of my friends who did not work for me. Apparently, in many cases, it was.

It first showed up in little things like not being invited to join any HP League softball teams anymore. In past years when someone was putting a league team together it was sort of a casual matter of course that the organizer would come around and let me know. From 1989 on that didn't happen any more and I ended up only playing on City League teams after that; these were usually organized by guys who were also managers. Steve and Jack Smith, another pal who had recently become a manager over in our printer division, both organized these kinds of teams. I liked playing in City League, of course, but our teams in that league weren't co-ed and that did take some of the fun out of it. Steve had been a manager for as long as I had known him and he had the people skills and leadership skills to get away with a certain amount of fraternization. But he, too, had long noticed the invisible wall that can go up between friends when one of them puts on the manager hat. There was a stanza from an old rock song that went, *No one knows what it's like to be the bad man . . . to be the sad man . . . behind blue eyes. No one knows what it's like to be hated . . . to be fated . . . to telling only lies.* Steve called this 'The Manager's Song.'

Vern and I always remained as close as ever; we were brothers. But in '89 Vern was courting another friend of ours, Mary Carter, and they got married late in the year. Naturally I was happy for both of them; Steve, Chris, and I attended their wedding, which was a small civil ceremony performed by a local judge. But the courtship period did cost me my summer hiking partner until after the wedding. Steve was my other usual hiking partner, and we had been planning to take part of our vacations one of these summers and spend it hiking the Atlanta loop, which is a multiple day hiking and camping trip near the little town of Atlanta, Idaho in the Sawtooth wilderness area. Steve and Chris had returned from England in 1987 and we had been planning this trip for three years. In 1987 Steve had come down with the flu just before we were going to go, so we had to cancel. In '88 it had been my turn to come down with the flu and we had to cancel again. Then in '89 Steve broke his leg during a softball game just before we were going to go and we had to cancel a third time. Steve and I agreed after the third time that maybe the Atlanta loop was just plain bad luck for us.

So, all in all, I found myself a little short on friends in 1989. My friend Jan Skurzynski had left HP not long after the Challenger disaster and was working a day job as a bartender at the Red Lion Riverside and taking part in Boise's very active music scene at night. I missed seeing her around the site after she left so I'd often drop in at the Red Lion after work for a few drinks and some conversation with her. Jan used to pour my Beefeaters & tonic a little heavy, which I liked, but more importantly she introduced me to the insides of the local music scene. It didn't matter to her in the least when I became a manager.

Through Jan I met and got to know many of Boise's incredibly talented professional musicians. At the time Monday nights were 'jam session night' at Pengilly's saloon in downtown Boise. The jam sessions were organized by an amazing musician named John Hansen. John is, quite simply, the absolutely best guitar player I've ever heard bar none, and practically no one outside of Boise knows about him. Whenever I'd get to feeling cocky about my own ability as a musician, all I had to do was spend a night listening to John play. When his fingers went flying over the guitar strings, they'd just be a blur and I'd say to myself, *I know nothing about music. Nothing at all.*

Among the many musicians who were drawn to the jam sessions and became my friends were Billy Braun, who is one of three remarkable brothers from the town of Twin Falls, Gayle Chapman, who came from Minnesota and was the original keyboard player in the rock group Prince, and – once in awhile and not nearly often enough – Rosalie Sorrels, who was a nationally famous folk singer in the golden age of folk music in the 1960s. Jan also played in the jam sessions. A little time after I started coming down for them, Jan and Gayle partnered up to form a folk duo named Black Diamond. I love folk music and whenever Jan and Gayle had a gig anywhere in town, I always came down every night they were playing to listen and to lose myself in their music.

Through Billy I met his brother Muzzie, who lived with his wife and three boys in a cabin up in the

White Cloud mountains thirteen miles up the Yankee Fork. They lived up there with no electricity or other modern gadgetry. Muzzie's boys were talented little musicians in their own right, just as cute as buttons, and they even appeared once on The Tonight Show with Johnnie Carson. After that Muzzie's oldest boy actually got a main part in a movie – a western – and Muzzie himself appeared in one scene as an extra. Muzzie was sitting on the set one day during the shooting of the movie when the director asked him if he'd like to be in it. "Sure!" Muzzie replied, whereupon the director called one of the makeup people over. Pointing to Muzzie, he said, "Clean this guy up. Make him look like an outlaw."

At a jam session in Pengilly's (1989). With me is my friend Diane, who was a social worker. She ran a shelter house for women in Boise.

'Jam session' was an appropriate name in more ways than one. Pengilly's was usually packed on jam session night and we'd be jammed in there wherever a place to sit could be found. There were several women, mainly divorcees, who were regular attendees and who I got to know pretty well. One of them was Ruth Haefer, who owned and ran the Idaho School of Massage Therapy in Boise. Another, Adele Thomsen, was a commercial artist. A third, Diane, was a social worker who managed a women's shelter house in Boise. In addition, there was a group of interesting women who were very active in the National Organization of Women. All in all, I made more women friends than men friends on the music scene, although two new friends I made were Tom Simpson, who is an engineer at another Boise firm, and Scott Simplot, who is the son of J.R. Simplot, Idaho's billionaire potato king. As you can see, we were quite a diverse cross section of America, all jammed shoulder to shoulder together and united by our love of the music.

Enjoying a Saturday afternoon at the Ste Chapelle Winery with Adele and Ruth (1990).

My social life with my new friends wasn't entirely confined to the music scene in Boise. That was, naturally, our most central shared interest but by no means the only one. I was able to rediscover a part of life that all my years with HP had almost made me forget even existed. It was a wider sense of community untainted by business relationships. A big company like HP tends to homogenize people to a certain degree when one's friends and acquaintances all work there. From late '88 on, my circle of friends included the rich and the poor, the businessman and the artist, the conservative and the liberal. To that small circle of my brothers I now added something new and special: a small circle of good and special friends who were women. What we all really had in common was something very special but easily forgotten: we were Americans. I was back in America's melting pot again and it felt *great.* If it's been too long since the last time you were in it, I recommend it to you. It's a hot spring for the heart.

This new part of my life began after a Pengilly's jam session one Friday-night-to-Saturday-morning when John, Billy, Jan, and I adjourned to Jan's house afterwards. The three musicians – who by the nature of what they do tend to be true night owls – weren't even close to calling it a night yet and I was too 'up' from the evening to feel tired either. A sort of post-jam jam session broke out at Jan's. I didn't know how to play a guitar at that time, but I could still sing and I joined in as a vocalist in the songs I knew. Billy took a liking to my voice and he was scandalized when I confessed I didn't know how to play guitar.

Not too long after that, Billy and his partner were playing a gig at Angel's, an upscale restaurant and bar in downtown Boise. Billy likes the more old fashioned show tune style of music in addition to Beatles and other soft rock songs. They were about to do a Beatles number and he spotted me sitting there in the audience. He cajoled me – ordered me, really – to come up and join them on stage. I had had a couple of beers by then, which helped me ignore my nervousness about getting up there, and we did one of the songs we'd done before at Jan's house. I assume that's why Billy wanted me to get up there with them. He'd already 'auditioned' me for that number and had liked my harmony. I have a tenor voice and between the three of us the harmonization really sounded pretty good. The crowd liked that one, so Billy had me stay there for a couple more before they took their break and he let me sit back down again. A few people I knew from HP happened to be in the crowd that night and I guess they were pretty surprised to find out I could sing. I got several compliments afterwards and I'm afraid it kind of stirred the ham in me.

Not too long after that night, another guy I knew at HP, John Hodges, talked to me about maybe teaming up with him to do a few gigs every once in awhile. John's pretty talented as a musician, and I think it would be fair to say he's a musician working a day job as an engineer. I wasn't too bad on the keyboard by then and John was a pretty good guitar player as well as being good with other instruments. I didn't take too much persuading and eventually we did a few gigs together on special occasions like Saint Patrick's Day celebrations at some little bars in the town of Meridian, which was just a few miles down the road from Boise. I particularly liked playing St. Patrick's Day. A few folks even thought I was an Irish tenor. We didn't get paid for doing it other than getting all the free corned beef and cabbage and beer we wanted. And tips. John set out a tip jar and the patrons were fairly generous about stuffing twenty dollar bills into it. Everybody had a pretty good time at these gigs, none more than me.

Word got around at work about our doing this, and this led to kind of an interesting and unexpected thing about a year later. There's a fairly large Vietnamese community in Boise made up of people – and now their families – who had fled Vietnam when it fell to the North in 1975. One of the young engineers at work, a guy I had originally hired and who worked for me for his first couple of years, got married and he had hired a Vietnamese band from Seattle to play at his wedding reception. At the last minute their keyboard player couldn't make the trip. Apparently you can't have a real Vietnamese band without a keyboard player and Thang asked me if I'd sit in and substitute for him. "I don't know any Vietnamese music," I told him.

"It's easy," he assured me. "It's all cha-cha-cha music." Okay, that I can do. I agreed.

It turns out that Vietnamese music *is* a bit different. Western music tends to be written in eight, twelve, or sixteen bar arrangements. The Vietnamese music we played that night was ten bar. That took a little getting used to but I soon got the hang of it. I didn't know one single song they did, so I just improvised around what the others were playing. Apparently that's exactly what the keyboard player is supposed to do in a Vietnamese band because during breaks all these Vietnamese folks kept coming up to me and exclaiming how wonderful it was to meet 'an American who plays Vietnamese music.' I didn't have the heart to tell them I was just faking everything.

John Hansen and I became very good friends, and late in 1989 I was able to help him out with something. John wanted to put out a tape of his favorite songs but he didn't have enough money to produce it. He was coming up about three thousand dollars short. I don't have a tenth the musical talent he has, but I did have money. I told him I'd bankroll the production of his album. He was really happy to hear that, and he started to tell me what he thought would be a fair compensation in return for my 'investment.' I just waved my hand in front of my face until he stopped talking. "I just want a free copy of the tape after it comes out," I said. I wasn't making an 'investment.' It would have been a sin against the arts for John not to be able to make that tape just because of money. He made his tape and I still have my free copy of it. □

We were about halfway through 1989 when another startling event took place out at work. Word came down from above that DMD was splitting into two divisions, a big one and a little one. The little one was to be known as Data Storage Systems division or DSS and was going to be a division devoted to our box

products. The big one was to be known as Disc Mechanisms Division and would keep the acronym DMD. The Coyote product line and its manufacturing were to be part of the new DMD. Eagle, on the other hand, was going to DSS even though the HP 7937 was not a 'box' product except insofar as it was not an OEM mechanism product and didn't have a 'C' product designator. The DSS-DMD decision effectively set in stone the strategy I opposed, and that had led to the cancellation of Eagle II, because the new DMD was by definition going to be a division that concentrated exclusively on the OEM jelly bean disk drive market. To my somewhat-less-than-unalloyed-joy, the new DSS division manager was none other than my old pal Doug Clifford. Now all of a sudden I *was* working for him. But at least there were two layers of management between me and Doug. It didn't look like I'd be running into him on a day to day basis. However, any more friendly teasing was now *definitely* out. I don't tug the lion's whiskers.

I was surprised by the announcement, and as the details regarding the makeup of the two divisions were explained to us my surprise turned to stunned surprise. Most of the vast organizational overhead of the old DMD was staying with the new DMD. DSS was getting only tiny slices of it, which meant we were going to be a pretty lean and mean division so far as our cost structures were concerned. At the same time, our box products – which were standalone storage products that sold directly to end users and not at all into the OEM market – commanded fairly large profit levels. DSS was both getting the money-making products and shedding the crippling overhead costs. *Man,* I thought to myself, *DSS is going to be one rich division*.

DMD, on the other hand, was set up to produce high tech commodities with low profit margins and was being saddled with the existing high cost operating structure. From where I sat what was in store for them looked pretty obvious. Basically they were screwed. And they had given away Eagle, which was the most profitable product the old DMD had ever had. By the time the HP 7937 went into product obsolescence it had brought over *one billion dollars* in revenue into HP's coffers. This one product, all by itself, brought in as much money as *the entire company,* all of HP, had brought in the year that ended just before I joined the company in 1975. Its ratio of average selling price to factory cost was thirty percent higher than the typical HP product, which meant its profit margin was one of the highest in the company's history. The new DMD was giving away its biggest breadwinner. I remember thinking sarcastically at the time, *"I must not have what it takes to be a division manager. I'd have never come up with this plan."*

Of course it wouldn't be fair to lay the entire blame for this astounding move at the feet of Don Curtis. A division manager doesn't have the authority to create brand new divisions of the company. That kind of decision rests with one of the company's vice presidents – in this case with Dick Hackborn, the guy who had been division manager of DMD when it started up and when I first moved to Boise – and with the VP's staff of 'business unit managers.' DMD – and now DSS – belonged to what was known at the time as the computer peripherals business unit, a unit that included that hot new product line from next door, the Laserjet printer. The business unit managers were known by their acronym, the BUMs, and if ever there were a 'bum call' this one was it. I guess I wasn't cut out to be a corporate vice president either.

One of the main reasons I had decided to become a manager had been so I could try to influence our strategy and try to get us to not head off in the OEM direction. Well, that objective was pretty much rendered moot by the division split. Now it was too late for that and all I could do was worry about my friends and all those other people who were trapped in the new DMD. There wasn't one single thing I could do to help them. I had never expected my new job to be more fun than a barrelful of monkeys, but at least I'd had a sense of a larger *mission* in taking it. Now, without that sense of mission, my job *felt* like a job for the first time since I'd had to work in the bakery all those years before. What I *could* do now was work to make my new division as successful as possible. That, at least, would be something I could do for the production workers and all the others whose livelihoods depended on our mutual contributions as a company. And there was no better product to accomplish this with than Eagle.

Or so I thought. Later in the year, as we rolled toward that last quarter of calendar year 1989, another surprising decision came rolling down, this time from DSS's management chain of command. We were to

start preparing for the transfer of the HP 7937 into product obsolescence. What this meant was that we were to design a low volume production line that would be transferred to a third-party company HP used to support old products that were being taken out of our product catalog. The Eagle factory would be dismantled and my team would be reassigned to production engineering for our main 'box' product line.

Disk drive technology is a fast moving technology and the new five-and-a-quarter-inch and 3.5-inch disk drive products now in design and in the marketplace were, from a purely technical standpoint, superior to Eagle's technology. Everybody knew that and everybody, including me, knew it was only a matter of time before the HP 7937 would no longer be competitive. By the end of 1989 Eagle would be three years old, and that's quite an advanced old age in the mass storage business. What bothered me was the end-of-the-year timeframe set for shutting down Eagle. In my perhaps naive way of looking at things, the marketplace determines when a product is no longer competitive and I didn't see any sign in our production schedule that Eagle had reached that point yet. Probably Somebody Up There had access to some good market forecast data that clearly showed the timing was right for bringing Eagle to a close. But if so, no one ever shared this data with me. I don't know if Vashro was involved in the decision or not. I do know I wasn't. As far as I could tell, the decision could just as easily have been an arbitrary act of market anticipation. To put this another way, it could have been nothing more than a self-fulfilling prophecy. I hope it wasn't, but I don't *know* that it wasn't. I did know our division had never won any blue ribbons for its strategic planning process. Like in most of HP, strategy never really was our strong suit. Tactical execution and being able to rapidly respond to opportunities and problems was.

Whatever my private doubts were about the decision – and I did have them – it was my responsibility to carry out this decision. That's the way it worked at HP in those days. The objectives for my team were supposed to support and help to achieve the objectives set at the next level up in our organization. Some of my folks did openly question the decision to terminate the Eagle product, but as much as I agreed with the doubts they were expressing, I couldn't share my own doubts with my people. I couldn't change the decision but I could guarantee failure by leading a revolt. As Gene Kranz, NASA flight director for the Gemini and Apollo programs, has famously put it in the title of his autobiography, failure is not an option. Eagle was going to die, but after having given seven years of my life to it I was determined it would meet its end with head high and absolutely no decline in its quality or in its reliability. That was the goal I stated to my team and every single person, both in production engineering and out on the line, signed up for it without reservation and with determination to make it so. We were all proud of Eagle and we were going to see to it that we could always be proud of it right down to its last day. The Eagle folks made that happen, and I've always been proud of all of them for that accomplishment. □

While we were busy keeping Eagle shipping and, at the same time, preparing for its obsolescence, there were other things on my plate that needed to be done in order to get ready for our new job of supporting the box product line. The Eagle factory was going to be completely dismantled and given over to DMD for expanding our thin film disk fabrication facility. The box product line was located in Building 83 Lower, which also housed so many other various functions that it was a regular sardine can. One of the things we would need was adequate floor space to house production engineering, and I wanted that space to be right off the production line where communication between the line and us could be as nearly instantaneous as possible. We also needed space to accommodate R&D transition teams coming down from the lab as the planned suite of new DSS products entered the production prototype phase. I wanted the lab team right next to us and not off in the distance someplace where they couldn't see what problems needed to be fixed before their new product could be handed over to production operations.

Floor space was always a contentious issue. No group ever thought they had adequate floor space to do their job. Over the years there had come into being a special group, known as Site Facilities but more commonly called 'the space group,' who had been handed the unenviable task of planning and *deciding* who was going to get what floor space, where it would be, and how much anyone was going to get. They were part of that big overhead structure we had built at the Boise site.

No one was ever happy with this group's decisions because everyone always thought *their* group drew the short straw so far as space was concerned. The space group really had a thankless job and regularly had to put up with abuse from everyone else. It was natural and inevitable under these conditions that a kind of Fort Apache attitude developed within this group. Nobody likes to be unappreciated and it was certainly true that they were *very* unappreciated. How would *you* like the job of standing between two seven-year-olds with *one* ice cream cone? That pretty much describes the situation they were in.

I didn't have to be a rocket scientist to see the parallels between their situation and that of Lee Brooks back in my Delcon days. One of the people in my team was a bright, conscientious, and extremely dedicated woman named Ok Hee Chang. Ok Hee had been a top craft production operator who had been moved off the line to fill a kind of general production trouble-spotting role. I call it 'trouble-spotting' rather than 'trouble-shooting' because as part of the production line all that Ok Hee could do was bring problems to the attention of the line supervisors. By herself she couldn't make anyone fix the problem. This had been kind of frustrating for her and not long after I took over the production engineering group her line supervisor came to talk to me about Ok Hee. She felt, correctly, that the nature of Ok Hee's job was more aligned with the function of my group than with that of production operations. What would I think of taking Ok Hee into my group?

I already knew Ok Hee. My first day in my new job she had come to me before my chair even had a chance to get warm to tell me about some problem she had spotted. I think she expected to be disappointed in the outcome of this meeting because Vashro had previously made a habit of ignoring her. But the problem – I no longer remember exactly what it was – was a real problem and it was something that needed to be fixed. Nobody was more surprised than Ok Hee when I put one of my engineers on it. Over the next couple of months I came to respect Ok Hee's judgment and commitment to Eagle, and so I thought the supervisor's suggestion that she be transferred into my group was an outstandingly good suggestion. I had to arm wrestle with Vashro to get this approved. It wasn't something I had the authority to do on my own and, quite frankly, my boss couldn't see or didn't want to see the benefit of having someone who was not an engineer or technician in his organization in anything but a secretarial role. But I argued him into it and, being an Amiable, he reluctantly okayed it. Ok Hee turned out to be a treasure and she made a lot of important contributions to making Eagle fly high.

Now I gave her a different kind of problem to help me with. I asked her to look around for any kind of space problems I could take to the space group. I didn't care what kind of problems these were. I just wanted them to be plausible space problems I could go ask the space group to help me with. I wanted this *before* I had to go to them with the request for my floor space needs in the box factory. Ok Hee came through for me and soon I had a nice, minor little space problem I could take to the space group. I trotted over to their area with it.

I'll never forget the nice greeting I received when I walked into their cubicle. One of the folks was sitting at her desk and as I walked up to her she snapped, "What do *you* want?"

I humbly admitted that I had a space problem and I wasn't sure what to do about it. Could she help me? She listened suspiciously as I described the problem. After I finished she snapped, *Do this!* and told me what her decision was.

"Okay," I responded cheerfully. "Thanks!"

I treasure the look of surprise and puzzlement that spread across her face. Something wasn't right here. Where was my argument against her decision? Where was the abuse? I peeked back over my shoulder as I was walking away. She had stood up and was watching me go.

Over the next few weeks Ok Hee found some more space problems for me and I took each one over to the space group. Each time, whatever they said, I went away and did exactly as I was told. No argument. When the time came for me to bring my big space request over, they gave me almost the entire ground floor of Building 83 that wasn't already given to the box line. *Including their own space*. I actually ended

up getting more space than I had dared to hope for. The space group was a pretty good bunch of folks. □

Vashro made some other changes in our organization in preparation for the post-Eagle world. The production technicians were being moved from production operations to manufacturing engineering, a designation that included my group, a newly formed New Product Introduction or NPI group under an old friend of mine, Dave Prouty, and a software group that would be under a capable woman named Katie Kolstad, who I knew slightly from various encounters over the years. Dave, Katie, and I would be Vashro's staff, which finally made his job what it was supposed to be: a manager of managers. It was also decided that the group of admin people – clerks – who kept track of all our production documentation would be officially formed into a group – the documentation group – and placed under a supervisor. For reasons never explained to me, it was decided this group would become part of production engineering, my group. So now, in addition to my engineers, Ok Hee and my administrative assistant, Fred Barton, I would have two supervisors reporting to me, one for the production engineering technicians and one for the documentation group. Vashro didn't ask for my opinion on any of this. He just told me about it. I approved of the technician group; I had plans for them. I didn't see why the Documentation Group should be put under me, but I didn't have any particular objection to it. If I'd been asked, I'd have said this function was part of production operations. After all, they were the ones who built the products and needed the documentation. But nobody asked me.

The task of hiring the new supervisor for the documentation group then fell to me. Or rather I should say the formality of hiring this person fell to me. Bob already had someone in mind and there was only one applicant for the job, a slightly heavyset woman in her late twenties or so named Linda. I had never met her before the day we sat down for her interview. She came from the production operations side of our organization and for all I know Bob had encouraged her to apply for this job. Whether or not Vashro had anything to do with it I don't know, but I pretty much think he did not. Vashro didn't bother himself very much with getting to know individual production people below the supervisor level. In this he was a very strange kind of Amiable. Like a number of people I've met who fancy themselves to be liberal and enlightened, he tended to view people as abstract people rather than bothering to get to know them as real people. I've never met any abstract people for the simple reason that there aren't any.

The interview itself was nothing particularly special. Since Linda was not an engineer it was what is called a 'behavioral interview.' This consists of talking about what sorts of things the interviewee has had experience with in the past and how she dealt with various situations that bore some similarity to the sorts of things that could reasonably be expected to pop up in the new job. Linda had no previous experience with being a supervisor, so I knew I'd probably have a bit of a coaching job on my hands. But all I was looking for was someone who could lead a small team and see to it the documentation operation ran more or less smoothly. By the end of the interview my judgment was Linda could probably handle that. One thing did bother me a little bit, though. Throughout the interview she had a kind of deer-in-the-headlights look about her. It is very common for a person to be nervous during an interview, but something about her nervousness seemed a little excessive to me. It bothered me enough that I mentioned it to Bob afterwards. "She'll be fine," he reassured me. "Don't worry." I generally respected Bob's ability to judge people so with that reassurance I went ahead and hired Linda.

That, as it would turn out, was the worst mistake I ever made. □

As 1989 drew to a close we were busily engaged in taking down the Eagle line and verifying the tiny little 'obsolescence line' our third-party vendor would use to support Eagle for the next ten years after HP ceased to sell new ones. It was during this that my phone rang one morning. It was a call from an R&D project manager down in Cupertino who was working on one of HP's new computers being developed in Data Systems Division. He was in a panic. It turned out that all of his group's design data was stored on an HP 7937 and this drive had suddenly failed. Through an oversight DSD's central computer system that automatically backed up the data on the lab's disk drives hadn't been backing up this particular drive. Everything his group had done for the last six months was on that drive. Tens of millions of dollars were

at stake. Was there anything we could do to help him?

I asked him a few questions about the symptoms the failed drive was exhibiting, and from what he told me I had a pretty good guess what had happened. One of the things we'd started doing after I took over the production engineering team had been to analyze the data we got back on Eagle field failures, and we had identified a problem in our production process that was causing the kind of failure that exhibited the symptoms he was describing. The basic problem was an inadequate tool used on the production line to apply lubricating oil within the actuator. The tool didn't reliably meter out the proper amount of oil and every once in awhile too much would be applied. It would leak out from where it was supposed to be and get onto the surface of the disks. Friction between the heads and disks during turn-on and turn-off would eventually turn this oil into a kind of tar and make the heads stick to the disk. Once this happened, the next time the Eagle was turned on the spindle motor would wrench the heads loose, bending them out of alignment and sometimes tearing out small pieces of the disk surface. One of my guys had fixed this problem on the line early in 1989 but there were a lot of Eagles built before the problem was discovered. This one was one of them. If it was what I thought it was, there was a good chance we could recover most of the guy's data for him. But it wouldn't be simple and we'd need to get that drive back to do it.

"We'll see what we can do," I told him. "Send the drive back here." That very afternoon my colleague down in Cupertino sent his best technician up to Boise on the first available flight from San Francisco. In the seat next to him was the ailing Eagle, securely bundled up inside a sturdy shipping case. To the best of my knowledge, it was the only Eagle that ever flew business class. In the meantime my best EE, Eric Johnson, and the production technicians set up an 'emergency room' in one corner of what had been the production line and got ready to receive our 'patient.' Andy Rad, who took care of all the software for the various computers we used in production, was also part of this team and was preparing some diagnostic software tools. We would need his skills if we were to have any chance of getting DSD's data back.

As soon as the Cupertino guy arrived with the Eagle we wheeled it into our 'emergency room' and started some very careful testing. This was done very cautiously because we didn't want to cause any further damage to this already damaged disk drive. The damage was already so bad there was no realistic hope of ever completely fixing the drive. But the cause of the failure turned out to be what I had suspected it would be and there *was* still a chance we could save most of their data. As it happened, there was one man on the face of the earth who knew the intimate details of Eagle well enough to design a way to make that possible, and that man just happened to be none other than Eric.

Eric figured out right away what had to be done and in a few short hours he had designed and built some special electronics that would let us bring up the drive well enough so that it could talk to a computer and respond to commands. It was a very, very sick Eagle and its condition was extremely delicate, but Eric got it working well enough to start transferring data. The Eagle controller included a very, very powerful error-correcting code and we needed every ounce of this code's power to recover the data. Andy rigged up some special software to nurse the drive along and to copy its data off to another Eagle. It took most of a long, anxious day but in the afternoon Eric and Andy came to me in triumph. They had recovered *all* the data. Not one single bit was lost. Andy set up a phone link to Cupertino and transmitted all the recovered data to a computer down at DSD. They were in business again. Eric, Andy, and the techs had made an absolutely fabulous accomplishment. I had thought we could probably get most of the data back, but I hadn't dared to hope we could get it *all* back. But that's what the guys did.

Less than a half hour later my phone rang. It was the DSD project manager and he was gushing with thanks and gratitude. He thanked me over and over again. "I'm happy we were able to help," I told him, "but we were just doing our job." He didn't buy the modesty, although all the while I was thinking none of this would have ever happened in the first place if *we* hadn't had that oil problem to begin with. But I thought it best not to bring that little detail up.

Later that afternoon the lab manager at DSD called our manufacturing manager and repeated all this unvarnished and lavish praise for what a great team he had in us. Then the DSD division manager called

our division manager and did the same thing. “Your people embody everything that’s best in the spirit of the HP Way,” he said. So then I got a visit from Doug and a nice ‘attaboy’ which I passed on to the team. Aw shucks, Doug. Just doing our duty. But thanks.

Christmas scenes from 1988 and 89. Upper left: Nephew Bryon, Sherri, Darrel Hicks, one great-niece and one great-nephew. Upper right: Darrel, nephew Scott, Scott’s wife, Bonnie Hicks, nephew Aaron, one great-niece. Lower left: Bill’s family – Bill, nephew Nick, Maryann, niece Marnie. Lower right: My cousins from Aunt Sylvie’s family getting ready for dinner at the retirement home where Sylvie now lived.

Back in Iowa one generation was getting old, another generation was coming up from behind, and a brand new generation had begun to be born. My five nephews from Sherri and Ronnie – Bryon, Scott, Mark, Dwight, and Curt – were young men now. Bryon, Dwight, Curt and Scott were already married and had kids of their own. That made Sherri a grandma, and also made me a great-uncle – a status that felt a bit strange to me. Sherri didn’t seem to have had any difficulty in making the transition to being Grandma Sherri; she really loved her grandkids, who she called ‘the pumpkins.’ Bill and Maryann had two kids. My nephew Nick was just entering adolescence and my niece Marnie was still a little girl. Dan had adopted Melody’s first boy, my nephew Aaron, and they had had the first child of their own, my nephew Donald, in July of 1988. My niece Danielle would be born in January of 1990. Nick had been born in Austin in February of 1975, while I was living in the Lincoln Apartments, and Aaron had been born in March of 1977. The two of them were terrific boys who I deeply love, but put them together and they could be little terrors who could keep Melody and Maryann both hopping. Mom, of course, was now a great-grandma. The ‘pumpkins’ who were old enough to talk hadn’t quite gotten this right yet and called her ‘Grandma Great,’ which never failed to get a big smile out of Mom.

Living as far away as I did and getting back to Iowa only once a year, I missed seeing my nephews and nieces grow up and I would likewise miss seeing my great-nephews and great-nieces grow up. I would have dearly loved to have been around more when they were kids but that just wasn’t in the cards for me. It was especially difficult to even keep track of my great-nephews and great-nieces. When I did come back for a visit it was a lot like going to Aunt Sylvie’s when I was little only now I was one of the tall people and they were the short people. I did try to be a good uncle and a good great-uncle to them and

I hope I was. Of all the 'pumpkins' the only two I really got to know even slightly were Dwight's girl, Heather, and Scott's boy, Toby. Heather stood out because even when she was barely taller than knee high she was already a grand little lady. It always seemed to me she was born with a mind already grown up and her body just had to hurry to catch up. I got to know Toby because he lived in the family settlement in Reynerville, would come over to see his grandma and grandpa while I was home for a visit and we'd talk. He reminds me an awful lot of Scott when Scott was a boy and a teenager. As I write these words, only a short time has passed since Bryon's daughter Patty had my first great-great nephew, Trevor, and Heather gave birth to my first great-great niece, Ashlyn Carol. I hope to meet them one day soon.

I have only one true regret in my life, and that is that I never had a son or daughter of my own and now I never will. I would have dearly loved, perhaps more than anything else, to have had a son of my own. I'm not too sure how good a father I would have made, but I'm pretty sure I'd have made a terrific grandpa. As it is, I'm a bit like the character in the movie *Goodbye Mr. Chips.* My boys and girls are the hundreds of wonderful, wonderful young people who are and have been my students.

Gary's parents, Bonnie and Darrel, were always part of Iowa Christmas. Gary was their only child and I can't even begin to imagine how terrible his death was for them. But for as long as they both lived, they were part of our family and no one ever called them 'in-laws.' Christmas wasn't Christmas without them.

Aunt Sylvie was several years older than Mom and was now in her seventies. She was as wonderful and alive as ever, but now she had reached that time of life when she really couldn't live by herself anymore. She had moved into a very nice retirement community and I did have the chance to spend one Christmas dinner there with her and her kids, my cousins. I can never see my cousins without remembering the Teters' family reunions we used to have in the park in Maquoketa when I was very little. There would always be a big picnic spread and there would always be a baseball game. The games weren't exactly regulation; there were always a lot more than nine players on a side and we little kids always got to field and bat right along with the grownups and the older kids. I can still remember when one of my uncles got a base hit one time and ran to first base, where I was standing with my little glove. He got there all huffing and puffing from running, and I was amazed and wondered what was wrong with him. At that age I could run full-out all day long and never get tired. I couldn't understand why anybody would huff and puff just because they'd run ninety feet to first base. Another thing I always remember when I see them is the party they threw one time to celebrate Grandma's and Grandpa's wedding anniversary. They had a mock wedding ceremony and one of my uncles dressed up like a woman – he was the bride – and put great big wads of cloth under his blouse to imitate breasts. When he marched down the aisle the whole Teters clan broke out into a song, *Here comes the bride! Big, fat, and wide!* At the time I didn't have much of any idea what was going on, but I thought that was hilarious.

Mom and Dad (1989)

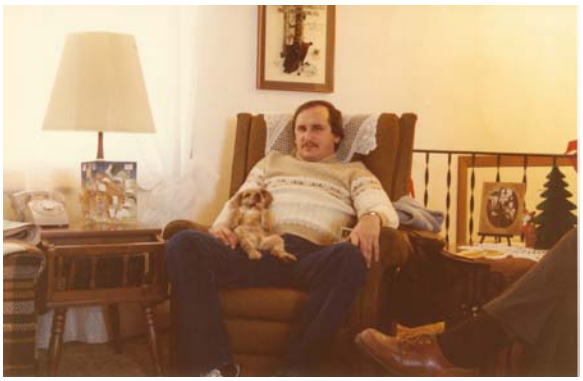
Dad was seventy-six years old the holiday season of 1989, and old age was starting to settle on him pretty heavily. The great physical strength that had been his source of pride his whole life had left him now and his eyesight had gotten so bad he really had no business driving a car – a fact that he lamented even while he continued to drive. He was starting to feel like he wasn't useful for anything any more, and this depressed him. Probably the brightest light in his life now was his grandson – my nephew Aaron. Aaron really loved his grandpa and Dad really needed to have someone who still looked up to him. One of the things I couldn't help but notice when I'd come for a visit was the way Dad often mistakenly called Aaron, "Rick." When I was a teenager working for him in the bakery he'd frequently slip up and call me, "Bill, ah, Rick." That

had really annoyed me back then but I had learned to put up with being "Bill-ah-Rick." I don't know what Aaron thought about being called "Rick," but I just joked that Dad was running one generation behind in his mind.

Dad had started keeping chickens on the settlement and they were sort of his pride and joy. Actually, I thought his chickens were pretty cool. During the winter the chickens would burrow out these little snow caves all around the house. They'd snuggle up in them next to the walls to keep warm. Unfortunately, the stray feral cats that roamed around all over the place also developed a liking for Dad's chickens. For a time he tried to defend his chickens using his old 22 caliber single-shot squirrel rifle. But by 1989 his eye sight had gotten so bad he couldn't see well enough to shoot any more. That year when I was back I noticed he had a lot fewer chickens than the year before and I asked him about it. He told me about the cats getting his chickens in the saddest voice I ever heard him use. There was one cat in particular, a big yellow-striped Tom, that was his worst nemesis. While most of the feral cats came around at night after the chickens were shut up in the chicken house – which afforded them some protection – this big Tom would come around in broad daylight to do his chicken hunting and Dad couldn't stop him.

A couple days later Dad and I were sitting in the dining area talking when I saw a big yellow Tom coming across the fields toward the chicken house. "Is that the cat you were telling me about?" I asked. I doubt if Dad could really see him all that well, but he said it was and started muttering in frustration. "Do you want me to shoot him for you?" I asked. Dad jumped up and scurried off to his bedroom, returning in a minute with his rifle. I loaded it and stepped out onto the back patio. The cat was still probably about sixty yards away when I took aim. I thought it was too easy a shot to get him in the body, so I took aim at his head instead. More of a challenge for me and the cat would never feel a thing. I touched off the shot.

Across the field every hair on the cat's body suddenly stood straight up. He'd become a furry beach ball and just as quickly vanished from sight. I walked across the field to make sure he was dead and fetch the carcass. When I got there, no cat. No blood trail. The bullet must have gone *whiz!* just past his ear and the cat vanished like a phantom. I couldn't understand how I'd missed at that range. I guess my eyesight wasn't what it had once been either. All I could do was hope the cat had taken the hint and would stop coming around anymore. Whether or not that turned out to be so, when I came back the next year all Dad's chickens were gone. The varmints had gotten every single one of them.



Brother-in-law Dan

Dan is an avid hunter and each deer season he'd go out to bag a deer or two. One time he got one and one of the boys – I don't remember if it was Aaron or if it was little Donald – was so excited about it he had to tell everybody he met. "My daddy shot a deer!" he'd exclaim. "He shot it forty-seven times!" That wasn't true, of course, but everybody for miles around started teasing Dan about it. "Gee, Dan," they'd say, "what did you do? Go deer hunting with a machine gun?" Or, "Hey, Dan! Bag any hamburger this year?" □

As 1990 began Eagle was history and my group took over production engineering for the box product line in Building 83 Lower. The box assembly line was far less high-tech than the Eagle line had been since essentially all that had to be done was put together various subsystems that were manufactured elsewhere and shipped to us. On the other hand, all the DSS products were assembled on that one line – now that Eagle was gone – and so the assembly line had to be flexible enough to deal with whatever mix of products the production schedule called for. In addition, the R&D lab continued to develop new box products and these, too, had to be introduced into the common production line.

When we arrived in Building 83L, it didn't take me very long to be shocked by how chaotically the production process was run. The original box line had been designed for the original box product and over

the years since then it had evolved by more or less the path of least resistance. There were problems in getting the material to flow to where it was needed on the line, problems with getting finished goods to the packaging area where they were boxed up for shipments, there were even problems with maintaining proper training and procedures for assembling the products. What should have been a relatively simple operation turned out to be running by the grace of extra efforts on the part of the production people, and in this environment mistakes were inevitable.

One symptom of this was change control. More accurately, the utter lack of it. Production operations are always supposed to be routine affairs, running like clockwork according to well-defined production procedures. We did have such procedures covering each one of the several products built on that line. But it is also necessary from time to time to do extraordinary procedures, usually in response to some line stopper problem that has popped up. At DMD and at DSS the vehicle for putting such an extraordinary procedure in place was known as the Temporary Change Document or TCD. Like the name implies, a TCD is supposed to be a short-term, temporary change in normal procedures. It is supposed to cease to be in effect after some relatively short period of time after the problem is corrected and, if necessary, the appropriate long-term change is made to the normal production procedures.

On the box line TCDs weren't too temporary. Over the years hundreds of them had been introduced to respond to various problems and had just been left in place. Under Vashro no effort had gone into fixing the long-term procedures and retiring TCDs. As a result, it was up to the shift supervisors and the trainers to carry in their heads the knowledge of what the *real* production process was because this real process was actually undocumented. If anyone had actually followed the official production procedures the result would have been disastrous. On top of this, engineers from both the lab and from manufacturing had long enjoyed the freedom to run experiments on the production line. The TCD allowed this. Sometimes they'd forget to withdraw the TCD after they finished running the experiment, and then the line would run for awhile building products in a way that had never actually been authorized. Vashro had let just about anybody who wanted to come out and play on what was now my production line.

Another symptom of how poor a shape the process was in was reflected in our pilot run success rate, or, again more accurately, our lack-of-pilot-run-success rate. From time to time changes in the design of a product and even entirely new products have to be introduced. A pilot run is kind of like the last dress rehearsal before the change is released permanently into the hands of production. By the time a new product or a permanent change to an old one reaches the stage of this dress rehearsal, *everything* should be right and pilot run should be nothing more than the final check before manufacturing release (known in our engineering jargon as 'MR'). In fact, production *plans* on being able to ship the units that are involved in a pilot run as soon as MR is authorized. The target goal for pilot run success rate has to be nothing less than a 100% success rate. I was handed a line where the pilot run success rate was 25%.

But at least the incidences of line stoppers was very low. That was because there was nothing in place to keep tabs on the quality and reliability of the products we were producing. It's easy to achieve a low rate of line stoppage if nobody ever looks for problems and just assumes that everything's fine. There was no real way to tell how much substandard product – 'crap' as a customer would call it – we'd been shipping off this line before my group took over the engineering, but I was determined to try to find out. If the number of line stoppers we had during 1990 is any indicator, it must have been a lot.

There *was* a group ultimately responsible for seeing to it that all these problems didn't happen in the first place, and there was one individual who was ultimately responsible for this group doing their job. The group was called production engineering, and the individual with the ultimate responsibility was called the production engineering manager. Me. You can't blame production operations for any of this. Production operations operate according to how engineering tells them to operate.

It took me about a week to fully realize how many serious problems we had. After that, I found myself in what you might call a delicate situation. The guy who had let this line get into such bad shape in the first place also happened to be my boss. I couldn't very well go tell him, "Jim, you really screwed up."

But he had. That's just the brutal truth of the matter.

Upstairs in the R&D lab there were several new products under development and scheduled to go into manufacturing, one after another, over the course of the coming months. As I saw things, the most urgent needs were for getting the production line back under control and for setting up audit and failure analysis procedures to first find and then deal with whatever problems were happening out on the line. To address the second need I turned to Eric and asked him to set up the kinds of operations we'd had on the Eagle line to maintain product quality. Eric also partnered up with Vern Dutton, my supervisor of our technician team, to set up a Failure Analysis Lab to investigate the root causes of yield problems on the line.

To address the first, I asked Ok Hee and Linda to work with the supervisors and trainers to get the line off the TCDs and bring the procedures up to date. I also told the production supervisors, and Bob, that we were going to set up a new change control system. Over time it had become habitual to overuse TCDs – which were supposed to be for one-time events – to introduce permanent changes. From now on there would be another document, which I called a Change Proposal Worksheet or CPW, that would be used as our positive control for every change intended to become permanent. The CPW had something in it a TCD did not, namely a long list of signoff authorizations that included *every* manufacturing function that was supposed to be involved in product changes. For example, the site had a safety and regulatory compliance group that was supposed to check every change made in the materials out of which something was built because these changes could potentially affect our Underwriter's Laboratory certification of a product. This group had been complaining loudly for quite some time that they weren't being notified of things, and on more than one occasion some fairly serious regulatory agency problems had arisen as a result. TCDs didn't require their okay; CPWs did.

I had no trouble at all getting Bob to sign up for the new change control system. He immediately saw it was necessary. The production supervisors were a different story. Every one of them opposed it at first. I think they saw it as something that would just add to their workday burdens and they were burdened enough already. I felt sympathy for their concerns but I was pretty certain they'd start to support it once they saw the benefits. And that, in fact, is what happened. It took about a month, but after that they were among its biggest boosters. In the interim, with Bob backing the plan I had all the support I needed to put it into operation immediately. Usually I prefer to work through a process of consensus building rather than just wield the power my job position conferred on me. But consensus building takes time and I saw the present state of the factory as being in a state of emergency. The supervisors didn't see it that way because they'd gotten used to the day-to-day chaos.

One group I knew wouldn't like the change control system was the engineers, both mine and those from the R&D lab. R&D engineers, of course, don't like forms of any kind – as my long-ago experience at Delcon had shown. Truth be told, I don't like them either. But I also didn't like getting vaccination shots at Dr. Swift's office. Sometimes you have to do things you don't like. I knew the engineers would never be very happy with having to work with CPW forms; but that's life. I was the manager and I had the authority to make the final decision to accept or not accept changes into production. That was a pretty powerful bit of authority and I used it. I had Fred make a huge banner sign that hung on the wall above my desk. It read: *All* permanent changes require a CPW.

I knew the best I could hope for from the engineers was an attitude of resignation about having to put up with the 'bureaucracy' the change control system involved. And that is in fact the attitude they came to develop. A typical conversation at my desk went something like this. An engineer would come to me and say something along the lines of "I want to make such-and-such a change. Do I need a CPW?"

"If it works, is it going to be a permanent change?" I'd ask.

He'd look at me like I was an idiot. "Well, yes," he'd reply. Then I'd point to that sign. He'd make a face and go away to start a CPW on its way through the system. That was how it went after awhile. Initially, as I had anticipated, some of them would argue with me to the effect that *his* change was so

special and urgent there wasn't time for a CPW. "What part of the word 'all' is giving you trouble?" I'd ask. The engineer, of course, was concerned with getting his own job done swiftly and efficiently. But *my* job was to see to it the entire factory and our connected business operations – like product regulations – worked swiftly and efficiently. 100% of the revenue of DSS came off that production line.

I didn't clear any of this with Vashro. Basically I knew I could never talk him into it without having to bring up the long list of things that were wrong with factory operations. That, of course, would have amounted to the same thing as telling him how badly things had gone to pot on his watch and *that* was a conversation I didn't want to have. Within the old HP culture this was my call and I didn't need his approval. I had decided to let the results speak for themselves once we'd had time to get some results. Then he could see it as an 'innovation' and not a censure. And that meant *he* could take credit for it with his own boss, the manufacturing functional manager. HP informally defined 'management' as 'getting results through the efforts of others'. When the new system succeeded he'd have done his job as *my* manager. If it failed – which wasn't going to happen – then I'd get to take the blame. Personnel departments – and Amiables – don't like to hear things put so bluntly, but the fact is that's the way industry works even in enlightened companies like HP.

Still, I knew he'd hear about it eventually. And probably not like it. I was just hoping he wouldn't hear about it until enough time had passed for me to have some positive results to showcase and to have won over the support of the supervisors. Unfortunately, I underestimated how fast the grapevine worked. We had barely begun to use the new system when he called me in to see him about it. As I had expected, he didn't like it. He accused me of fomenting a bureaucracy. *I* found his tone offensive and snapped, "An organized bureaucracy is better than a disorganized one."

That wasn't the smartest thing I could have said. But I don't always say smart things.

My point, which I explained to him, was that we already had a bureaucracy based on the TCD system and it had 'become complicated enough over time that it was no longer up to the task' of dealing with all the varieties of products the line was now expected to produce. And there were new products – 'NPIs' or 'new product introductions' – on the way that would only make the situation harder to control. He didn't look more than about a third convinced by my argument and things came to kind of a delicate point. He could have ordered me not to do what I'd done and I'd have had no choice but to follow that order. I'd have also had no choice but to find another job under a smarter boss somewhere else. I don't accept orders to fail or to tolerate mediocrity. That goes against *my* code. So, we had kind of a tense moment there. But he didn't issue that order. Among the many unwritten rules we had at HP, there was one that said a boss can't tell a subordinate *how* to do his job. He can tell him what the job *is* – that's what our system of objectives is for – but he can't tell him how he's supposed to achieve the objectives. Vashro 'stuck with the code' of the HP Way and didn't countermand my decision.

As we progressed through 1990 and the impact of the new system registered, production became its greatest booster. Far from making their jobs harder, it made them easier. Nobody is faster than a production person to recognize when that happens. The non-production areas of manufacturing also became supporters and for the same reason. My decision was vindicated, but Vashro never quite forgot our conversation. I never once heard him mention the new system – much less brag about it – to anyone. But Bob did. And, as it turned out, once our product audit and FA (failure analysis) operations got going, the change control system was what allowed us to manage our way through the blizzard of line stoppers that subsequently erupted. As I had feared, there had been a lot of problems hiding in our operation. And we fixed them. Eventually this started showing up in our warranty failure data from the field when our product field failure rates began to drop. Most manufacturing managers would be pretty happy with that result but I have my doubts whether Vashro ever even knew about this particular data. Certainly I never got an 'attaboy' from him on this. Or anything else for that matter. It looked to me like his system of managing a factory used an 'is anybody complaining about anything?' metric. He was an Amiable, just not with real people. He was an 'abstract' Amiable, something I think is kind of pathological.

Aside from shipping all of DSS's products, introducing new ones, and fixing a record number of line stoppers – we had over fifty of them in 1990, twenty-two in September alone – there was one other new big deal we had to deal with that year. It was called Building 22. The DSS production line occupied some pretty prime real estate – namely the ground floor of Building 83 – right in the heart of DMD and pretty far away from the shipping and receiving docks. Somebody Up There had decided to lease a new building in the industrial park that sat across the street on the west side of the HP campus and to put DSS production in that building. That building, which was designated Building 22, would be ready to occupy late in 1990 and we were slated to move there with the coming of 1991.

In point of fact there was a lot of sense to this. The box products line had over time become crowded and cramped to the point where people and material were almost piled on top of one another. The coming introduction of the new family of products would finally overflow the cramped space we had. Vashro had added another engineer to my group – an older, experienced guy named Arlan Saunders who really knew the box line well – to oversee the engineering details accompanying this move. Nobody, myself included, saw the upcoming move of the factory as being all that big a deal.

Nobody, that is, except Arlan. With his detailed understanding of the box line, Arlan could see full well all the myriad practical problems that had evolved over time and were now hampering the production operation. I knew the line had such problems but I hadn't realized yet just how many issues it really had. Initially I saw the upcoming move more as a relocation exercise than anything else. Arlan didn't. He wanted us to have a brand new factory designed from the very start to build an unlimited variety of different products, in whatever mix of quantities, all on the very same generalized assembly line. He wanted, in other words, a factory designed in accordance with our division's product strategy.

Arlan patiently set about educating his new boss, me, on the engineering issues of box product production. He explained to me in painstaking fashion the many, many fine details of assembly flow, material storage and flow to the line, and the numerous difficulties inherent in having even relatively small differences in assembly tools or procedures between our different products. Before too long I was sold. DSS needed a new factory. Not too surprisingly, Bob and the three line managers – each shift had its own line manager who worked for Bob; the line supervisors worked directly for them – weren't hard to sell on the idea. Nobody is more intimately acquainted with the details of production operation than the line managers. All our line managers were women, and they were all very, very sharp people.

The trick was going to be to sell upper management on the idea. Arlan's vision, which was taking shape in the form of detailed engineering design documents, wasn't going to come for free. There would have to be a capital investment, and it wasn't going to be a small one. This was one decision I didn't have the power to make. I could recommend; I couldn't authorize these kinds of expenditures. In the old DMD, new factories for building new disk drive models had always been co-designed right along with the R&D lab's new product development. Our situation was different. Pretty much nobody Upstairs thought the box line really amounted to much. Weren't we just screwing parts together in a box? Compared to the comparatively high tech nature of a disk drive production line, the box line was low tech and nobody in any management position in the old DMD was ever very interested in low tech production facilities. Our line wasn't glamorous. All it did was produce all the division's revenue, a mere $300 million per year.

In order to get Arlan's design funded we'd need to be able to show a significant return on investment. HP had long had a minimum ROI that any major new product had to show in order to be approved. But in our case, where was the 'return' going to come from? After all, customers don't buy factories. There was only one way we could show any financial return at all, and that was from major production cost reductions the new factory design would make possible. If we couldn't prove the financial case approval for Arlan's design would never get past Vashro's desk, and rightly so. We needed an ROI analysis.

I got in touch with Finance – officially known as 'Admin' since that functional area also included Personnel – and requested their help in this. They assigned one of the accountants to work with Arlan and me on this. The three of us sat down together and, over the course of about the next month, we slowly

pulled together all the data and projections needed for an ROI. Our current costs weren't hard to come by. That is, after all, something the accountants keep pretty good tabs on. The real trick was estimating what operating costs were going to look like with the new factory design. This, in turn, reduced to operational objectives for production rates, time-and-motion costs, inventory costs, and so on. Arlan supplied detailed guesses for all these factors based on his analysis. When the analysis was finally completed I was more than a little surprised. The ROI figure came back at 126%, more than enough return to justify the project. Armed with this analysis, getting approval up through the management chain proved to be no problem. Now all we'd have to do was deliver on all those operational objectives. The ROI analysis became the basis for setting measurable goals and objectives for the line in the new factory.

Arlan did an outstanding job and the new factory in Building 22 came on line right on schedule. The first shift that started building products for real in Building 22 was our second shift, known as the swing shift. On the very first day of operation, the swing shift set a new all-time single shift record for production. Bob wasn't the least bit shy in making sure they heard about this accomplishment all the way up to Doug Clifford's level. Jerry Flandro, our manufacturing manager, and Bob threw a party to celebrate the opening of Building 22 and to recognize the many people who contributed to this success. Among those receiving trophies at this celebration were Arlan and, to my surprise, myself. Both of us received very nice wooden wall plaques bearing the engraved inscription: *In recognition of a job exceptionally well done. The Building 22 Program.* Below this was inscribed our names, Arlan's name on his and my name on mine. Today my plaque hangs on the wall of my study just above my desk. □

Serving up burgers and dogs at the company picnic in 1990.

DSS was a small division and, despite the fact that all our different groups and departments were geographically scattered over numerous locations on the HP campus and Building 22, I think we were a fairly close knit division. With our low overhead costs and high profit margins, we were a very successful division right from the start. No business that pulls in three hundred million dollars a year in revenues is ever free of stress, but compared to what the folks at the new DMD were faced with we were as nearly a stress-free division as I'd ever seen, the only exception being little Delcon Division back in the seventies. People were proud of our success and proud of working for DSS. Even Doug Clifford seemed more human in those days, not quite the nail-biter I'd perceived him as back in our R&D labs days. We had fairly regular celebrations that helped promote morale and *esprit de corps.* These were never as wild as those DMD had in the early days – those days were gone forever – but they were fun and people from all levels rubbed elbows at them.

I particularly enjoyed serving up the food at those functions where we had food because inevitably I'd get to see a lot of folks I didn't have much of a chance to see at work due to how spread out we were and how busy my job managed to keep me. Serving hamburgers and hot dogs also held a strange kind of nostalgia for me. Back in the sixties when I was a kid Dad always had a watermelon patch and during the county fair we'd often set up a little food concession at the fairgrounds where I sold watermelons, cantaloupes (which Dad called 'mush melons') and soda pop. At the time I wasn't too thrilled to pull that duty, but now I found myself looking back on those days with quite some fondness. I found myself also remembering riding on the floats in the parade that marked the start of the fair, something I hadn't thought about in many, many years. Another memory I found coming back to me was Ridiculous Days. For several days each summer, the uptown Maquoketa merchants all got together for a big sales extravaganza called Ridiculous Days. Everybody who worked uptown would get dressed up in all kinds of outlandish costumes and people would come flooding into the main uptown area – which consisted of

about three city blocks – to enjoy the festivities and, of course, to buy things. Sometimes uptown would get so crowded traffic had a hard time moving. Now *that* was community. I don't know why serving up burgers and dogs at HP reminded me of that, but maybe it was because it felt like America.

Lunch time with friends during a whitewater rafting trip (1991).

On the average my job was pretty low stress despite its responsibilities, but sometimes the stress level really shot up during our not-that-infrequent emergency line stoppages. Even back on the Eagle line these irregular doses of high excitement tended to add up, especially since part of my job was to remain cool and unruffled looking during these events. Line stoppers are a normal part of life in production and we needed to handle them without panic and to just work the problem to its resolution. As the leader, how I acted set the tone.

I think the price tag for this showed up on the bathroom scales. I was starting to gain weight again and to combat this I increased the duration of my workouts at home. I've never liked jogging or running-for-the-sake-of-running. My preferred exercise was weight lifting and I preferred free weights to the weight machines found in gyms at that time. I had set up a weight lifting room at home and had designed a thorough exercise program that I followed. Three days a week I lifted for three hours a session, and on off days pedaled an exercise bike to keep my metabolism levels up. Jogging was the trendy form of exercise at that time and a few people thought it strange that I was a weight lifter. I guess they thought of weight lifters in unflattering intellectual terms. When I'd be asked about this from time to time, I'd just grin and say, "Do you know how a weight lifter says, 'Ouch! That hurts!'?" When they'd shake their heads I'd say, *Feels good! Feels good! Feels good!* I liked the 'burn' that came with a good workout.

But one day I got more burn than I bargained for. I was doing deep knee squats with the bar across my shoulders and the back of my neck. I didn't really have all that much weight on the bar at the time, only about one hundred fifty pounds. As I was coming back to the standing position, all of a sudden I felt a sharp burning pain in both knees. For the next month my left knee in particular ached all the time, enough so that I'd had to stop lifting. Something was obviously wrong and I tried to schedule an appointment with one of Boise's best knee doctors to find out what was wrong. As it happened, by the time I could get in to see him a month had passed, the ache had disappeared and things seemed to be back to normal. He couldn't find anything wrong from x-rays and his other external examinations and could only guess at what had happened. He knew something had because every once in awhile my knees made little clicking noises he could clearly hear. He told me the only way to find out what was wrong was for him to drill some holes in my knee and go in for a closer look. Even then he couldn't guarantee he'd find anything.

"Is that what you recommend?" I asked him. He shook his head. "Not if it doesn't hurt anymore." He was an honest doctor. I decided against having exploratory surgery.

But as it turned out, things really weren't healed up and back to normal. Both knees slowly deteriorated over the next couple of years until I had to give up playing softball. What eventually happened was I developed 'trick knees.' Every once in awhile, something painfully pinches in one or the other of them and leaves me unable to walk without the help of a cane for awhile. Well, it's too dangerous to go backpacking and camping way out in the back country if you can't depend on your legs to walk you out of there. The injury put an end to my hiking days and, as the condition worsened, put an end to my weight lifting program too. It pretty much left me with just whitewater rafting for outdoor activity, where you're never isolated from other people and emergency help, if needed, is always near by. □

1990 was the year I had my most direct and active experience in politics. It started while I was having

lunch in the cafeteria. Ted Barnes was with me and out of the clear blue he asked me if I would help his wife Marjorie run for the Idaho House of Representatives. Her opponent was none other than the majority leader of the Idaho House, Republican representative Gary Montgomery. It had been years since Mr. Montgomery had even faced an opponent in the elections. His seat was regarded as a 'safe' seat and even the Idaho Democratic Party considered him unbeatable. Ted and Marjorie had talked about it and wanted me to fill a slot on her campaign staff as 'campaign strategist.' They already had a campaign manager for taking care of recruiting volunteer campaign workers, finding and setting up opportunities for Marjorie to speak to the public, and so on. But they needed someone to help in turning mere individual issues into a unified political platform that would let the voters know who Marjorie Stuart was and what she stood for, and to help figure out how to counter the image of Marjorie Mr. Montgomery and his people would try to paint. Was I interested in helping out?

I didn't know Marjorie very well at that time, so I asked Ted to tell me briefly why she was running for office and what her core issues were. He gave me a quick rundown. Later Marjorie herself would tell me more. The things Marjorie stood for were things I stood for too, while, in contrast, most things Mr. Montgomery stood for were things I opposed right down to my core, and so I agreed to join the campaign.

The Idaho Legislature has a well-deserved reputation for being 'the most Republican legislature in the country.' But even this description doesn't really tell you about the Idaho Republican Party. The Party leadership here is the most extremist bunch of political dictators anyone could ever hope to not meet. Calling them 'conservatives' is rather like saying Napoleon was a tad ambitious. My support for Ronald Reagan and for George Bush never extended one single inch to the Idaho Republicans. They have been the majority party in Idaho for as long as I have lived here, but in the 1980s the Idaho Democratic Party was still a fairly strong minority party and over the years I found myself on their side of the issues almost all the time. The leadership of the Idaho Republicans consistently leads that party to undermine and hurt public education, to underfund and even try to privatize the state universities, to pass every religious law dreamed up by so-called Christian fundamentalist political organizations – usually referred to anymore as the 'base' of the Republican Party – and to remove every ounce of any exercise of judicial discretion from the hands of state court judges. They regularly defy rulings of the state courts and carry out the business of legislation by means of closed party caucuses in open violation of state law. Their social radicalism is defined by and takes money and orders from the national organizations of the so-called 'religious right.' I think 'The Moral Majority' and similar radical groups are basically a political front in a movement that would overturn of our system of government and replace it with an authoritarian theocracy similar to the one in Iran. The Idaho Republican leadership never met a religious law they didn't like or a teacher they did. Mr. Montgomery stood at the apex of the Idaho Republican leadership. Would I enlist in an effort to remove him from office? You bet I would. In a New York minute.

One of the very few good things to follow as a result of the Nixon years had been the repeal of the blue laws. These were a hotchpotch of various religious laws designed to force Protestant religious conformity on everyone through the power of government. One blue law example was the one making it a crime for grocery stores to sell beer or wine on Sunday. There used to be a lot of these kinds of laws and all of them had been taken off the books in most places in the seventies after Nixon's resignation, Kansas and Utah being the most noticeable exceptions. They were part and parcel of the same prejudicial persecution that through the history of our country has found a fundamentalist justification for oppressing Catholics, Jews, and anyone else who didn't dance to the tune of the dominant fundamentalist cults. It isn't necessary to set up an official state church to restrict people's rights to the free exercise of their religious views or to *not* conform to others' religious views. All you have to do is codify the dogmas of the sect you would make state-sanctioned in the form of laws. That's what the blue laws were for. When they were repealed I had thought 'good riddance' and never expected to see them come back. But in the eighties with the rise of the so-called 'Moral Majority' and other radical elements of the religion-based political party, the move was on to bring back state-sanctioned fundamentalist doctrines.

I had not forgotten the way the so-called-Christian right had called the AIDS epidemic 'God's

punishment' of people of whom they did not approve and how they had opposed government steps to fight AIDS. I had not forgotten how they had refused to condemn murderers of doctors. I had not forgotten how their crowds of activists had surrounded clinics to heap abuse and psychological sadism on desperate young girls as they sought to enter these clinics. The name Falwell's fundamentalist political party chose for itself stated as clearly as possible one of their tenets. If they saw themselves as the 'moral' people, then they clearly would have to hold that *I* was one of their 'immoral' enemies because I utterly reject as un-American their ignorant and unholy dogma of intolerance, hate, and persecution.

One thing I have always respected about Billy Graham has been his uncompromising stance that religion must stay out of politics altogether. In this he has been alone among our nation's national religious leaders and stood out from all the posturing fakes who make their living being TV evangelists. The latter seem to me to be 'Old Testament Christians' who take it on themselves to define 'moral' as meaning belonging to their cult and 'immoral' as disagreeing with their doctrine in any way, no matter how ignorant of God and barbaric that doctrine becomes. No religious group that bases itself on fearing God and telling its members they must toe the line in order to avoid hell or win a blissful place in the afterlife is 'moral' in the slightest degree. No morality can ever be based on self-love and self-interest. If you do a good deed *because* you want to avoid punishment or 'win favor in the sight of God,' you're doing that deed for your own sake and nothing else. That isn't acting from moral law. You can only act from moral law if the reason for your action is because either, in your very best judgment and in the depths of your heart, your deed is categorically the right thing to do or because not taking that action would be categorically wrong. When any church or religious cult seeks political power, the reason can be nothing else than to gain the power to violate the social contract, force other people to conform to the dogma of that cult, and to take away other people's religious and political liberty. And to do that is categorically wrong. To do that is immoral. It is to me no source of wonder that Billy Graham has never belonged to the so-called 'Moral Majority' because I think they are the most immoral political party in America and their leaders know *nothing* about God. 'Take heed you are not led astray, for many will come in my name,' Jesus is supposed to have said. If he really said that, he got it right.

Ever since the 1988 elections, Idaho's Republican-dominated legislature had been in the hip pocket of this national religion party and had been pressing to pass religious laws that at root were and are aimed at persecuting and criminalizing people for acts contrary to the dogmas of ignorance that define the national agenda of this un-Christian and un-American religion party. If there was something I could do about it, here was a chance and a *duty* to do it. To not do what I could to try to wrest power from the hands of this religion party that masquerades as Republican would have been morally wrong and a betrayal of my Promise. And that, more than anything else, was why I volunteered to take an active part in the 1990 election campaign. You could say my activism was 'faith based' too, but with one big difference. I wasn't active in order to force other people into following my faith; I was active to oppose those who were trying to force me and the rest of us to knuckle under to their dogma. As I see it, if the tenets of a religion are so flimsy that the sanction of law and the power of the police are necessary to hold the 'flock' together, there's something essentially missing in that creed: It has forgotten God and substituted an idol. I don't worship a book. I don't believe all new-born babies automatically come into the world as sinners.

And so began the campaign for the Idaho House. Marjorie and Ted lived in rural Star, a tiny town west of Boise with fifteen thousand registered voters in the district. Politically, we were raw amateurs. None of us had ever run a political campaign for office before, none of us had ever been a candidate for political office before. The state Democratic Party thought Mr. Montgomery was unbeatable and gave us almost no support or guidance or advice at all. They wrote us off from the very start and we were on our own. But we had a small and dedicated group of campaign volunteers and we learned as we went. The very first rule, laid down by Marjorie herself at the outset, was we would have a clean, honest campaign based on issues. And that's the kind of campaign we had. I will also say this for Mr. Montgomery: He, too, ran a clean campaign without smear tactics or any dirty tricks. Naturally, the Republican campaign machine tried to paint Marjorie as a 'tax-and-spend liberal,' but that's standard fare for the Republican Party. They

characterize all Democrats that way in every election.

Marjorie worked tirelessly, appearing at pretty much every little fair, event, and gathering where there were people to talk with. Our volunteers planted Marjorie Stuart posters all over the district, everywhere property owners would give us permission. Funding for the campaign came in from small donations and, if I remember correctly, we also got a modest amount from one or two Democratic PACs after we began to start showing unexpectedly good numbers in the polls. Volunteers wrote campaign letters to the editor for the local newspapers. You know the kind; you see them in every election and almost all of them are written by campaign volunteers and vetted through the campaign staff – me in this case. We did have one case where an overzealous supporter sent in a letter that unfairly and personally attacked Mr. Montgomery. We saw that letter only after it was printed, and Marjorie wrote a letter of her own, apologizing to Mr. Montgomery and letting everyone know that kind of tactic was not acceptable to her or her campaign.

By election day the race was unbelievably close. For election night we rented a room in a downtown Boise hotel where our supporters could gather and we could watch the election returns come in. Hour after hour the voting results trickled in and still the race was too close to call. There was a heavy voter turnout in the district, and the night came and went without a clear victor. It wasn't until late the next morning when all the precinct results were in and the absentee ballots had been opened and counted that the election was decided. We had lost by one of the narrowest margins imaginable. If a trifle over one hundred votes – out of nearly fifteen thousand – had gone the other way, Marjorie would have been elected, defeating the most powerful man in the Idaho House. We actually were ahead in the ballot count for a fair time on election day; it was the absentee ballot count that tipped the scales the wrong way.

It was a disappointment to lose, but we had come so very close to victory that all of us could stand tall and take pride in how well we really had done. There wasn't any doubt the message was heard that year. Idaho Democrats actually did very well that election, although of course they remained the minority party. The 1990 election was a close one and it did at least put an end, for a few years, to the tide of religious laws coming out of the Idaho legislature. Not a permanent end, unfortunately, but for awhile at least the religion party radicals had to duck and cover.

In addition to being an election year, 1990 was also a census year, and this led to the most contemptible act of gerrymandering I've ever personally witnessed. In 1991, as required by law, the voting district boundaries were redrawn to reflect the results of the 1990 census. The Republicans, being in the majority, dictated the new boundaries and the lines were drawn to ensure Democratic voters were parceled up into minorities in every district in Idaho. The most brazen act in this gerrymandering happened in Marjorie's district. The boundary line between districts fourteen and fifteen ran through a farm field a few hundred feet away from Marjorie's house. This line was altered by adding a little loop, only a couple of feet wide for most of its length, that swooped down and surrounded Marjorie's house. They moved her into the other district so she couldn't challenge Gary Montgomery again in the next election. The Republican gerrymandering worked, too. The Idaho Democratic Party has never yet again been able to elect more than a tiny handful of people to the legislature. They effectively turned Idaho into a one-party state. I think there was something awfully Communist about that. □

With our move over to Building 22, 1991 started off as a very good year. The new factory operated perfectly and the flood of line stoppers had now passed, just in time for the parade of new product introductions to get fully underway. Located in one section of the factory was a brand new NPI line facility where Dave's team and the R&D folks could experiment to their hearts' delight with the assembly and test processes co-developed along with the new products themselves. The lab guys liked this in part because the NPI line, not being part of normal production, did not have to worry about CPWs or other forms of production control. Lab engineers like to innovate and try new things, and that was what the NPI line was for. I liked the NPI line because now I didn't have lab engineers out there playing on my production line. Everybody got what they wanted. Pilot run failures were relegated to ancient history.

With the line now running smoothly and producing good products, we could now turn to another goal that Vern Dutton, the technician supervisor, and I wanted to accomplish. We could put our staff of bright, skilled technicians to better use. Technicians, I am sorry to say, had long been a very underappreciated and underutilized group at DMD. Most of them had been relegated to carrying out very routine testing and troubleshooting procedures that were aimed more at making a sick box well so it could be shipped. In this role, failure analysis – the actual discovery and long-term fixing of problems – then fell to engineers. One lesson I had learned years before on the HP 7908 line was just how much good technicians could contribute to FA. What Vern and I wanted to do was set up a new system. The day-to-day routine and procedure-driven tasks most of the technicians had been performing would be turned over to specially trained production operators, people without the two-year Associates' degree technicians have. Our technicians would then be moved to the FA lab or to the NPI line, where their training and skilled craftsmanship could have a much higher impact. The techs would in effect be working under the direction of the engineers, either mine or Dave's, and this would, in turn, leverage up how much our staff of engineers could accomplish. The operators, the technicians, and the engineers would all have jobs that were much more inherently interesting and at the same time would have a much higher positive impact. It was a system in which everybody won.

When I proposed the plan there were skeptics. How could production operators do a technician's job? Wouldn't this run the risk of hurting product reliability? Etc. Etc. I was able to point to the old FA operation from the HP7908 as a past success story, and could point out that 90% of what we had our techs doing right now really wasn't all that highly technical. I'm pretty sure Vashro had his doubts about the plan, but I had noticed he tended to undervalue and underrate how good the operators and the techs really were. Bob and his line managers didn't share this concern; they knew how good their people were. Dave, too, was in my corner on this because he could clearly see how the new system would help with new product production development and improve the transition team process. In point of fact, Dave and I shared the longer term goal of trying to eliminate the need for transition teams from R&D or, at the very least, reduce the amount of transition time needed. R&D lab engineers are at their best when they're inventing new products, and new products were always the lifeblood of our business.

So, while there was some skepticism there was also a lot of support for the plan and we got the go-ahead to try it. Ok Hee worked on establishing the written procedures the production operators would follow and with training the corps of top-flight operators the line managers and supervisors identified. Eric and Vern supervised the overall technical details of designing the new system, testing it, and running the pilot run when we were ready to introduce it into the production process. The team did a great job and whole thing worked like a champ. It was a quantum leap in improved factory operations and it noticeably raised morale for the line people, the technicians, and the engineers. Vern and I were pretty proud of this accomplishment. □

As it turned out, this was the high water mark of my time as production engineering manager. There was even some talk at this time to the effect of my becoming a 'section manager,' officially known as a Level 63 manager, one number up from my job as production engineering manager. Even Vashro, who was a Level 63 himself, was paying lip service to the idea. The future was looking pretty bright.

What I didn't know was that all of this was about to come to an abrupt end. There was a cancer quietly growing within my team, and her name was Linda.

Linda's documentation group performed an important if completely routine function. They kept track of our production documentation and kept this documentation up to date. She had been working for me now for a little over a year and had been a good if not outstanding supervisor up to this point. It wouldn't be an exaggeration to say that the less anyone heard from the documentation group, the better they were doing their jobs, and up to that time there had been only two incidents involving the documentation group that had required my attention.

The first had been a minor personal spat that had broken out between two of the women in Linda's

group in mid-1990. It didn't have a single thing to do with work; they just didn't like each other. From my point of view this was something Linda should have been able to take care of all by herself, but for whatever reason she was having trouble resolving it and finally brought it to my attention.

I've mentioned before that HP was a company that never did earn a very good grade for strategic planning. The success of the company really turned on the ability of its people to respond to situations with a very high degree of tactical excellence in the execution of everyone's individual jobs. The thing that was the bedrock of this ability was teamwork. Everyone at all levels of the supervisory and management chains knew this was the foundation of our success and, consequently, teamwork was the most highly valued commodity in the company. Linda had five women in her group and two of them were not working and playing nicely together. That's very bad for teamwork.

When Linda first brought this up with me, I chalked it up to her inexperience as a supervisor. After all, she hadn't been in her job for all that long yet and problems like these are among the most difficult for a supervisor to deal with. In a lot of companies supervisors take a meat ax approach and 'solve' the problem by firing one or both of the people involved, but this was wholly contrary to the HP Way and we weren't going to do that. There is an old saying in management: When you have an employee who is not adequately doing his or her job there are only two choices – fire the person or develop the person. In the HP I worked for, we *always* tried the latter first. Sometimes, rarely, that didn't work, and only if it didn't would we resort to the former. There were very, very few instances where people got fired in HP.

Every supervisor and manager in the company knew this. At least they were supposed to. It's part of the normal training supervisors and managers receive when they become a supervisor or a manager. This training, admittedly, falls a bit short when it comes to practical ways to deal with problems like the one in Linda's group. That's where a degree of leadership ability comes into it. The supervisor or the manager is expected to be able to figure out how to deal with it without resorting to the meat ax. So when Linda first brought this to my desk, we had a conversation about how important teamwork was and how it was part of her job to find a way to achieve it in her group. There weren't many practical tips I could give her in this particular situation. If Linda's people had been men there would have been any number of locker room speeches or coaching maxims that would have been sufficient. But in this case, the whole thing was the kind of silly cat fight men usually find incomprehensible. I don't think it was a coincidence that all the production line managers and supervisors were women; the production line was overwhelmingly made up of women and to lead effectively a leader has to understand his or her people. That's something a person tends to learn as part of growing up, and the gender differences in communication style that develop during childhood and adolescence are never to be underestimated. I figured Linda was in a far better position to know how to talk to her people than I was about this. All I could suggest was that she try explaining to her two battlers why teamwork was so important and why open squabbling like this was not acceptable in the workplace. I asked her to give that approach a try.

In retrospect I'm not so sure Linda knew what 'teamwork' means. Whether she did or did not, she came back a few days later and told me she wasn't getting anywhere with them. "What do you want me to do?" I asked her. She wanted *me* to talk to them. Okay, that happens sometimes. I don't like it when it does, but it happens sometimes and it's just one of the things a manager has to do once in awhile. I asked her to set up a little meeting of the four of us. We held it outside in HP's park-like campus, away from the other folks in Linda's group and in as private a spot as we could find.

Linda said not one word during this meeting. Her two people started in by bad mouthing each other but I cut that off pretty abruptly. "There's something I want both of you to understand," I said. "The only way this company works is through everybody's ability to work *as a team*. I don't know how or why the two of you aren't getting along, but what you're doing is hurting the team and I won't allow that. I don't care if you don't like each other, and I don't care what you do outside of work. But *at work* you *will* get along with each other. Your feud ends now. Do you understand?"

Oh, yeah. They understood. Before we were done they were even both wearing sheepish-looking

grins. I'm pretty sure there was no more trouble after that. Certainly I never heard of any trouble between them at work after that. In HP management parlance, what I had done was called a 'verbal warning.' It doesn't go into an employee's personal file, but it is the first step in what we called 'the corrective action process.' Was it a threat? Yes, of course it was. If you strip off all the double-speak, *any* disciplinary warning from a supervisor or manager to an employee is a threat. I didn't have to say 'get along or else.' A manager doesn't have to be cruel or heavy handed in disciplining an employee. There aren't that many people who aren't smart enough to understand a message like this so long as the unacceptable behavior is clearly identified and the specific expectation for future behavior is communicated. These two women were good workers and good employees; they just forgot for awhile that they were co-workers.

I'm not sure Linda understood, though. I mentioned before that deer-in-the-headlights look of hers. She wore that look all throughout that meeting. It made me wonder what exactly she had been saying to them before getting me involved.

The second incident involving the documentation group also happened in 1990 and this one came from entirely outside production engineering. It came in the form of a memo from the group that looked after site computing resources. This group wasn't my favorite part of the Boise site. In early 1989 I had received a memo from them telling me the company was going to 'standardize' on a particular brand of HP computer across all the areas. Every group was supposed to 'modernize' its computing resources by buying this particular computer system for every employee in the group who used a computer. It would be the 'standard computer' going forward into the future. As it happened, the computers in Eagle production engineering were kind of long in the tooth anyway, so I spent a big wad of money re-outfitting the team. Less than a year later, I got another memo saying basically the same thing except that now the 'standard' computer going forward into the future was an entirely different model. I guess the site computer group just assumed all the managers on site had unlimited budgets to blow on computers. There wasn't anything wrong with the still-new machines we had, so I said to myself, *Oh, screw this,* and filed that memo in my wastebasket.

Now I had yet another memo from them. For years the mainstay business computer used in HP had been the HP 3000 Series II, one of the most successful computer systems HP had up to that time. But now the old HP 3000 was awfully long in the tooth as well and was being replaced by the new line of "HP-PA" computers, collectively known within HP by the project code name 'Spectrum.' One of the old HP 3000 systems on the site was the one that held all our production documentation, and the memo announced that this system was going to be phased out effective on such-and-such a date. What *I* had to do, it went on to say, was (1) buy a new HP-PA system for my group; (2) hire a computer administrator to run it; and (3) have my group move all of our documentation to the new computer system. And, oh, by the way, the software systems used by the two computers weren't compatible. We'd also have to translate our documentation from the old software packages to new ones.

Yeah, right. I didn't have any trouble imagining the kind of warm reception this would get from Bob and from Vashro. I was supposed to just meekly spend a few hundred thousand dollars on a computer system plus get a hiring requisition for a new high-priced computer guy? I picked up the phone, called the memo's author, and we arranged a face to face meeting to talk about this.

I must say, the young woman who came down to see me bubbled with enthusiasm over the whole thing. "This has the support of Top Management," she said gaily. I could even hear the capitalization of the words 'Top Management' in her voice.

"It's not in my targets," I replied. 'Targets' are spending targets, upon which budgets are based. Once a year every manager had to undergo a ritual known as 'targeting' in which he or she tries to guess how much budget The People Up There had already decided upon for each area, and these targets then became the group's budget for the next fiscal year. Typically the manager would do a bunch of work to figure out how much money he'd *like* to have in the operating budget, turn in this 'forecast' to his boss – Vashro in my case – and then the boss would return it to him with the comment that the forecast was too much

money and would have to be cut. Then the second round would begin. This went on until the manager either guessed the secret amount or went under it. The official idea behind this process of looking for the foregone conclusion was so all the managers could 'participate' in the budget-setting process. Some guys never caught on to the fact that the budgets were already set from Up Above. In my case, the process was made even more fun by the fact that Vashro wouldn't settle for a target from me that came up to the secret number on the back of the card. Instead he'd require that I turn in a too-low target and he'd put the rest of the actual targeted dollars in a 'slush fund' – as he called it – of his own. That way I'd always run out of operating money before the end of the year and have to come to him for a handout. Ah, well. If that's the way he wanted to run his operation, that's the way we'd run.

But this computer thing went way beyond normal circumstances. "I can't do this," I told her. "It's not in the targets and I just don't have the money or the hiring requisition."

"But this has the support of Top Management," she repeated.

"No, it doesn't," I said. "Not if it isn't in the targets. What this is telling me to do," and here I held up the memo, "is impossible. I can't do it."

"Well, you'll have to find a way to do it," she said. She really thought her group had the support of Top Management. "On such-and-such," she continued, naming the looming deadline, "the 3000 is going away."

"There isn't any way to do it," I repeated. "Your group is just going to have to find a way to take care of this without requiring me to spend money I don't have."

"This has the support of Top Management," she said again.

"Tell me something," I said calmly. "When your group takes down the 3000, all the production documentation of this factory disappears, and I have to shut down production on every single one of the DSS products because of it, how much top management support do you think your group is going to get?"

This wasn't a bluff. I meant it.

Lo and behold, it turned out the computer group decided to change the plan. They bought the new computer system – they were buying one for their group anyway – and they used the expertise they had, and I didn't, to take care of all the work involved in the software changeovers and in porting our documentation to the new system. Linda kept an eye on what they were doing and her group helped out a bit. The group that created this problem ended up solving it too, and that's the way it should be.

Those were the only two problems involving the documentation group that ever made it to my desk. The rest of the time they just quietly did their job and I didn't worry about them. Linda and I had monthly meetings to review her group's objectives and to establish them for the upcoming month. This was purely routine and a normal part of HP's system of management by objectives. Compared to everything else, there was nothing requiring much of my attention to be paid to Linda's team at all, and that's the way it was supposed to be. Now it was 1991 and everything in the factory seemed to be going very, very well. There were only two things that happened I didn't particularly like. The first was a personnel problem in Vern's technician group that ended badly, the second was a reduction in my technician staff ordered from Up Above.

For quite some time we'd had one guy in Vern's group who basically wasn't doing his job. I'd known this guy for a very long time, dating all the way back to the 7908 days, and I knew he had been a very good technician back then. But something had changed over the years and for a long time now he was failing to accomplish his monthly objectives, failing to be able to stick to his own work plan, and he had generally become a burden to his work group. Vern, his supervisor, had been trying hard for months to try to get him turned around, but nothing worked and Vern was getting frustrated. I did what I was supposed to, which was to let Vern try to handle it, but even I was getting concerned because in my occasional conversations with this guy I could tell he was a very different man from the one I'd worked with years

before. His attitude was one I found incomprehensible in an HP employee. I didn't know if he had just ceased to care very much about doing his job, or if he had developed some kind of a drug problem, or if maybe he had some kind of mental illness problem. He knew he wasn't getting his work done and that didn't seem to bother him, although he acknowledged that fact on some high Platonic level.

Vern had no better idea of what was going on than I did, but it finally reached the point where resolving this issue had made it on to Vern's monthly objectives. Nothing worked and at one of our meetings, Vern said in frustration, "What are we going to do about this?"

"Well, it looks to me like you've tried just about everything else," I said. "I hate to do this, but I'm not seeing any other choice but written warning. What do you think?" Written warning is the next to last phase of the corrective action process, and it's pretty serious. It means the employee either comes up to an acceptable performance level or he gets fired. It is the step of last resort for managers and supervisors.

"I agree," said Vern.

In HP at that time the company bent over backwards to try every means of salvaging an employee. We got a representative of the Personnel Department to sit down with Vern and myself to carefully, carefully draft the written warning statement for the performance evaluation Vern would give this guy. It spelled out, line by line, what the unacceptable work performance problems were, how progress toward improvement would be evaluated, a general timeline over which this improvement was expected and required – everything that could possibly be done in a last attempt to salvage the guy's job. It took us about a week to do this, and we thoroughly scrutinized every single word so that the expectations were objective and reasonable, and so the evaluation itself stuck to work and didn't in any way attack the employee's character. It was by the book.

The day for Vern to administer the written warning finally came. He and his guy went off to one of the private conference rooms in Building 22 to hold the evaluation session. A short time later, Vern came to me with a shocked look of disbelief on his face. "He tore it up," he said in a dazed voice.

"He tore what up?" I asked.

"The performance evaluation."

I was astounded. "Why? Were you guys having a big argument?" Tearing up a performance evaluation is an act of insubordination and insubordination was one of the few ways to 'crash land' – immediately get fired – there was at HP. If it had happened in the heat of a moment I was prepared to overlook it with nothing more than what we called a one-time warning: If you ever do this again, you'll be fired.

But Vern shook his head. "He just read it and then tore it up," he said. "I said, 'Whoa! Don't do that!' and he just said it (the evaluation) wasn't correct." Vern went on to tell me he had been completely matter of fact about it, just flat calm, as if Vern wasn't even his boss and the evaluation was just an opinion.

I asked one more question. "Was this insubordination? In your judgment, was he being insubordinate to you?" Vern nodded. That settled it. "Fire him," I said. Vern turned a little pale; I didn't feel good about it either. But I didn't see any other choice. I wasn't going to carry somebody who wasn't going to do his job. Nothing else is more deadly to teamwork and to the morale of members of a team. The team is first.

This kind of thing is a serious matter and my decision had to be approved by Vashro, Personnel, and the division manager, Doug Clifford. First I let Vashro know what had happened and he agreed. Then I drove over to the main site and made the rounds, explaining what had happened and that my recommendation was to terminate employment. Our Personnel guy, the same guy who had worked with us on the written warning statement, okayed my decision. Then I had to go explain it to Doug, and he approved the action. I came back to Building 22 and gave Vern the go-ahead. I had one last face to face meeting with the guy. It was very weird. He claimed he didn't really know why he was being fired, but what was absolutely strange was that he didn't particularly care either. No hostility at all. He acted like it was no bigger deal than having to gas up the car. The interview made me feel chilly. *This guy's cheese*

has slid off the cracker, I thought to myself. I didn't at all like firing him, but I don't have any doubt at all it was the right decision.

As soon as the new way of organizing the production technician team was in place, Vashro called me into his office and told me that now we didn't need so many production technicians any more. There were a number of other groups, both in DSS and DMD, that were screaming for additional technician support and I was going to give it to them. He was cutting my technician staff in half. The guys were to be informed of the available jobs over on the main site and any that wanted to transfer were to be allowed to transfer, up to the quota he had set. It was a move that would cripple our failure analysis plans.

I didn't like it. "You know what's going to happen, right?" I told him. "We're going to lose our very best guys." The best techs always preferred lab jobs to production jobs. That didn't bother Vashro.

Well, he was my boss and the decision was made. He hadn't called me in to discuss it; he'd called me in to inform me of it. The matter was completely out of my hands except for damage control. I asked Vern to come over to my cubicle and I told him what was going to happen.

"We're going to lose our best guys," was the first thing he said. I know, Vern. I know. Vern didn't like it. I didn't like it. Just like we predicted, our best guys lost no time at all taking advantage of the opportunity to land more prestigious positions over in the various R&D labs. The only thing we could do about it was make adjustments and carry on. And that's what we did. □

It was shortly after this that I started having some very strange conversations with Vashro. He would quietly take me off to one side and start speaking in abstractions about management. I couldn't tell at first if he just wanted to make conversation or if there was something on his mind. He spoke in Amiable-speak and I still didn't own a secret decoder ring. It was all vague and hypothetical and after each of these seemingly casual conversations I'd always think the same thing: *What in heck was that all about?* I had a very uncomfortable feeling about these conversations. In the two previous years I'd worked for him, he had never once had the least interest in just the two of us having a chat. Suddenly he wants to talk about management philosophy? I was pretty sure something was going on, and I was pretty sure whatever it was I wasn't going to like. But I could never get him to just come out and tell me what was on his mind.

It was Linda. I don't know when it started, but she'd apparently begun going to Vashro and complaining about working for me. What her complaints were I was never told. She never told me; Vashro wouldn't tell me. It's kind of hard to fix a problem if nobody will tell you what it is. Maybe where Vashro had gone to school they had a course in mind reading; they didn't have one at any of the schools I'd gone to. We had three or four of these conversations – pointless from where I stood; rich in meanings I would imagine from Vashro's standpoint. You know, if he had just come out and said, "Linda doesn't like working for you," we could have settled the problem immediately. The documentation group wasn't part of production engineering and I'd have been just as happy if he wanted to transfer that group to somebody else. To operations, say, or to the NPI group – which is really where most of their work flowed from in the first place. Maybe Vashro was angling to try to get *me* to suggest this. Thinking back on our conversations, that is possible. But he hadn't asked me before putting that group under me in the first place. Why would he think it would occur to me – on grounds of management philosophy of all things – to raise the suggestion now? He had never once asked for my opinion on any matter having to do with how he organized his organization, nor had he ever taken any suggestion I did offer.

Anyway, there finally came a day when he all of a sudden decided to make himself clear. Why? I have no idea. It happened not long after the firing of that technician in Vern's group; maybe Linda thought she was next or something and fled to Vashro with some new wild tale. What I do know is Vashro summoned me to a conference room, where he proceeded to criticize my personality, my mannerisms, my personal style, my leadership style, and pretty much everything else except my personal hygiene and grooming. There had been serious complaints about me, he told me. "From who?" I asked. I was deep in astonishment. From Linda, he informed me. Then he went on to tell me he had personally conducted a

poll of the people who worked for me to see if the charges – whatever they were – were substantiated. They were. "Who did you talk to?" I asked again. He named Vern, the technician supervisor, and one of my engineers. That was all. There were thirty-five people in my group, but he had learned all he needed to know by talking to two of them.

Apparently compared to me Captain Bligh was a model of Amiable civility. I was going to attend a class on anger management. I was going to become a smiling, happy guy everybody loved. I was going to exorcise my inner demons. I was going to become the sort of exemplary leader he was.

HP had a euphemism for criticism. 'Constructive feedback.' I guess that's what Vashro thought he was supplying. It didn't sound too 'constructive' to me. Telling somebody he's the worst tyrant since Attila the Hun seemed a little bit personal to me. Especially coming from Vashro.

I felt like I was being personally attacked, so I tried to defend myself. "You know," I pointed out, "we've gotten a lot of pretty good results since I took this job. Don't you think that counts for something?"

No. It didn't. What counted was how I got along with people. All people. Actually doing the job was somewhere far down on the list, among the unimportant things. Spoken like an Amiable.

So, anyway, after that rather stormy meeting the next thing I knew was I was sitting in a room in a downtown hotel learning all about 'anger management.' It wasn't a worthless class. They actually did have a few handy tips. If Vashro had asked me if I was willing to go to this class, I probably would have said I was. But, again, he didn't ask me. He told me I was going.

When I finally got back to work, I thought the best thing might be to have a chat with the three folks who Vashro had 'polled' in his famous psychological investigation of my character flaws. I spoke first with Vern, then with the engineer. Quite frankly, neither of them seemed to be harboring any big problem and they were both surprised to learn Vashro had taken their comments the way he did. Then it was time to talk to Linda. We had our chat in my cubicle, out in the open with people working all around us. I didn't want to take the chance of having this meeting in some remote conference room somewhere because I had no idea what she might go tell Vashro afterwards. She was a woman, I was a man, and I sure didn't want to take the chance of finding myself facing any accusations of harassment. To tell you the truth, I didn't know what to expect from Linda at this point. I wanted witnesses just in case.

It was one of the strangest and most unproductive meetings I've ever had. She came into it with that deer-in-the-headlights look of hers and I could barely get her to say anything at all. I asked her what I could do to make her more comfortable in her job. She had two themes she kept repeating over and over. The first was I had to win her trust. Win her trust? She'd been working for me for over a year and nothing bad had ever happened to her in all that time. What wasn't to trust? "Perception is reality," she kept repeating. Now we were having a philosophy conversation. 'Perception is reality' is one theme the philosophers bat around every now and again. They have some pretty deep, high-brow arguments and counterarguments concerning it. But I knew Linda didn't know a thing about any of that. It was a phrase she'd picked up from somewhere and hung her own interpretation on. I didn't think it would do any good to try to talk about the difference between perception and cognizance. 'Untrustworthiness' isn't an object of perception anyway; it's an object of thinking. I did try to point out there wasn't much I could do about *her* perceptions. These were subjective and belonged to her. "Perception is reality," she repeated again.

Okay. Back to the issue of trust. "Don't you think trust runs both ways?" I asked.

No, she replied. It was entirely up to me to win her trust.

We got absolutely nowhere. Finally I said, "Well, there's a lot for both of us to think about here. Give me a little time to think about what you've told me and we can get back together again in a few days to see what we can work out." To tell the truth, I wasn't sure what to do about the situation. I had just had a conversation with a person who acted like she was living in her own universe and I didn't have any

experience in dealing with a neurotic person.

It turned out I wasn't going to have a few days. I wasn't going to have a few hours. Linda left our meeting and ran straight back to Vashro. He, in turn, summoned me back into that conference room again. This time there was no trace of amiability whatsoever. He glared at me from across the table and the first thing he said was, "You've retaliated against the Open Door."

HP had what was known as the Open Door policy. Any employee who felt they weren't getting along with his or her boss could take his or her concern to the next manager up the chain. The basic idea is for that manager to act as a kind of ombudsman to help get whatever the problem two people were having straightened out in the most amicable way possible. It's supposed to be a non-judgmental process. To 'retaliate' against the Open Door means the manager or supervisor has inflicted some kind of punishment or retribution against the employee for availing him- or herself of the Open Door. It is one of the most serious charges that can possibly be leveled at a manager. It constitutes misconduct and it's an offense that can get you fired on the spot. Linda had run to Vashro and told him I'd retaliated against her.

Talking to an employee isn't retaliation. It's what you're supposed to do when you learn about a problem. I hadn't threatened her, I hadn't done anything that could even remotely be construed as being a threat. Not, at least, by anyone who was playing with all her marbles. I tried to get Vashro to tell me specifically how I was supposed to have 'retaliated' but all he did was keep repeating that Linda had informed him that I'd 'retaliated.' I doubt if he'd even bothered to ask Linda what form this 'retaliation' had taken. He wasn't interested in hearing my side of what had happened at all. Vashro as much as told me he thought I was lying about what had taken place. I guess that's one of the conveniences about living in a world of abstract people instead of a world of real people: You never have to bother yourself with facts. All you need to do is have 'virtual' conversations with the 'virtual' people in your universe, all inside your own head. Then you can get as mad at the real person as you want since obviously he'd have said the same things your 'virtual' person said to you. Yep, perception is reality: virtual reality.

This accusation was so unfair and so fantastic I finally really did lose my temper, and I denied the accusation with some warmth. Probably this wasn't the best thing I could have done, seeing as how I was just back from an anger management class, but I'm not used to being called a liar and I wasn't in the mood to just sit back and take all this. You see, it wasn't until that meeting when I realized two things: Linda was trying to get me fired and my boss was ready to do it. I was already guilty in his mind.

I was in serious trouble here so before things could get any worse I played the one card left to me. "I want Personnel in here," I told him. "I think you've already made up your mind and I want a mediator present for everything we have to say to each other from this point on." Vashro glared at me when I said this, but I was within my rights to demand this and he didn't have any choice in the matter. He was going to have to wait a few days before he could fire me.

I am convinced calling in Personnel is the only thing that saved my job. It turned out the Personnel guy was the same guy we'd worked with earlier on the written warning procedure. He was completely fair minded about the whole thing; he beat up Vashro just as much as he beat me up. In the end, I was offered a choice. I could remain as production engineering manager but be in corrective action under a written warning. Or I could quietly accept a transfer to some other management job somewhere else on the site. For me that choice was a no-brainer. I didn't have any doubt in my mind at all that no matter what I did Vashro was going to evaluate me as 'not meeting' whatever requirements were going to be set down in that written warning evaluation. If I tried to hang on to this job I was going to be fired. My boss had turned on me like a rabid dog and it was all over between us as far as I was concerned.

"I'll take the transfer," I said to the Personnel guy. Then I looked Vashro right in the eye. "After this, I wouldn't spend one more minute working for you," I said.

Practically the next thing I knew, I found myself back in Building 82 Upper sitting across the table from my old boss, Greg. His section was starting work on a new project, Coyote IV, and he had an

opening for an R&D project manager for the part of the development involving design of the new factory that would build Coyote IV.

How much of the whole story he had been told I don't know, nor do I know who did the telling. He gave me a puzzled look, though, and he said, "I thought things had been going very well over there."

"So did I," I replied. Greg had known me for a long time and he trusted me. And I trusted him. I knew he was one guy who understood why our jobs existed, which wasn't to spread virtual peace and love across a virtual world. At the end of a fairly short conversation we shook hands and I was working for him again. Back in the lab. Back in DMD.

There was only one thing left to do over at Building 22. The announcement that I was leaving had to be made to the team. I had to be there for it, but Vashro insisted that he would do all the talking. He called everybody together and gave them the news I was taking an R&D project manager job back over at DMD. He never said anything about why this was; it's normal practice to pretend to the team that nothing was wrong and this was just a normal 'taking advantage of an opportunity' situation. But I'm pretty sure every single person in the group knew full well I'd been removed from my position. People aren't stupid.

The reaction from the group was one of stunned amazement. With the exception of Linda, nobody looked happy about it. Ok Hee actually broke into tears. While I was cleaning out my desk, a lot of the folks came over to wish me good luck and have a quiet word or two. A few of them did ask why I was leaving, and I didn't lie about it. "Basically I was fired," I told them. When they asked why, I just said, "I really don't know." That was the truth. I didn't share any details at all about how events had played out; there was no good to be served by that. Arlan, though, had an interesting theory about Vashro's motivation. "He's jealous of you," he said. I've thought about that a lot since that day, and I'm not so sure Arlan wasn't right. After all, we'd just spent a little over a year cleaning up the mess Vashro had left from his days as production engineering manager of the box line. Was he jealous? I can't say because my judgment isn't altogether objective on this question. I think he's just a swine.

There are two interesting postscripts to the story. Very soon after I left, Vashro transferred Linda and her group out from under him to the dayshift line manager of production. I've often wondered if this wasn't to prevent Linda from doing to him what she'd done to me. Shortly before I left HP for good I heard Linda had been removed from her supervisor position. It wasn't a promotion. I'm human enough that I felt pretty happy upon hearing about that. If you're wondering, I didn't have anything to do with it.

The second interesting thing also came quite a bit later but before I left HP. One day out of the clear blue the announcement was made that DMD and DSS were merging again. They had put the old Disc Memory Division back together. Nobody ever said so out loud, but I've always assumed Somebody Up There happened to notice that without the box product line DMD was bleeding red ink. Merging the divisions was one way to postpone the inevitable day of economic reckoning. After DSS was disbanded, I heard some time much later that Vashro had been shipped off to handle some backwater management job at a small and unimportant overseas location. 'Time wounds all heels,' I thought when I heard that. I had long come to understand what my friend had meant about watching my back around Vashro. □

It would turn out Coyote IV would be the last product I worked on for HP and next to last commercial product I would ever work on. The Coyote IV team was a mix of some of the old Eagle R&D people plus a lot of 'new' faces – new in the sense of being new to the section since the last time I'd worked for Greg; many of the folks were people I'd known for quite awhile but hadn't worked with on the same project. After two plus years of working in production engineering, Coyote IV started out being almost like a vacation for me. This wouldn't last, but it did start that way. There were two project managers, myself and an old pal named Jeff Allen, who I hadn't worked with before on the same project but had known for a long time. Jeff was managing the actual product development and because of this he was *de facto* the senior manager under Greg because at DMD everything in an R&D project was driven by the product design team. My team and I were there to design the factory that would produce what Jeff's team

designed. Among other things, this meant most of the pressure rested squarely on Jeff's shoulders.

DSS had been organized along a fairly traditional line hierarchy, the kind you see depicted in pretty much any organization chart. We had a fairly simple business and it only required a simple management structure. DMD, on the other hand, practiced an HP form of 'matrix management.' Matrix management was one of those management ideas that originally came out of the space program in response to the enormous complexities of projects Mercury, Gemini, and Apollo. Naturally, nothing we were doing even came close to the complexity of Apollo, but a watered-down version of it did make sense given how big the division was and the more or less accidental way its various departments had sprung into being over the years. One way to describe DMD's matrix structure is to say it consisted of a lot of parallel 'traditional org chart' functions and departments with a lot of 'dotted line' connections running back and forth between them. Most of these dotted lines led straight to the R&D project managers, and of these most of them led straight to Jeff. My main 'dotted line' connected to the production manager, a very good, capable guy, also named Bob, and our relationship was very much like the one I'd had with Bob Claridge on Eagle. My other main dotted line, of course, was with Jeff. Jeff's universe was a lot more interconnected. To put things in perspective, when I was managing the whole R&D team for Coyote IV in 1992, I counted up one time how many 'lines' I found myself connected to. Including the lab engineers, there were fifty and over half of these were dotted lines between the lab and other departments.

Coyote IV was what is called a 'leveraged' product, which means it was fundamentally based on its predecessor, Coyote III. It was still a 'next generation' five-and-a-quarter disk drive mechanism, and so there was considerable design work involved in inventing it. But there wasn't as much absolutely new design as there had been in Coyote III, and so comparatively speaking the development time was shorter for both the product and the factory. The lab team was comprised of smart, top-notch engineers and so for the first year or so things went very smoothly, smoother in fact than any other DMD project I'd been involved with.

The biggest difference I noticed was the much greater role played by marketing throughout the project, and this was due to the much different marketplace into which Coyote IV would be sold. DMD was now an 'OEM business' selling disk drive mechanisms as components to other companies (and, of course, to HP's computer system divisions). The way this business works is driven entirely by the customer companies. These companies are generally designing their next products at the same time we were designing the disk drives we wanted to sell to them. What this means is that these companies demand, and get, 'pre-release' prototypes of disk drives so they can evaluate them and make their selection of which one of several competing disk drives will be the one that gets designed into their products. There is what is called a 'market window,' during which if you can't supply them with prototypes, you're out. It is essentially a winner-take-all process. If you hit the market window *and* your prototypes evaluate out as better than your competitors, you win 100% of that customer's business. If you miss the market window, you sell nothing. It's win or die.

The customers know they're receiving prototypes and so they don't expect them to be perfect prior to manufacturing release. They *do* expect them to be perfect *after* manufacturing release, and they expected us to be Johnny-on-the-spot about responding to any and all problems their testing and evaluation process turned up. They evaluate their potential disk drive suppliers just as much on prototype delivery and responsiveness to their problems as they do on the disk drives themselves. That's not hard to understand. All disk drives in this kind of economic market are close substitutes and it's pretty easy for a customer to switch from one company's product to another's. The most mission-critical responsibility that fell to Bob and me early in the project was seeing to it we supplied prototype Coyotes on demand to all the customers whose business we needed to win. That was very, very different from the old market model of the Eagle days and it affected everything.

The Golden Age of the disk drive business was over now and would never come back. The new reality was we were in a low-margin market of high tech products, much higher technology in fact than goes into

the central processing unit (CPU) of a computer system. By the time of Coyote IV disk drives had gotten so small and required such high mechanical precision to build that literally we could no longer assemble disk drives by manual processes. The production line had to be highly automated and used a lot of robots to carry out this precision assembly work. It is a capital-intensive business and you live or die by what the economists call 'economy of scale.' What this means is you make only a tiny, tiny amount of profit on each unit sold and you make your money from sheer volume of sales. One thing I noticed was that most of the HP people who glibly talked about 'economies of scale' had a pretty primitive idea of what this meant. There were a lot of folks who simply equated it with high production volumes. That's part of it, of course. The other part is that nothing but direct material costs can be allowed to go up as volume increases. If you add to your overhead or labor costs as volume goes up, pretty soon you find yourself in the position of, as the joke went, 'losing a little on every sale but making it up in volume.' That was the part of economies of scale a lot of people had trouble getting their hand around.

I know our marketing people didn't quite get that part of it. They understood well enough that the fixed costs – that is, the capital equipment part of factory cost – depended on volume and it wasn't a good idea to have a factory capacity that enormously exceeded sales volumes. Consequently, in the early days of the project they tended to be pretty conservative about projecting how many Coyotes the factory would need to produce. Their initial estimates were made just prior to targeting for fiscal year 1991 and our capital equipment targets for the factory were based on these estimates. This happened before I came back to DMD and Jeff (or Greg, I'm not sure which of them), very wisely multiplied up the early forecast numbers on the assumption that marketing was underestimating things. This wasn't as reckless a decision as it might sound. The division could never survive on low volumes. We'd have to hit the higher volumes or it was all over. Given DMD's bloated overhead structure, we would in fact have to hit *very* high volumes or it would be all over.

As you can probably tell, new product development at DMD had become a very complicated thing during the time I was away at DSS. It required a great deal of coordination in order to succeed. Once a week, every Tuesday morning at ten o'clock come rain or shine, there was a meeting of what was known as the Tactical Planning Team. Present were representatives from every area of the division who were involved in any way with Coyote IV. It was a pretty big group. Jeff chaired this meeting and it ran by a set agenda. The purpose of this meeting was to review events of the past week and, if necessary, change the tactical plan to respond to events. As it turned out, we changed the tactical plan pretty much every single week throughout 1991 and into 1992. As I've said already, the secret of HP's success was always tactical execution and nimbleness in responding to events, not grand strategic thinking.

Most of what went on at the tactical planning meetings is a blur to me now – just a sequence of one tiny but important thing after another – but four consecutive TPT meetings in 1991 still stand out in my memory. At the first one the marketing guy announced with great joy that the latest sales forecasts for Coyote IV had doubled. Everyone smiled broadly. I silently blessed Jeff's and Greg's foresight in targeting for a bigger factory; the new projection was still well within the capacity we were designing for.

The next week, the marketing guy joyfully announced that sales forecasts had doubled again. More good news and we still had plenty of factory capacity to deal with it.

The third week, the forecast doubled again. More good news. But this time I was a little edgy because now the forecasts were right at the capacity we had targeted and were designing for.

The fourth week, it doubled again. Really, really good news except that now our planned factory was too small. What we were planning for could no longer meet the forecast. After the meeting I asked the marketing guy for a quiet word. How much more did he think the forecast was going to grow? It had grown sixteen-fold in one month. Was it going to be thirty-two-fold next week? He explained that they – the marketing department – wanted to be conservative in their estimations. I explained that it took a long time to build a factory and if the capacity wasn't built in on Day One it couldn't meet the sales demand. That seemed like kind of a new thought to my marketing colleague. He promised to get me a more

forward looking, ‘acceptable risk’ sales number, and a couple of days later he delivered on it. It turned out to be a pretty accurate number, too. Our marketing people knew what they were doing.

I sat down with my guys and we talked about what this new number meant for what we were doing. To nobody’s surprise, it was going to take a much bigger capital investment for the factory. I took this number to Greg and explained the situation. I was asking for fifteen million dollars over and above what had been targeted. In business parlance, this is known as a ‘cost overrun.’ It was the biggest one I ever had. However, because it was caused by an extremely good thing, higher sales volumes, it turned out to be a pretty easy sell when we had to take it way up the management chain to the BUMs. Expenditures of this level needed the approval of an HP vice president, and we got it. So far as my team and I were concerned, the rest of 1991 went pretty smoothly after this. 1992 was going to be a different story. □

As the summer of 1991 arrived I was still living in the same little eleven-hundred-square-foot, three bedroom starter home I’d bought in 1979. When I first bought it, this was plenty of room but over the course of a dozen years I’d accumulated a lot of things. Most pronounced had been the growth of my personal library, which had just reached about one thousand books and was still growing. But I now owned other things as well such as a lot of musical equipment, camping gear, and the little free-weight ‘gym’ I’d set up. Basically, things were getting piled up on top of each other and I needed some elbow room. It was time to buy a bigger house.

Over the years I had been awarded stock options on HP stock several times. These options were good for ten years and some of them were coming up on expiration and showing a very nice profit to boot. I did a little figuring and decided that between them and my stock market account I’d be able to buy a new place free and clear while still holding on to most of my investments. Then when I sold my old house that would get rid of its mortgage. I got in touch with a realtor, gave him my specifications for what I was looking for, and told him the price range I had in mind. He got to work and found the perfect place. It was a three thousand square foot, five bedroom house, brick construction, with a fully finished basement. It was located on McKinney Street in an older neighborhood on the west side of Boise and had been built during the Kennedy administration. Its owner was a banker and the house itself was in mint condition.

I guess the housing market wasn’t in too great a shape just then or something because when the banker found out I was making a cash offer he became very reasonable in our price negotiations. We closed in June and the next thing I knew I was living in my ‘new’ house. It had a large family room in the basement and that was where I set up my music studio. One of the downstairs bedrooms became the gym and a second downstairs room – technically not a bedroom because it didn’t have any windows – became my library and study. The third downstairs bedroom I made into a ‘miscellaneous’ room. The master bedroom and guest bedroom were upstairs, along with the kitchen, a large living room, and a TV/dining area room. I now had all the elbow room I could possibly want. Anything bigger would have just been showing off. I figured at the time this was the house I’d retire in.

The next job was selling the old house on Linstock Street. I told my realtor I wasn’t interested in any kind of fancy wheeling and dealing here. I wouldn’t carry any part of the new owner’s costs, I wouldn’t loan the buyer any money; when the deal was closed I wanted no further involvement with him of any kind. I wanted to put the money in my pocket and walk away with it.

It took until the end of July before he found a buyer who would meet these conditions. It was kind of amazing how creative a lot of the first offers I received were – creative, that is, in terms of the schemes some of them had cooked up to try to buy my house without actually paying for it. One guy from California was particularly amusing. He was basically out to buy property in Boise and play the real estate market game. I’m pretty sure he did not plan to live in my house himself. Whatever was on his mind, he’d concocted some complicated and grandiose scheme whereby, in effect, he was offering to buy my house without having to pay for it himself. His basic idea was that I’d loan him the money to buy my house. I guess he thought Idahoans were either hicks or idiots. “Don’t bring me any more of these,” I told my guy.

We finally found a real buyer. He was a young married guy from Utah with something like three very young children. He had just gotten a job in Boise working for the state. Like all state jobs, it didn't pay very much and he was really strapped for money. How he was going to cram all those kids into that little bitty house I didn't know, but I figured that was his problem to work out. The only catch was that he couldn't come up with the money until September. It was part of his offer that he'd rent the house for a month – he had to move to Boise and start work – and we'd close in September. The rent amount he offered was reasonable so, although generally I have no interest at all in being a landlord, I agreed to these terms.

One thing I'll say for this guy is he really knew how to be a renter. This was their first house and when they moved in he didn't even own a lawnmower. I had my lawn mowing done by a company that took care of people's lawns so I loaned him my lawnmower free of charge. During August there were a few times when a small rock would get stuck in one of the sprinkler heads and it wouldn't pop up. He'd get on the phone and give his 'landlord' a call, and I'd drive over there with my toolbox. I kind of had some fun with that, putting on a pair of overalls, a tee-shirt, and a baseball cap. I looked like something half way between Uncle Wayne and the landlord at the Lincoln Apartments in Ames. I'd come rolling up in my little VW pickup truck – which I'd bought from Steve when he and Chris were moving to Bristol; I used it for camping and for hauling musical gear to the gigs John and I were playing – and he'd show me which sprinkler head wasn't working. I'd bend over with a screwdriver, flip the rock out, and that would be that. One thing I will say about my 'tenant'; he sure was helpless around the yard. But his kids were pretty cute. When September came we closed on the house and I was out of the landlord business for good. After paying off what was left on the principal of my old mortgage, I was free of debt – finally – for the first time since I'd taken out that first student loan to pay for college.

It was pretty obvious even from the front yard that the Linstock house really wasn't big enough for a family the size of the one he had. I didn't expect they'd live there for too many years, especially after the older kids got old enough to start wanting their own rooms. Sure enough, in '93 I happened to drive by the old place one day and saw it had been sold to somebody else. The young family from Utah was gone.

It irritated me that they'd run off with my lawnmower.

Scott, my stock broker, and a few of my colleagues out at HP professed surprise that I'd paid cash for my new house instead of borrowing more money from a bank. Their basic question was why I'd want to give up the income tax deduction you get for mortgage interest payments. I thought that was a pretty silly question. "Suppose my interest payment is three thousand dollars a year," I'd tell them. "How is it a win for me to pay a bank three thousand dollars so I can pay the government one thousand dollars less?" I guess they must have looked no farther than the amount of the deduction rather than looking at the actual amount of money they spent. People really are ignorant of basic economics. It didn't escape my notice that most of the guys who asked me about this drove a BMW or a Porsche. Kind of expensive toys, I've always thought. I drive a boxy little Toyota Corolla FX-16 (a 'rice rocket') I bought in 1987 for cash. I'm still driving that car today, although it won't be too much longer before it will be time to buy a new car. Again for cash. That one will probably be the last one I'll ever own. □

Maybe it was because I was spending so much time hanging out with all my musician friends, but in autumn of 1991 I got the idea for a very special kind of Christmas present for my family. I thought they'd get a big kick out of it if I made a cassette tape album of some original songs I'd been writing. As a song writer I'm never going to win any prizes, but since my musician friends didn't hold their noses when they heard one of my songs, I figured they were good enough to please friends and family. The music studio I'd set up in my new house included some fairly nice recording equipment, so I got to work on the album.

Over time I'd written twelve songs – not quite country songs, but not quite rock songs. Maybe 'folk country' would be a good description for them. Whatever anyone wants to call them, I knew they were in a style of music Mom and Dad especially liked. The lyrics to one of these, *Mending Fences,* were written by my friend Ruth. Most of them were love songs but a couple were comedy numbers.


Christmas 1991 and 1992. Left: Me, Dad, and Bill (1992). Right: Mom and me (1991).

By now I'd learned how to play the guitar a little, but I'm basically just a strummer and no more. It was like one of my musician friends – the one who gave me guitar lessons – said: The guitar is the easiest instrument to learn how to play and the hardest to learn how to play well. I'm better at bass guitar. I wanted the guitar parts of the arrangements to sound a lot better than I could produce, so I asked some of my professional friends for a little help. They were happy to oblige me. Gayle contributed her talents on the keyboard, bass, and lead guitar on some of the numbers. Jan contributed some really good guitar on some of the others, as did my friend Tom Simpson. I supplied most of the keyboard parts, some of the bass parts, a little bit of rhythm electric guitar, and, of course, the lead vocals. My friend Adele contributed her artistic talents and designed the cardboard 'jacket' insert that went into each cassette holder. I called the album *Habits of the Day,* which came from a line in one of the songs. Production was very, very limited. This was something special, just for my family. Bob Dylan has nothing to fear from me.

As I'd hoped, *Habits of the Day* was a big hit at Christmas time back in Iowa. Mom actually got just a little bit teary eyed about it, which was pretty unusual for her. I was really surprised at what a hit it was with my little nephew and niece, who thought it was pretty cool that Uncle Ricky was a musician. Of course, they were little kids and not too hard to impress. Yet. Of the songs on the album, the most popular one with the folks back home was one of the comedy ones, *Big Dumb Guys.* That one, as it happens, was also pretty popular with female audiences in Boise, too. Somehow – and I've honestly never been sure how – a couple of radio stations (KMAQ in Maquoketa and another station in Davenport) each got hold of one of the albums and played *Big Dumb Guys* on the air a few times. I've always assumed one of my relatives loaned them their copy. It was a little embarrassing, but the kind of embarrassment that had me grinning from ear to ear. Paul Simon I'm not. Hank Williams' legend is safe. But it still gave me a kick.

It was a pretty great Christmas except for one thing. It was impossible not to see how heavily age was wearing on Dad. Mom was still a very spry senior citizen, but Dad wasn't looking too good at all. Gone was the physical strength he had always been so proud of and from which he had always drawn a lot of his self image. His weight had dropped a lot – by an alarming amount I thought – since Christmas the year before. On top of this he was suffering from macular degeneration – a disease that destroys cells in the retina and can't be corrected by glasses or any other kind of treatment – and so he wasn't able to read anything that wasn't in very, very large print or see well enough to drive a car any more. His big hands, which had always been so strong, were now enfolded in loose-fitting skin and had lost their strength. His

arms weren't tree trunks any more. He even lacked the endurance to stand or walk for very long or very far. All this added up to leave him in a constant state of depression. Uncle Foryst, Dad's brother and the eldest of Grandma's and Grandpa's four children, had died a few years earlier, and I think Dad was feeling his own mortality. That Christmas Bill took me quietly to the side and said, "I think we're going to start seeing a lot of funerals in this family the next few years." I nodded; there wasn't really anything to say. But neither of us knew just how right he was about that.

Dad was seventy-eight years old that Christmas. We didn't know it yet – and the local tribe of witchdoctors who call themselves medical men wouldn't figure it out for a couple more years – but Dad was suffering from cirrhosis of the liver and his condition was terminal. No one knows what caused this. Dad's doctor said it was 'genetic' – which is pretty much the term they use these days when they don't have the faintest idea of what's going on. I know one thing for a stone cold fact: it wasn't caused by alcohol. Dad was a teetotaler his whole life. Back when he was just a teenager he'd gone drinking once, had a hangover, and that was that. It wasn't a religious thing. Dad just thought drinking was the stupidest thing a man could do – an opinion he'd always share with me whenever I'd go out for a beer. When Melody and Dan had gotten married, I'd gone over to Dad during the wedding celebration with a glass of Champaign in my hand and said, "Dad, I want to thank you." He asked what for. I held up my glass and said, "This is the first time in your life you ever bought me a drink."

Dad had just scowled. "I didn't buy you that," he growled. □

Back in Boise a section manager position had opened up and my partner Jeff landed it. At the time our project looked like it was in pretty great shape and would be finished before too much more time had gone by. Consequently, Greg thought – and I agreed – that rather than replace Jeff with a new project manager we'd finish off the project with just one project manager. Me. We even began to transfer a few of the development engineers on Jeff's team to start work on other projects. That's how good things were looking right then. That was before we met John from EMC Corporation.

EMC – popularly called 'EMC-squared' – was projected to be our biggest customer for Coyote IV. At the time they were still a relatively new company based in Worchester, Massachusetts, and were pioneering what was known as the RAID business. The acronym stands for 'redundant array of independent disks.' A RAID is a large-capacity mass storage system built up out of many disk drive mechanisms so arranged that some of these disk drives stored coded information that would allow the system to keep running even if one of the constituent disk drives failed. At the time this was a fairly new concept in the mass storage business. They hold enormous volumes of data and are used by companies such as the airlines in applications like airline reservations systems. They are the very top of the line of 'box' products, enormously profitable, and just exactly the kind of business I had thought we should have gone after rather than choosing to enter the no-profit killer marketplace of commodity disk drives. Today EMC is a large company and, the last time I looked, one of the most successful in the business. A single EMC RAID product could use a dozen or more Coyote IV drives. John was the manager at EMC in charge of qualifying disk drive mechanisms for use in their products. He was the guy who would decide if we sold thousands and thousands of Coyote IV drives to EMC or none at all.

I had always thought HP was a company with the highest possible commitment to product reliability. Well, that turned out to be wrong. Compared to EMC, we were pikers. I'd never seen another company with a more complete, total, and almost fanatical devotion to reliability than EMC. At the time they were still a young, small company and they were scared green that one day one of their products would crash, take down somebody's airline reservations system, and that then EMC would get sued out of existence. Ideally they wanted disk drive mechanisms that would last longer than Stonehenge but they knew this kind of reliability goal was unreasonable. They would settle for disk drive mechanisms that could demonstrate a reliability level of one million hours mean-time-between-failures (MTBF). In 1992 disk drive mechanisms typically were capable of from about one hundred fifty thousand to three hundred thousand hours MTBF.

John, as it turned out, was the perfect guy for the job of dragging the disk drive industry kicking and screaming into the world of ultra-high reliability. I've never been a big guy, but even next to me John was an itty bitty guy, a short, intense Italian with pure east coast manners – the kind of manners westerners regard as unpardonably rude and which, not all that many decades earlier in the history of the west, had been pretty likely to lead to a gunfight. When it came to reliability issues, he was an absolute lunatic. If he thought I was being the least bit lax or uncooperative in meeting his demands, he'd scream and yell and cuss at me, and he'd accuse me of lying to him about where Coyote IV was and what we were doing to make it better. If we were having a face-to-face meeting, he'd see my face turning red and see my muscles tensing up in anger, and then he'd abruptly say, "Hey! Don't take it so personally!" Lunatic.

John and I had face to face meetings only a few times a year, but we had telephone meetings practically every week. The only difference was that over the telephone he couldn't see me swelling up with anger over being called dirty names. At first our marketing folks would sit in on these teleconferences, but after only a couple of times they quit coming and left dealing with John to me. The specific technical issues would vary from one phone meeting to the next but the agenda of the meeting was pretty much always the same. Figuratively speaking, John would ram an umbrella up my hind end, open it, and then pull it back out. I would fantasize about taking him out into the parking lot and pounding him into a greasy spot on the concrete.

Every single meeting I'd come within an inch of losing my temper and telling him how the cow ate the cabbage, but I always managed to keep control of myself. EMC was our biggest customer and I had a pretty good idea that Bruce Spenner, who had taken over as division manager from Don Curtis while I was still in DSS, would take a dim view of one of his project managers telling off the guy who could make or break our success. I'd known Bruce for a long time, since his days with HP down in the Bay Area, and we liked each other. But, as the old saying goes, business is business. We needed a happy John in order to succeed and the only way to get a happy John was for me to sit there and take it and then go do whatever it took to solve the problems he and his team were uncovering. So I'd take a tight grip on myself and after every meeting go outside and walk around the HP complex, chain smoking one cigarette after another until my rage subsided and I calmed down enough that I was safe to be near again. This went on all throughout 1992 and into 1993.

The heck of it was John was right. I hated the way he expressed his righteousness, but he was right. I'll never forget the first time I met him – this was a face to face meeting in Boise – and the very first words he said to me: "What are you doing to achieve one million hours MTBF?" I was dumbfounded by the question. Our spec goal for Coyote IV reliability had been set for three hundred thousand hours MTBF, which was a goal consistent with where the industry was at that time. We were, in fact, the reliability leaders. Nobody then, except the Japanese, was even dreaming about a million hours. Frankly, I didn't think it was possible. But it was.

There is a kind of reliability urban legend in engineering called 'the random failure.' It's such a well established legend that it gets written into engineering textbooks as if it was a fact. The impression it leaves with most people is that 'stuff happens' – failures in this case – for basically no reason at all, that there is always some base level of failure rate caused by mere random chance and once a product reaches this level there isn't anything more you can do to improve its reliability. This isn't true. By 1992 I'd been involved with failure analysis work for over a decade, ever since setting up DMD's first FA lab during the days of the 7908. Every failure *always* has a physical root cause. Sometimes the root cause is something introduced in the production process, but more often it is a mechanism inadvertently designed into the product from the very beginning. There are no random failures. It's only a question of what base level of failure rate a company is willing to tolerate from its products. Every company on earth will tell you 'we do everything possible to meet a zero-failure goal' but really this isn't true. The legend of the random failure is what lets well-meaning people *think* it's true. The reality is that what a company decides to accept as its 'base' failure rate level is usually decided upon in terms of warranty failure costs. John wouldn't let us get away with that kind of decision making for Coyote IV. Either we met *his* goal or HP

didn't sell disk drives to his company. It was as simple as that.

Somewhere in the back of my mind, I knew this about failure mechanisms and failure rates. But there was a lot of pressure from other project and section managers for us to get done with Coyote IV so the people on the Coyote IV team could be moved to other new product developments. Neither my colleagues nor their bosses had yet had the opportunity and unforgettable experience of dealing with John, and they suspected me of just being stubborn and 'perfectionist' about finishing up our project. I wasn't after perfection. I just wanted a million hours MTBF. Really what I wanted was John off my back. I did tell them a few stories about what it was like dealing with EMC – a company that would be a key customer for them as well – but they didn't really believe me. I couldn't blame them for that. *I* could barely believe it and I was the guy with the umbrella sticking out his behind.

The plain and simple truth of the matter is that if John hadn't been a lunatic, if he'd been a reasonable guy, we wouldn't have even tried to hit one million hours MTBF. And a few years down the road our Japanese competitors would have blown right past us on reliability because the goal *was* achievable. I wasn't the only guy on earth John was making miserable. He had even forced Texas Instruments, the giant semiconductor company, to change the way they manufactured integrated computer chips to make them more reliable; that was something HP had been trying to accomplish for years with absolutely zero success. Coyote IV turned out to be the world's first disk drive that *did* achieve the million hours goal. I know because the guy at EMC who measured product reliability in the field told me he'd clocked Coyote IV at better than a million hours after we'd finally won the business and EMC started shipping products in volume with our disk drives in them.

I had the chance one time to see the production process at EMC up close. The chance came when John called me one day – I *never* called him; it hurt too much – and basically ordered me and the product development team to fly out to Worchester and have our noses rubbed in the reliability problems his team was uncovering. It was a completely unpleasant trip – for me at least – but it turned out to be a very important and productive trip. The guys had the chance and the experience to see for themselves, in one on one dealings with John's people, exactly what the challenges were we had to successfully meet. Those challenges were something nobody could really appreciate with actually having the experience. It's the kind of thing you can't just tell somebody about that he'll understand down in the gut. It's the kind of thing a person has to actually encounter up close and personal. I don't think there was a person on my team who didn't come back to Boise energized to meet and beat these challenges after seeing what they were. Of course, it helped that none of John's people we met were anywhere near as unpleasant to deal with as he was. The un-pleasure of dealing with John was reserved for me.

I was very, very impressed with the factory at EMC and their production process. In fact, we ended up incorporating certain key elements of it into our own production process in Boise. That wasn't a popular decision back home. Bob and the entire production staff absolutely hated it. Mitch didn't like it either. But it was something we had to do to meet John's goal, and if we didn't meet John's goal the product would fail. Without EMC there was no chance of making any profit in the teeth of DMD's bloated overhead costs structure.

Aside from the Worchester factory, there were three other things that stuck in my mind from that trip. One was how hot, humid, and oppressive the weather was in Massachusetts. Boise is in the desert and the humidity is extremely low. Over the years I'd gotten used to being baked in our heat. In Worchester I was boiled and the humidity almost made me sick. The second thing that stuck was the maniac traffic in Boston. How Boston avoids having a large scale demolition derby each and every day of the week is completely beyond my comprehension. One of my guys was from the Boston area and he did all the driving for us. I didn't want any part of Boston's *bansaiii!* motoring. The third thing was Plymouth Rock. After our meeting with EMC we took a little side trip to go see it. Frankly, it isn't much to see. It's just a rock and not a very impressive one at that. But there was a clam chowder place right next to it and *that* was worth the trip. There aren't too many things I like better than clam chowder and they really know

how to make it in Massachusetts. Manhattan clam chowder? Forget about it. Feed it to the pigs.

All this hard work on reliability really started to pay off. I kept a spreadsheet detailing each and every failure being uncovered either at EMC or on our own line in Boise. It was quite a long list and the failure rate associated with each and every item was very, very low. But they had to be driven lower in order for Coyote IV as a whole to hit a million hours. John and I would go down this list every week during our phone conferences. It took a long, long time to accomplish, but we were getting close to the goal.

Apparently, though, it was taking too long in the eyes of some engineer back at EMC. I never found out who it was, but some guy there let his frustration boil over one day in early 1993 and he sent a letter to NCR. NCR was a giant computer company and they were one of EMC's most important customers. As it happened, they were also, after EMC, one of our biggest Coyote IV customers. The letter they received pretty much denounced Coyote IV as an unreliable piece of crap; it turned out NCR had been pushing EMC to use our drive, and this guy didn't like it. The letter more or less set a fox loose in the henhouse and the next thing anyone knew, we had a three-way teleconference call going between the manager at NCR, John, and me. NCR was very much in charge of this meeting. It was a memorable day.

John was amazingly quiet and well mannered all through our meeting. The NCR folks had basically taken the position that Coyote IV was a wonderful disk drive and if there was a reliability problem EMC must be causing it. Over and over and over, the NCR guy kept offering me the chance to say there was nothing wrong with our disk drive and EMC was the culprit for any reliability problem there might be. He kept serving this chance up using different words, and every time he did I took pleasure in picturing in my mind an image of John sitting there in Worchester biting his fingernails off and sweating. That made it the most fun meeting I ever had in which he was involved.

But the truth was there was nothing wrong with EMC's process and the reliability problems really did exist in Coyote IV. They were our problems. So that's what I kept replying over and over again. I used the opportunity to review the top items on my spreadsheet list of problems, what we were doing about them, and when I was projecting they would be fixed once and for all. "There's nothing wrong with the EMC process," I kept saying. "Coyote IV should be able to go through that process just fine and that's what we're going to make it do. These problems are almost fixed now and it won't be long before they're completely taken care of." I praised EMC for their commitment to reliability. By the end of the meeting NCR was happy, they were signed up for what we – and EMC – were doing, and the crisis was ended.

I think John was grateful that I didn't use this chance to pay him back for all the fun he'd put me through. In our weekly phone conferences after that he'd still ram the umbrella up my behind but he stopped opening it before pulling it back out. □

For me the job of manager never was very much fun, especially compared to actually doing product design. It had its moments of great personal satisfaction, but most of the time it felt like a job and nothing more. There are people who love it; Greg is one of them I think. But I never loved it. It was just something somebody had to do and when that somebody turned out to be me it was a duty to do it as well as possible. Part of it – and to my way of thinking, the most important part of it – was to get the job done and achieve the results the company needed to achieve. That is the essence of the social contract every single person implicitly enters into when they go to work for any organization. The other part of it was doing this in such a way that you never lost sight of the fact that your people *were* people with lives, ambitions, and dreams of their own. Kant wrote that it is a moral categorical imperative to always treat people as ends in themselves and never as merely the means to an end. I believe that. It is the essence of moral leadership. But it's often hard to do well and I know I wasn't always as successful at it as I should have been. I did try very hard. But it's a tough obligation to meet consistently. Maybe *the* toughest.

There is a tendency anymore for management systems to treat people as 'human resources' rather than as people. Managers, especially higher level ones, read management magazines and mimic trendy theories of management they find there. Calling people 'human resources' was something that began at HP not too

long after Bill and Dave retired and John Young took over as president and CEO. I hated being called a human resource and I never knew anybody who liked it when the term was applied to them personally. It was a term I avoided using because from that term it is only a short step to falling into the habit of thinking about people in the same way as you think of desks or production robots. It's popular among managers to say management is a science but it isn't. It's a pseudo science. The essence of management is leadership, and leadership – moral or otherwise – isn't something they teach in business schools nor in any of the various management courses HP had. Budgeting, scheduling, recruitment, and the other things they do teach are only a small fraction of the job, important but not the most important things a manager does day to day. American business has a awful lot to learn about moral leadership.

One particular case in point of the 'scientific' management that was slowly changing the HP culture, and that I hated, was the employee ranking system that came into place in the 1980s. We never told our people how this system actually worked and for a pretty good reason. Somebody had tried to make a 'science' of this process by reducing it to a formal procedure. It was a very de-humanized process.

In the old days if an employee did something heroic that bailed a project out of trouble, he or she could reasonably expect to be rewarded for doing it. That couldn't happen anymore. The new mantra was 'sustained long term performance' and under this way of looking at things heroic acts no longer counted. Instead, all of us Level 62 managers periodically had to participate in an all day affair known as 'relative ranking.' We would gather in a big conference room and, one by one, compile a list of all our employees at a given job level – Level 58 for engineers with three years experience or less, Level 60 for the great majority of our engineers, and Level 62 Technical Contributor for the small fraction of people promoted to this next 'rung' on the 'technical career ladder.' The starting point for each list was the list that had been put together at the last meeting. Employee performance was divided into five categories: unacceptable (U); good (G); very good (VG); excellent (EX); and exceptional (XP). Except for the U category, each of these levels was 'defined' by one specific person. That meant there were four people who, all unknowingly, had suffered the misfortune of having been identified as the 'prototype' performer in each category. If Joe Blow had been tagged as the prototypical VG performer, that meant he was always going to be regarded as a VG performer no matter what. He'd be in the middle of that part of the list where 'VG people' were listed and he could not move up in the rankings no matter what he did. He could move down, of course; all he had to do in order to move down was quit doing a very good job. I never saw that happen in my time as a manager, but if it had somebody else – either the name just above his or just below his on our list – would then have become 'the prototype performer' in that category. But unless that happened, poor old Joe Blow was going to be a 'VG performer' until the day he quit, retired, or died. In effect, his job performance was no longer evaluated unless it happened to go bad.

The 'prototypes' were the anchor points for the rest of the list. Other people could move up or down within their category but it was a zero sum game. If one person moved up a notch on the list, somebody else moved down. This was because the number of people in each category, category U again being the exception, was forced to correspond roughly to a bell-shaped curve. We artificially forced a distribution. Of course, the Personnel department issued strict instructions that we weren't supposed to force a distribution. But if the final rankings turned out to violate the bell shape then the chairmen of the ranking session had to appear before the division manager and justify why the distribution had been violated. No one ever wanted to do that. So, while 'in principle' we didn't have to force a performance distribution, in practice we always did. Every single time. One consequence of this was it was very difficult for any of our people to change performance band, e.g. to move from a G performer to a VG performer, etc. If someone from the G band moved up to the VG band, someone in the VG band had to move down into the G band.

No manager liked to have this happen to one of his people because then he had the unpleasant task of explaining to his person why he or she had dropped into a lower performance category. It *was* possible for a person to climb into a higher category; I was able to secure this for a few of my people over the years. But it always started a nasty cat fight in the ranking meeting between two managers and it usually only

worked if the 'bottom' category person – say the bottom guy in the VG band – wasn't too highly regarded by his boss, who then didn't mind so much if his guy slipped down to G to make room for somebody to move up into VG. It was easier for a person to move within a category, although in practice nobody ever moved more than one or two places on the list during any one ranking session. It was easy because if you moved one notch in the VG category you were still VG and your boss didn't have any uncomfortable explanations to make. The only people who couldn't move were the prototypes.

You can see why we kept this process secret from our people. If what we were required to do had gotten to be common knowledge it would have totally destroyed all the teamwork on which the success of the division depended. Our people wouldn't have liked the fact that their job performance was secondary to the skill their manager brought to 'gaming' the other managers during ranking sessions. How do I know this? Because we Level 62 managers knew the Level 63 managers ranked *us* by the very same system and *we* didn't like it. When I'd first become a Level 62 manager, I'd entered the list at the VG level, most likely because I was entering it from the EX category of Level 61 (the level that immediately predated the introduction of the technical ladder; when the new system was introduced Level 61 was abolished), and if they'd put me in at the G level it would have meant a pay cut for me. They'd have had a hard time explaining to me why being promoted was accompanied by less pay. After I was initiated into the relative ranking rite, I knew right away I was going to be in the VG category for the rest of my days at HP. And I was. Not too surprisingly, there was next to no teamwork between Level 62 project managers in our lab except within a single project team.

I suppose this system was as fair as any unfair system could probably be. But it was just one of the many things that came into being once our people ceased to be people and became 'human resources.'

All around me I could see any number of signs that the new management culture at DMD was evolving away from the HP Way philosophy and with an Alzheimer-like pace was forgetting what the word 'company' actually means. In 1991, in response to a downturn in business, DMD had cancelled the annual company picnic in order to save money. The picnic had been a tradition at HP for decades and was one of the many largely symbolic but still extremely important ways of demonstrating that we were all part of something bigger than any one of us. When they reinstated the picnic in 1992, a lot of the higher managers were surprised that attendance at the picnic dropped to a fraction of what it had always been. Mitch understood. "You can't cancel a tradition," he remarked to me shortly afterwards. "It isn't a tradition anymore if you do." Mitch was right, of course. We had gotten the message the year before: *you people don't count as much any more.* That wasn't the message higher management had meant to send. But they didn't understand leadership or that leadership is the soul of management so it really wasn't too surprising to me that they didn't know how to lead. HP wasn't alone in this decay. In fact, my opinion is we were holding out against the trend better than most big companies across America. But the rotting of the social contract and the disappearance of moral leadership had infected us too.

Well before the end of 1992 my own morale was starting to sag pretty badly. It resulted from what I was seeing all around me as the company's very personality was becoming more dehumanized, the mounting economic consequences of that stupid decision to enter the commodity disk drive market, and the unrelenting stress of having to pacify John from EMC *and* fend off the efforts of my fellow managers to get the de-staffing of Coyote IV back under way again before the project was finished enough to succeed. It was a rare morning I could even make it to my desk without somebody running me down in the hallway to bring to my attention whatever the crisis of the day was going to be that day. I developed a painful eye condition in which the natural moisture that lubricates the surface of the eyeball dried out. Often what would awaken me in the morning was the sensation of being poked in the eye with a sharp stick as the inside of my eyelid would stick to my eyeball and thin layers of skin would be ripped off. I was having to lubricate my eyes artificially using Celluvisc® eye drops every few hours. The eye condition was caused by stress. How do I know? It went away completely after I left HP.

The Epicurean philosophers of ancient Greece had defined 'pleasure' as 'the absence of pain.' I was

on my way to lunch one day when all of a sudden it occurred to me that I had begun defining pleasure this very same way. My job was making an Epicurean of me. I certainly wasn't having any fun at work, so in the fall of '92 I started teaching again in the evenings for the Engineering in Boise Program. The difference between my day job and my teaching job was like the difference between sour and sweet. In my teaching job I was in continual contact with bright, fresh, eager young people who were a pure joy to be around and who really appreciated what I and my colleagues were providing to them. The classes were still evening classes, and afterwards I could drop in to one of Boise's downtown restaurants for a late supper and to listen to my musician friends perform if they happened to have a gig that night. All this was possible because I was no longer on call 24-7 the way I had been as production engineering manager. I continued teaching in the spring '93 semester, and at the end of the '92-93 school year I was surprised, honored, and very, very touched when the students voted to give me an Outstanding Teacher award. During all of 1992 and 1993, this was the only thing anyone said to me that meant, 'we appreciate you' right up until my very last day with HP.

My decision that after eighteen years it was time to leave the company happened in kind of an unexpected way. From time to time division managers and other higher level managers at HP would take management short courses. Occasionally the division manager – Bruce in this particular case – would decide it had been such a good class that he'd want to share it with all the managers in the division. When this happened, he'd order Personnel to see to it that every manager in the division would be scheduled and enrolled to take this class. We'd find out about it when the memo from Personnel came.

So it was that one crisis-filled afternoon I got a memo in the interoffice mail notifying me that I was scheduled to take the '7 Habits of Highly Effective People' class on such-and-such days at such-and-such time at such-and-such place. This sort of thing always had an uncanny knack for happening at the worst possible times during a project, so as you can guess I greeted it with something less than unrestrained joy. But it was something there was no possible way to get out of doing. The division manager had ordered it and that meant I was going, like it or not.

A couple days later I found myself sitting, early in the morning, coffee cup in hand, at a table at an off-site location so they could teach me how to be a highly effective person. Like Melody, I'm not a morning person but HP likes to start its training classes early. I was barely awake enough to know if I knew any of my fellow classmates. After some introductions and some preliminary talk, the instructor told us all to take out a sheet of paper and 'write down your goals in life.' She gave us about fifteen minutes to do this, but a second cup of coffee helped and at the end of the allotted time I had my list. Then it was *yak, yak, yak, yak* for the rest of the day.

The second morning, which came just as early as the first had, there was some more preliminary talk and then we were told to make another list, this one 'your job description.' I was tempted to describe how my job looked to me, but I played along and wrote down the job description for an R&D project manager instead. Then it was *yak, yak, yak, yak* again for the rest of the day. "Be proactive. Begin with the end in mind. Put first things first. Think win/win. Seek first to understand, then to be understood. Synergize. Sharpen the saw." I didn't think these 'seven habits' were exactly front page news, although it did occur to me Vashro could probably benefit from trying some of these for a change. Except the last one. He already knew about sharp saws. And sharp knives.

The third morning we were told to take our lists from the first two days, set them down side by side, and make a third list describing how our jobs supported our goals in life. I looked back and forth between the two lists over and over again. After fifteen minutes my third sheet of paper was still blank. I couldn't find one single thing in my job description list that supported one single thing in my goals list. Hmm. I proactively put first things first and thought *Rick, you have forgotten your aim.* Somewhere, somehow, sometime between 1989 and 1992 I had become one of George Santayana's fanatics.

I thought about this the rest of that day while the class droned on around me. Was anything I was now doing something working to fulfill my Promise, made so long ago in my special place that awful weekend

when President Kennedy had died? It was still true that the outcomes of my labors provided jobs for all those people who worked in production. For now, anyway. Tomorrow? That was a different question altogether. I knew those jobs were becoming less secure with each passing year as DMD struggled to survive in a marketplace we were ill-equipped to compete in, and the economic forces at work in that marketplace were things there was nothing at all I could do anything about. Greg had already started to have little private chats with me about the low profit margins picture beginning to take shape for Coyote IV. I could tell he was worried. And if Coyote IV margins were in trouble, I knew the story was going to be even worse for the three-and-a-half inch products planned to come along afterwards.

And the products themselves with each passing year had shorter and shorter useful lifetimes. Quite literally, the last product I worked on would disappear from HP's product catalog before the next one came out. The teamwork, the community, the *soul* of the company I had worked for all my adult life was disappearing like Lewis Carroll's Cheshire Cat right in front of my eyes. Worst of all, I had even let myself become a willing co-conspirator in an employee ranking ritual that put administrative process and procedure before people and which reduced them to being cogs in a machine. I looked into myself that day and I didn't like what I saw.

By the end of that third day I had made a decision. I would never forget my aim again. I would not be a fanatic anymore. By the end of the third day, I knew HP and I had come at last to a parting of the ways. It had been eight years since I had received my doctorate degree and I felt I had long discharged the obligation of gratitude to the company for all the support it had given me in the old days that had made that accomplishment possible. Now the time had come to move on.

I had good reason to think the Engineering in Boise Program would very soon have some full time openings for permanent professors despite the Idaho Republican landslide in the 1992 elections that followed after the gerrymandering of our electoral districts. Micron Technology, which was then on its way to becoming Boise's largest employer and whose shareholders included the two wealthiest businessmen in the state, was pushing for the establishment of a more 'permanent' program in Boise – one not so dependent on the use of affiliate professors and that would be staffed by professors who worked for the state. Even though Idaho's Republican legislature can usually be counted on to be education's worst enemy, the politicians could not and would not ignore the special interests pressure Micron's owners could bring to bear on them.

The 1992 election itself had been a disturbing one even on the national level. On the whole I thought President Bush had done a pretty good job but not one without its disturbing elements. Like everyone else I had celebrated the fall of Communism when the Soviet Union finally collapsed early in his term, but I was deeply disturbed by the unfettered free market capitalism that had been urged upon the new Russian Republic by the political ideologues of the national Republican Party. These people can always be counted on to see this nineteenth century model as the answer to everything, but it isn't. The rise of the robber barons in America in the nineteenth century and the violent countermovement in the rise of unions at the turn of the century proved the flaw in this way of thinking. Unfettered free market capitalism is a good thing if you happen to be John D. Rockefeller or Andrew Carnegie. It's not such a good thing if your name is Molly McGuire. President Roosevelt – Teddy Roosevelt – had known that and had fought back successfully against the rising tide of feudalism in America that had become pervasive in his day. I believed then, and I believe now, that if unions were all abolished tomorrow we would need them again by Monday of the following week. Unfettered capitalism is not and has never been the secret to America's success. Free enterprise, yes. Unfettered, uncontrolled capitalism, no. But the latter was what had been presented to the Russians. They tried it and conditions for their people soon worsened. A still-nuclear-armed Russia sliding into economic chaos was the most dangerous thing I could imagine.

I had nothing but praise for President Bush's leadership in the First Gulf War. Quite frankly, I had been very worried when that conflict first began. Iraq had a huge army equipped with Soviet hardware and before the war began few of us outside the military knew how amazingly effective America's military

technology would prove to be. Crushing Granada or Panama was one thing. Iraq looked very much like it was going to be a different story altogether. But America had new and competent military leaders now in Generals Powell and Schwarzkopf and a capable Commander in Chief in President Bush. Two decades and the lessons learned from the quagmire of Vietnam had made all the difference in the world. I had been amazed, inspired, and awed by the professional way America's new leaders dealt with the threat. Like a lot of people, I was initially disappointed we stopped where we did, but it didn't take me long to see that this was precisely what had had to be done. President Bush had clearly articulated the war objectives from the very start and he had stuck to them. The only thing I hadn't liked about it was the way Congress had once again failed in its duty and refused to *declare* we were going to war as part of the U.N.

On the other hand, America had slid into a deepening economic downturn after the war and I hadn't seen any effective steps being proposed by President Bush to do something about it. Congress, of course, wasn't doing anything about it either, but it is the President's job to step up and lead and I thought President Bush should have been doing more than he was. Still, if this had been all there was to it, I would have again supported him for re-election. But that wasn't all there was to it.

In the summer before the election, my phone rang one evening. It was a fund raising call from the Republican National Committee fund raising people. I hadn't been giving any money to them for quite a while by then, but my name was still on their rolls. When these calls come in, the caller basically just reads from a prepared script that outlines the party's basic campaign themes for the election. I could always tell just exactly what the Republican campaign was going to look like after one of these calls. This time there was only one item on the agenda.

"We have to get the word out," the caller told me, "about what a sleaze bag Bill Clinton is." I was just stunned. She actually called Mr. Clinton a 'sleaze bag'; those were the exact words. In over fifteen years of involvement in Republican national politics, I had never heard anything even remotely like this before. There was no other theme. Bill Clinton was a sleaze bag and he had to be stopped. That was it. As she continued to read, it didn't take long for a chilling fact to emerge. The fundamentalists had taken over the Republican Party. The old Reagan coalition – the real one that had brought me into it in the first place – was gone and the new one was something I wanted no part of. I declined to give them any money.

But that phone call was a wakeup call and a reminder to me that a change for the worse was taking place across the culture of America. Important things – attitudes and folkways – I had always taken for granted were changing now. I could even see signs of this in the workplace at HP. One of these, believe it or not, was what was happening to Doug Clifford. When DSS was re-absorbed, Doug was out of a division manager's job. You can't be a division manager without a division. Doug was still an employee. But he had no power and no position that I could see. Neither could any of my friends. I didn't know what his job now was, and neither did any of the rest of my colleagues from the project manager level on down. In a kind of cruel jest, somebody had hung a sign on the outside wall of his cubicle: *Will manage for food.* Doug and I had never been, and never would be, boon companions. But I still didn't like the looks of how the company appeared to be treating him. I thought about this during that third day of the '7 Habits' class and an old limerick Mom liked to recite every now and then for some reason came to my mind. It went

Here's to me and here's to you
And here's to love and laughter.
I'll be true as long as you
And not one second after.

A company has a right to expect loyalty from its employees as long as that company is honest, is a good corporate citizen of our country, and treats its people with dignity, respect, and a sense of ethics. But loyalty cuts both ways. When a company even starts appearing to lack loyalty to its people, it no longer has any right or even any reason to expect its people to be loyal to it. The social contract is broken. This, too, was in my mind that day and another reason I knew HP and I were done with each other.

That evening I did something I hadn't done in a long, long time. I began putting my resume together.

IX. The Clinton Years

As 1992 turned into 1993 a bolt from the blue fell. My long time friends, Steve and Chris, were getting divorced. To say the news surprised me would be like saying summers in Phoenix can get mildly toasty. I'm not at all going to go into the details of what happened between them. The only reason I knew the story was because I offered to let Steve stay at my house while he looked for a new place of his own. Both he and Chris thanked me for this; their divorce wasn't going to be friendly. If not for this, the story wouldn't have been any of my business and it sure isn't any of yours. Both Steve and Chris were and are my friends and I didn't take sides in the matter. But I did feel just awful about it.

Because Steve was living with me he knew I was planning to leave HP soon. As the Idaho Legislature began holding its sessions, every evening after work – after, that is, I got home from teaching – I turned on the TV and watched the *Idaho Reports* show on Boise's public television station. Back then this show came on nightly when the legislature was in session and reported on the major events that had taken place in that day's happenings. I was watching the progress of the bill to establish the appropriation for the Engineering in Boise Program, the purpose of which was to fund the staffing of the program with a permanent faculty. Steve couldn't help but notice I was watching this closely, he asked me about it, and I told him what I was planning to do if the appropriation passed. I didn't have to ask him to keep this to himself. He was my friend and he didn't breath a word of it to anyone.

The Engineering in Boise Program wasn't my only possible option, of course. With my resume there were a lot of places, both in academia and in industry, where I could land a job. But I no longer wanted to stay in the private sector and I did not at all want to leave Boise. In fourteen years it had become my home and my roots – aside from my family – were here. For me becoming a professor with the Boise Program was perfect. The day the Legislature finally passed the appropriation, I let out a whoop of joy. Steve congratulated me. The very next day I gave my resume to Bob Rinker and became the first applicant for the new positions that had just been created by an act of the Legislature.

The new professor positions belonged to the Boise Program but were part of the University of Idaho. I felt pretty confident about getting the job. After all, I knew most of the UI faculty personally, except for seven brand new professors on the Moscow campus, and they knew me. Nonetheless, there were something like one hundred sixty applications for the three available positions and I went through the same process everyone else did. There are very strict procedures and rules that governed the University's hiring process and representatives from the UI's Human Resources department – yeah, this management mind set infected the academic world, too – sat on the search committee to see to it all these rules and procedures were scrupulously followed. Nonetheless, I made the short list of finalist and took a couple of days of vacation in order to travel up to Moscow, three hundred miles north of Boise, for final interviews. These went well and I anticipated the job offer would come around March or so. There were no guarantees, of course, but I had no serious doubt but that I'd be offered one of the positions.

This timeframe looked like it would pretty closely match the end of the Coyote IV project. We weren't quite done yet, but the project schedule was projecting this timeframe for completion and by this time there were few uncertainties left that could seriously jeopardize the schedule. That left me with one more important thing I had to do for HP. I had to let Greg know I would be stepping down as a project manager at the end of Coyote IV. I wasn't prepared to tell anyone out there yet that I was leaving. I thought it was foolish to quit one job before landing another one. But I had to make sure they wouldn't be planning to put me in charge of another new product development. The division had enough huge problems surviving in that marketplace as it was, and I didn't want to chance hurting the launch of the next major new project by having its manager quit just as it was getting started. I was taking a risk by doing this; it was still very possible I was overestimating my chances of being offered a job by the UI, and if I didn't get the job I'd be demoting myself out at HP. But I didn't think it was too likely I wouldn't be receiving the offer, if I did receive it I knew I'd accept it, and I certainly didn't have the right to protect my own interests at the

expense of those of my friends and colleagues at HP. I had to step down, and I had to do it before I'd know if the deal with the UI would be finalized.

The time came not long before the end of the project when Greg called me into his cubicle to discuss my post-Coyote IV assignment. As it happened, the strategic decision had already been made that Coyote IV would be our last five-and-a-quarter inch disk drive. From now on the new product developments were going to all be three-and-a-half inch drives and it also looked like Greg's section would most likely be split up and a lot of the R&D lab reorganized. I imagine this was probably a difficult time for Greg since major reorganizations like this are usually a tough time for Level 63 section managers. He had barely opened our discussion when I told him I did not wish to be a project manager after Coyote IV. I think in one way he was a little surprised by this, but in another way not too surprised. He knew Coyote IV had not been fun for me. Whatever his thoughts and feelings really were, he accepted my decision and said he'd arrange for me to return to the bench after the project ended.

March came and went without any word about the job from the UI folks. That did start to worry me a little. They were taking an unusually long time about making up their minds and that could mean almost anything. It might mean, for example, that they had some exceptionally strong candidates in their pool of finalists and I wasn't as good as I thought I was. Coyote IV did take just a little longer to finish up than I had expected, but it, too, finally came to an end and no word about the job. I had hoped to make a clean break immediately after the project ended, but now it was turning out that I'd actually be starting work, as a development engineer again, on the next project.

As it turned out, the delay at the UI's end of things had happened because they were wrestling with a tough decision. I had been interviewed with the idea in mind that I would teach electronics, and they did have another strong candidate for the electronics position. He was a young, newly graduated Ph.D. named Jake Baker. All the extra time apparently was being spent wrestling with the decision whether to hire me or Jake. You see, academic departments have specialties within the field and what they wanted to do was to set up a different specialist in each of the available positions. But at the same time they wanted to hire both Jake and me. It was a dilemma for them. They were eventually able to resolve it by realizing that electronics is kind of a big deal in electrical engineering and it wouldn't hurt in the least to have extra manpower in that area in a program for which the biggest Boise area advocate was a company that made its money in electronics. They also remembered that I was a system theorist and could therefore handle the academic equivalent of a 'utility infielder' position, and therefore they could justify hiring us both. And that is what they eventually did.

But they weren't able to reach this decision until the end of May. By then I was part of a new team and had started working on a fairly minor and routine assignment. My new assignment had come about in a kind of curious way. At least it was curious to my way of thinking. After Coyote IV ended I found myself being sent around for little chats with different R&D project managers, and in the course of this I ran into something I hadn't expected. All these guys had known me and known my reputation as an R&D engineer for many years. But I had spent the past four and a half years as a manager and most of them seemed to take it for granted that meant I'd somehow forgotten how to be an engineer. My guess is that all of them had spent enough time away from the bench to lose confidence in their own abilities to design and invent, and they just assumed their situations were no different than mine. Anyone who really knew me would have known better than to assume this, but that's what they seemed to assume.

The main consequence to come out of all this was they decided to reclassify me as a Level 60 engineer rather than, as I had expected, move me over to a Level 62 Technical Contributor position. The latter was the 'dual ladder' equivalent to the management position of project manager, but it was a job classification for which less than ten percent of the engineer workforce was classified. Because they doubted the fact I was still up-to-date on technology, they didn't want to 'risk' putting me into a category that by definition was reserved for the best engineers. A good, old fashioned HP technical interview could have answered their doubts in quick order, but they chose not to subject me to any technical interviews. I've always

assumed they were afraid of embarrassing me, and if that's what they were thinking then I suppose it was meant to be a kindness. Or maybe the idea might have been that once I'd proven myself again in the Level 60 position they'd be able to 'promote' me back to my previous level. (Level 62 TC was a category that hadn't yet been in existence when I first became a project manager; I was a Level 61 at that time. But all the Level 61 folks had been 'grandfathered' into Level 62 TC spots when the new system started). Whatever the thinking might have actually been, demoting me to Level 60 meant I wouldn't be seeing any pay raises for as long as I remained in that classification. They weren't going to actually cut my salary – at least not right away – but the fact was I was making more money than any other Level 60.

I didn't think they handled this transition with a great deal of people skill, but I didn't actually resent it. It was part of the risk that came with stepping down and however events played out I was willing to accept the consequences. I knew I wasn't going to be around all that long, one way or another, anyway. And in truth my new assignment was pretty unimportant, not that interesting, and I didn't have a great deal of enthusiasm for it anyway. After all those years of front line duty in what I had come to think of as 'the disk drive wars,' I was just pretty tired of it all. I guess you could say I had a bad case of combat fatigue.

In any event, the situation didn't last longer than a couple of weeks before the letter offering me a faculty position came in the mail. The letter, dated June 1st, was from Dick Jacobsen, who was then Dean of the College of Engineering. I'd be reporting to Joe Feeley in the EE department. A university distinguishes between a 'program' and a 'department.' The faculty members in a 'program' officially 'belong' to an academic department. The Engineering in Boise Program was a program and that meant my official boss – the guy who would do my performance evaluations and decide on matters like pay raises – wasn't Bob Rinker in Boise but rather Joe up in Moscow. Bob was my 'dotted line' boss.

I called Joe on the phone that night and accepted the offer. Beginning August 15th of '93, I would start work as a tenure-track assistant professor of electrical engineering with the University of Idaho. By accepting this offer, I was taking a pretty big pay cut. My new job had a salary about forty percent less than what I was making with HP. But that was unimportant to me. What was important was that now I would be working to keep my Promise again, something I resolved never to lose sight of ever again.

Now that the deal was closed, it was time to let them know out at HP. The first thing the next morning I asked my new boss for a one on one meeting. I'd known Ken casually for quite a few years, but not really all that well. (He wasn't Ken Jochim; he was a different Ken). I liked him well enough, but we'd never worked together before. At that meeting I told him I was leaving HP. His reaction surprised me. His eyes got very wide and the first thing he said was, "This isn't because of *me* is it?" It had never occurred to me he might think there was something personal in this. No, I reassured him, my decision didn't have anything to do with him. I explained that I had decided to go into teaching and would be starting with the Engineering in Boise Program as an assistant professor come fall. That seemed to come as a relief to him and he congratulated me on my new job and even had the grace to say I'd be missed. In turn, I said I was going to miss all the people here at HP, and I really meant that. I didn't say I was going to miss *working* with them; I wasn't going to miss working at HP at all. But I was going to miss *them* and I knew I wouldn't be seeing some of them very much any more and most of them ever again.

We shook hands warmly and my days with Hewlett Packard were unofficially over. My official last day would come a few days later, but for all practical purposes my meeting with Ken was my last real act as an HP employee. It was eighteen years to the day since that now long-ago and far-away time when I had first arrived in Mountain View as a brash twenty-one-year-old kid who was two hundred dollars in debt to the company.

The speed of the employee grapevine at HP had long been an object of awe and wonder to every one of the managers. But news of my resignation swept through the division via the grapevine faster than any other bit of news I had ever seen. I didn't even have time to get back to my desk before Greg heard about it. We bumped into each other in the hallway as I was heading back and Greg gave me a kind of bitter

sweet smile but with no trace of surprise whatsoever showing in his expression. “I always thought you’d do this a long time ago,” he said. I couldn’t do much more than nod. I was glad somehow that it had turned out so I’d made my resignation to Ken. It just wouldn’t have felt right if I’d had to turn in my resignation to Greg. He is my friend and, really, the best boss I’ve ever had or ever will have.

The afternoon of my official last day a bunch of the guys I’d worked with for so many years threw a farewell party for me at the local pub we used to hit on Friday nights after work. Mostly they were guys who had worked for me on Coyote IV, but other old comrades also joined in. I was very, very touched by this. I was going to miss each and every one of them very, very much. I was happy to be moving on, but I would never, ever forget all those years and all the times – the good and the bad – we had been through together. We were *comrades,* and we always will be. Mingled in with my good feelings was a palpable kind of melancholy as well. A song my friend John Hansen had written kept going through my mind over and over. It seemed to speak to the heart of my long career with HP:

Though you might have lasted a lifetime
All good things must end.
I’ll say goodbye. This is a nice time
To say you were my friend.

You kept me warm in the cold.
You gave me strength.
You took me in.
I watched you grow.
Now you’re running over length.

And though you might have lasted a lifetime
All good things must end.
I’ll say goodbye. This is the right time
To say you were my friend.

I was now between jobs and it was a strange feeling. This was the first time since I was ten years old that I didn’t have a job to go do or full time school to attend to. It was a kind of emotional punctuation mark. An important chapter of my life had ended and a new one was beginning. □

Assistant professor (1993-4 school year)

There was a two month hiatus between the time I left HP and the start of the 1993-94 school year. Because I wouldn’t have a paycheck during that time I didn’t plan on any expensive vacation trips and I generally watched my spending. As it turned out, though, I only had to go a month without a salary income (my investments were bringing in money, but I always kept that money dedicated to my stock and bond market accounts except in case of emergency, and this wasn’t an emergency). Although my employment contract with the Idaho State Board of Education, who were also the regents of the University of Idaho, only ran for nine months – the latter part of August through the first part of May – and I was only paid for these nine months, the SBOE had a policy that university professors were paid across the entire state fiscal year, which ran from July 1 to June 30. That meant each paycheck was only about seventy-five percent of the earned amount but it also meant I started receiving pay from the university a month before I actually did any work for them. I found this out in mid-July when my first UI paycheck came. I initially thought it was a mistake and I asked Bob Rinker about it. That’s how I found out about the state’s stretched out pay system.

What I did instead was hang around the house during the day catching up on my reading and hang around the downtown music scene with my non-HP friends at night. When our regular poker game, the same one that had started way back my first year in Boise, came around, I'd drive out to my brother Vern's house and take my usual seat at the poker table. This was the only semi-regular contact I had with my old comrades from HP. Our poker game wasn't a high-roller affair. It was twenty dollar buy-in, nickel ante, table stakes, and pot limit. Occasionally someone could manage to lose as much as a hundred dollars at one of these, but he had to be a pretty bad poker player to lose that much money at one of our games and I'm not a bad poker player. All in all it was a very pleasant two months and I hadn't realized just how much I needed a break. Physically I felt better than I had in a long time; I just hadn't realized how stressful my last few years at HP had been. Now I was living with no stress at all. There must have been some kind of healing that went on during this break because that problem with my dry eyes slowly went away for good. I stopped needing all those regular applications of moisturizing eye drops. I stopped needing *any* of that.

Although I hadn't turned forty yet, my beard had started showing streaks of white over the past few years and its original dark reddish-brown color had faded to a light reddish-brown. I guess I must have looked quite a bit older than the calendar said I was. I came to realize this on my last day at HP when I was talking to one of the women who worked as a skilled operator in DMD's magnetic head lab. Somehow the subject of age had come up and I'd invited her to guess how old I was. "You're not too old," she said. "I'd say you're in your early fifties." She was mortified when I told her I was thirty-nine. For my fortieth birthday that September, Ruth gave me a tube of Just For Men® beard, mustache, and side burn gel. As with any gift, it's the thought that counts. But I didn't use it. I don't think I'm immortal and it goes against my grain to try to make people think I'm something that I'm not. Like twenty.

When I found out I actually did have an income in July I took one trip. I went back to Iowa to see my family and to see Glen, my brother and college roommate, who was by then living in Davenport and working for the City Engineering department there. Aunt Hazel's health had gotten pretty frail by then and she was now on an oxygen tank that went with her everywhere. Iowa had legalized riverboat gambling and both Mom and Aunt Hazel loved to go to the riverboats. We, the three of us, had some very fun outings there. I'd do the driving and we'd spend the day in the riverboat casinos. Mom and Aunt Hazel liked to play the slot machines and I got a big kick out of watching them. And, of course, I played the slots myself a bit. Dad and Uncle Wayne disapproved of gambling and would sort of glower at us when we got home. I think Dad also hated to be left alone while we were down in Davenport or up in Dubuque. His body was practically melting off his bones by then and he looked terrible. He'd gotten into the habit of saying some pretty morbid things. I hated watching him decline like that, hated the way his age and disease were slowly robbing him of his dignity and of any real joy of life. He had become a frail little man almost wholly dependent on others. His fire was out. Dad would turn eighty that September.

I've always been very glad I made that trip. Aunt Hazel died the following year. When she did I lost my second mom. I carry her with me now in that special, sacred place in my heart. □

With the start of the school year in August I began this new chapter in my life. It had been twenty years since that day I had resolved to have the same job as my old advisor, Dr. Triska. Now I did. As I like to put it, I had 'gone public.' I was finally really and truly Professor Wells. Randy's sneering old nickname from our sixth grade days had become a fact rather than an epithet. I wondered my first day if he'd learned how to pronounce 'Einstein' yet. I doubted it. 'Parole board' maybe. But I don't know whatever became of him and I don't care.

Our new faculty was a small and closely knit group. Bob was the administrator of the Program and there were a total of five of us teaching in the program. Our senior guy was Jim Peterson, who was a tenured full professor from the EE department up in Moscow and had volunteered to move down to Boise and join the program. Jim had been on my doctoral committee eight years earlier and had been the EE department chair at that time. The rest of us were tenure track assistant professors. Richard Wall had been

hired by the Moscow campus three years earlier and had been assigned to the Boise program. Young Jake Baker, an ex-Marine Corps officer was there, as was Herb Hess, a former Army officer who was now a major in the Army Reserves. Axel Krings, a young computer science professor from Germany who had gone to school in Nebraska, would join us to teach computer engineering the following year.

With my brothers Glen and Al at Al's house in Wisconsin (January, 1994).

My midlife change of careers startled my family and my other brothers, just as it had startled my friends and colleagues at HP, but I don't think it surprised them very much. It was still unusual at that time for a person to deliberately choose to make less money, but in the years to come more and more people of my generation came to make the same kind of choice as I had. During Christmas break in '93-94 Glen and I took a little trip up to Wisconsin to visit Al and his wife Kathy, and Al just chuckled when he found out what I had done. Al was running a pharmacy and he understood from first hand experience the 'joys' of managing any kind of enterprise.

We had about twenty seniors and twenty juniors in the program that year, and this number stayed pretty constant for as long as the program lasted. It was a small, intimate setting – all housed on a single floor of BSU's Technology Building – and I knew every single student personally. We had just two resident graduate students in the program that first year, but a few of the seniors would go on for graduate studies with us the following year.

I call that first academic year my One Perfect Year, mainly because it was. The Program had been set up to provide a college education in engineering for non-traditional, place-bound students, and part of this was that all our classes were evening classes. Each of us taught two classes, with the first class period starting at five-thirty and the second starting at seven o'clock. Classes ran for an hour and a half each from Monday through Thursday with no classes on Friday evenings. I'm something of a night owl by nature and not having to start work until late in the morning felt like a real luxury. Friday was research day for me. In the late afternoon before classes started, students would often show up early and come into my office to ask questions and get help on homework. Most of them were still pretty young, in their early twenties on the average.

I loved working for those young people. I loved helping them understand the new things they were learning, I loved advising them, I loved just talking with them. I discovered something about myself in the course of this. I discovered that even if I was in a bad mood about something, that bad mood would melt away into the nothingness just as soon as I saw one of the students and be replaced by a feeling of contentment that lasted for the rest of the day. I was in the business of helping people make their lives better, helping them prepare for a long and successful future, and I don't think there's a better feeling than that to be found anywhere in the world. For the first time in my life, I *knew* without any doubts or reservations that I was keeping my long-ago Promise. Young people are the future of our country and there is no possible doubt that *this* was what I could best do for my country and for God. My life had become a life of direct, personal service to real people and not to any abstract entity or ideal. How could anyone hope for anything better than that? What could *be* better than that? For me the answer is: nothing.

The students were bright, dedicated, honest, hard working, and, yes, a bit naive. They were still in the full vigor and bloom of the high summer of their lives, untainted as of yet by the wearing grind of years of toil that so often beats down so many older people as they pass through life. Their freshness, vigor, and youth is contagious, and working with and for them made *me* feel fresher and younger than I had in years. Emerson had seen a pristine truth when he had written

So nigh is grandeur to our dust,
So near is God to man,
When Duty whispers low, Thou must,
The Youth replies, I can.

Then there was the research. The University of Idaho is Idaho's land grant university and is charged with the mission of conducting research. It was expected and required of every professor that he or she engage in scholarly research and publish the results through the venue appropriate to his or her field. For me that meant refereed journal and conference papers. My principal research was, of course, the old question of how to make an electronic brain. But I also realized this was very basic and very speculative research work and I couldn't count on this alone to yield enough results soon enough to satisfy the criteria for publications I would have to meet to win tenure in six years. The consequences of failing to win tenure at a research university are a bit on the Draconian side. Denial of tenure means you're fired. To be denied tenure at one university also means it is next to impossible to land a position as a professor at any other research university. To be denied tenure is the academic equivalent to being excommunicated.

Most people outside the academic world do not understand what tenure means. I have met many people who think tenure means you cannot be fired. This is not true. A professor, even a tenured one, can be fired for failing to satisfactorily do his job. He can be fired for misconduct. He can be fired for stealing or for committing any felony. A tenured professor can be fired for most of the same reasons you can be except for these: He cannot be fired because of his opinions, because of voicing his opinions, because his discoveries present truths people do not want to hear, or because someone in authority just doesn't like him. For example, like all professors at all state universities, I work for the state. Ultimately that means I work for the Governor of Idaho and, less directly, for the Idaho Legislature via a chain that runs from the Governor through the State Board of Education (SBOE), the President of the University, the Provost, the Dean of my College, and the Chair of my Department. But because I am tenured, the Governor cannot fire me, nor can anyone else in that chain, without a hearing that establishes that I have committed a firing offense. And that hearing is conducted by an academic board of my peers. In its own unique way, HP also had a kind of tenure system in the years that I worked there, although certainly one much less formal. Take my problem with Vashro for example. I know full well he wanted to fire me but HP's system wouldn't let him. Tenure removes caprice and petty vindictiveness from the process, it protects the academic freedom necessary for the pursuit of truth in a world often implacably hostile to truth, and it *ensures justice.* Would you work for a bunch of politicians without some kind of safeguard? Neither would I. Can the tenure system be abused? Yes. What can't? But abuse of it doesn't happen very often.

Tenure isn't automatic and it isn't just a matter of putting in six – or some other number of – years on the job. First, going up for tenure isn't optional. If you're a tenure track professor you're going to go through that process when the University says you are, ready or not. Next, before a tenure track professor can be awarded tenure, his performance and track record is reviewed by three different committees – one at the department level and followed by a vote of all the department's tenured faculty members, then again by a committee at the college level, then another one at the university level – then by the Provost, and then by the University's President. Even after that, the SBOE has the final word on whether or not tenure is granted. But once it is, none of them can take it away again without due process and just cause. Politicians hate that, which is why so many of them would like to abolish the tenure system.

So, for at least the first six years there would have to be enough breadth in my research to yield publishable results. 'Publish or perish' isn't a slogan at a university; it's a reality. Fortunately, almost all of the basic theoretical elements of the electronic brain project also had applications to more traditional and 'main stream' areas of engineering research. The publications requirement would slow down my principal research, but it wouldn't stop it. And the bulk of this more traditional research work would be carried out by graduate students under my direction. I would be closely involved with it, naturally, but the really time consuming parts of it were done by my graduate student research assistants. Private sector industry people call this 'leverage.' Graduate school really is the last remnant of the old apprentice system

set up by the European guilds of the Middle Ages.

It requires external funding – grants or contracts – to support graduate students so I got in touch with my old friend John Stedman. John had returned to Boise after completing the start up of the Bristol division in England and was now a vice president in charge of HP's network products business unit. John had always been one of the best supporters and advocates of engineering education in Idaho, and he arranged for me to meet with some of the folks on the printer side of the HP site. As it turned out, these guys were interested in neural network research and I was able to negotiate a nice grant to study this. It was a philanthropic grant, which basically meant there were no strings attached other than that the research involve neural networks and that once a year I report to them what I had done with their money and what we had found out. That particular grant ended up lasting for four years and three graduate students were able to get their degrees because of it.

I came within a hair's breadth of landing a very prestigious contract that first year with the National Science Foundation as well. The Engineering in Boise Program was in the main an undergraduate education program and NSF had a program called Research Experience for Undergraduates, or REU, that was funded out of NSF's directorate that supports scholarly activities for the development of human resources (yes, there's that term again). The principal objective of NSF's REU program is to encourage more of America's best and brightest undergraduate students to go on to graduate school and take up careers in research. The program particularly aims at doing this by providing funds to make it possible for students from small colleges and universities, where opportunities to engage in research are limited, to gain experience in the world of research. Because we were located on the Boise State campus, our undergraduate students fit this description like a hand in a glove.

I wrote up an REU proposal and sent it in to NSF. In January of 1994 I received a phone call from the NSF program officer in charge of engineering-related REU contracts. If I would make a couple of minor changes in my proposed budget, she told me, she'd recommend my proposed REU site be funded. The changes were very minor and I happily made them. Everybody in the program was very excited about this because REU sites are very prestigious and the idea we were going to become one seemed almost too good to be true.

Unfortunately, it turned out it *was* too good to be true. In August of '93 President Clinton had signed into law the Omnibus Budget Reconciliation Act which, among other things, mandated a balanced federal budget be achieved through 'implementation of spending restraints.' One of these 'restraints' turned out to be cutbacks to NSF's budget. They had planned to fund thirteen REU sites that year but with the new 'restraints' ended up only being able to fund twelve of them. Mine was unlucky number thirteen, the one that got the federal ax. Needless to say, all of us were very disappointed when we received the news.

Still, in spite of this disappointment, my new career had started off very, very well. After classes ended in the evening if any of the students wanted to talk with me about something, I'd hang around and we'd talk. Sometimes it was about homework, sometimes it was about something that had been said in class, sometimes he or she would just want to talk. It didn't matter to me. I was happy to stay around as late as they wanted. Other nights, if the students didn't need anything, I'd go downtown for a late supper and catch the gig if any of my musician friends happened to be playing. It was my One Perfect Year. □

Maryann, my third sister.

My One Perfect Year had just barely ended when the most tragic of news came from Iowa. My sister-in-law Maryann, Bill's wife, had been killed in an auto accident. In a heartbeat in time, a

warm, loving, vibrant member of my family had been taken from us. Maryann and my niece Marnie had been on their way to someplace in Cedar Rapids and Maryann hadn't noticed the stop sign at an intersection. She ran the stop sign and her car was hit broadside by a truck on the driver's side. She died a short time later in the hospital from her injuries. Thank God, my niece Marnie, who I'm told was riding in the front seat, wasn't hurt.

I had been sixteen when Maryann and Bill got married and their wedding had been the first time I'd seen a Catholic mass. Maryann's brother was a priest and he had performed the wedding ceremony. Her family lived in Chippewa Falls, Wisconsin, and her mother, Marvel, really was a marvel. I had liked her and her family from the very first time I'd met them, and it isn't usual for me to take to strangers so fast. Maryann had been working as an airline stewardess –nowadays called 'flight attendants' – when Bill met her, and Bill had become Catholic in order to marry her. From the very start Maryann had always treated me like I was her own kid brother, had learned how to get away with teasing me like Sherri did, and I had come to love her very much. Now I flew back to Iowa to attend a much sadder mass. 1994 was the first of four black-wreathed years. □

The Wells Laboratory in Boise. Left to right: Gary Bartles (RA), me, Ken Blair (the computer administrator for the Boise program), Steve McCarthy (RA), Mark Laverty (RA). RA stands for Research Assistant. An RA is a graduate student.

The 1994-95 school year started off as well as the '93-94 academic year and for the most part was almost as good a year as the first had been. I was able that year to draw enough external funding to establish my own research laboratory within the program to support my first graduate student research assistants (RAs), and I was also appointed to the Graduate Faculty, which meant I could now serve as major professor on graduate students' graduate committees. A major professor is a graduate student's principal academic and research advisor and this is always a very close relationship not too much unlike the master-apprentice relationship handed down from the old guilds of medieval Europe.

The first new contract began with the ringing of my telephone in my office late one morning. The caller was none other than my old boss, Greg. It turned out Greg had also moved out of DMD and was now running an R&D section on the Laserjet printer side of the HP site. His section was responsible for advanced technology development for HP's Laserjet printers and his people carried out applied research rather than direct product development. This was in itself a bit unusual for HP; most such research work is carried out by HP Laboratories down in the Bay Area. From time to time a product division of HP might set up an operation of this sort, but line managers at these divisions tend to be unable to resist the temptation to raid these operations when a product development project gets into trouble. It is one of the main symptoms of American corporate management's inability to stick to a strategic outlook.

It would turn out that Greg's group would be more successful than most within HP. A year later his operation was a full-fledged R&D lab and Greg became a lab manager – a significant promotion. He had called me that day because one of his engineers, an experienced old-timer named Tom Camis, had made a successful case that they needed a highly accurate and sophisticated computer model of the physical processes involved in laser electrophotography. The main selling point of this idea was that if such a computer model was 'user friendly' enough, they could use it as a computer-aided-design (CAD) tool to reduce the costs involved in new printer development. Greg didn't have the staffing to carry out this work but he had remembered my modeling work from the Eagle days. Would I be interested in doing this work? Would I? You bet. In a New York minute. When he found out a university partner could do a job like this at a fraction of what it would cost HP to do it internally, that sealed the deal. He was originally

thinking in terms of a relatively short term project, but as it would turn out the model would meet their needs so well that our research partnership ended up lasting for ten years. Greg and I still bump into each other every once in awhile, and when we do he always teases me about how long-term the relationship coming out of this phone call ended up. "I should have known that once you let a camel get its nose in the tent," he said to me one time, "pretty soon you've got the whole blasted camel inside." Our research partnership went so well that a few years later HP honored me by officially designating me as an "HP Master Researcher." At the time, I am told, I was one of only six university professors world wide to be honored with this designation by HP. That is something I will always be pretty proud of.

Gary Bartles was the first in a line of half a dozen graduate students to benefit from this contract. Gary had graduated the year before with his bachelor's degree in electrical engineering from the Boise program. He was the kind of non-traditional student I call a 'second-timer.' He lived with his wife and children in the little town of Parma near the Idaho-Oregon border. As a kid fresh out of high school, he had attended the UI in Moscow, officially majoring in business but factually majoring in beer and girls. After flunking out he had gone to work in a bank and a few years later, after the Engineering in Boise Program started, he had taken advantage of the opportunity it presented and went back to school. This time he had the maturity and judgment needed to succeed and he was an excellent student. During his last undergraduate year he had decided he wanted to continue on and study at the Master's level.

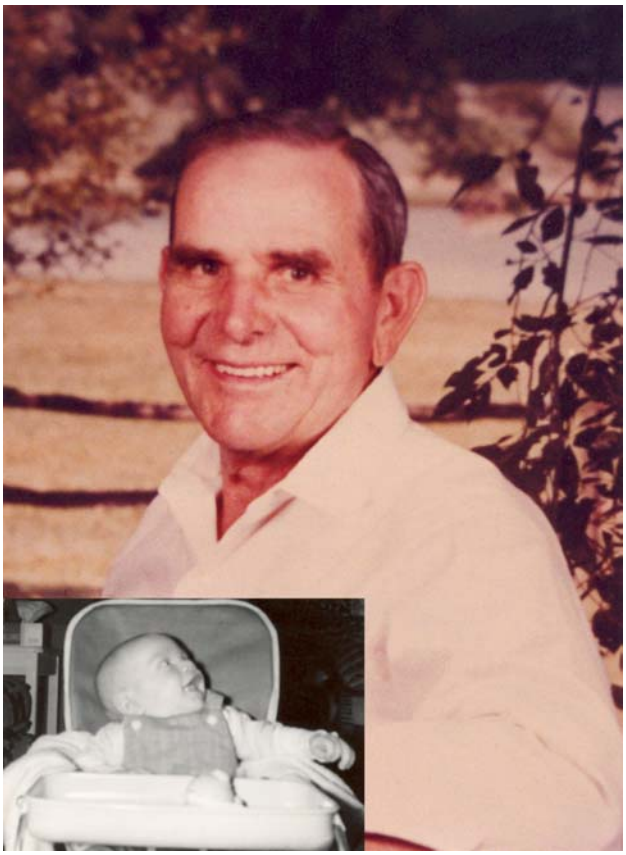
What most young kids fresh out of high school aren't too aware of is that your college record follows you forever. Gary's grades in the engineering program were good enough to get into all but the most exclusive graduate schools in the country, but these were weighed down by the abysmal grades he had earned his first time in college. As a result, his lifetime grade point average (GPA) fell below the minimum required by the UI for admission to graduate school. But there wasn't any doubt he had the mind and the dedication to succeed at the graduate level, so I went to bat for him and petitioned the UI to admit him despite his GPA. The University granted this and Gary succeeded marvelously, as I knew he would. He carried out excellent research, wrote his thesis, and successfully defended it in the fall of '96. The only thing he didn't do was turn in final copies of his thesis to the Graduate College. Gary told me all his papers, notebooks, etc. for his thesis had gotten lost somehow in moving and that was why he never turned in his final thesis draft. He is the kind of person who doesn't really care about having a diploma to hang on the wall; he wanted the knowledge needed to have a successful career. Having gotten that, actually getting his degree officially didn't matter to him, and so he is today what is known in academia as an 'ABT' – all but thesis. He works for HP now and I'm told they think he is an excellent R&D engineer. But I sure wish he'd taken that last trivial step needed to actually graduate. It's the sort of thing that makes a professor roll his eyes and shake his head. I'm sure parents know of a similar feeling.

The second new contract that year was also mainly a matter of networking. I knew a guy who was at that time a vice president with Maxtor Corporation, a leading disk drive manufacturer located in Longmont, Colorado. Kevin and I knew each other from the early days at DMD when he had been in the marketing department. As it happened, I also knew Kevin's wife, who was then an engineer at one of HP's Colorado divisions, from when she worked in the R&D lab at DMD. To add to this, Kevin's wife is also Bob's sister and that family relationship was what had brought them back to Boise for a family visit. Kevin got in touch with me while they were back, just to chat, and I told him about some of the research I was doing – for the electronic brain project – that happened to also be applicable to disk drives. He got interested in what I was doing and set up a meeting in Longmont with some of their R&D people. They also thought the idea was interesting and gave me a research contract to apply it to what they were doing.

The RA for this project was a bright young engineer named Steve McCarthy. Steve was a recent graduate from Gonzaga University, a private Catholic university in Spokane, Washington and he had moved to Boise to go to work for Micron Technology. I met him when he volunteered to teach some of the laboratory courses attached to the electronics courses I was teaching. It turned out Steve's job with Micron wasn't exactly what he'd had in mind and he became very interested in the topics I was then teaching in my courses on communication theory. He decided he wanted to get his Master's degree in this

area and I was able to hire him away from Micron because of the Maxtor contract. This was despite the fact that his salary at Micron was over three times what an RA stipend pays. This project also turned out extremely well and Steve presented one of our papers on it at a major conference in Seattle, where he became known to several of the 'big names' in the magnetic recording field. I like to send my students to conferences and have them present our papers for two reasons. First, I don't like business travel all that much; my years at HP had cured me of that liking. Second, these young people need the exposure far more than I do. When Steve graduated he got several job offers from companies that knew him from this conference and he finally elected to go to work for Maxtor in Longmont, where he was very successful.

You've probably noticed that these contracts, and the neural network grant, too, came about because I knew people who were in the right place at the right time. This has come to be called 'networking' these days. It's the kind of thing that young people – who haven't had the chance to meet and know very many people yet – tend to think is kind of unfair. You've heard the saying: *It's not what you know, it's who you know.* Generally this is said by people who don't know anybody. Older people, like me, have a different view of it. Even in federally funded contracts, winning a contract depends a lot on the reputation of the researcher. I don't see that it makes much difference how a researcher gets a reputation, and the older I get the more I like 'networking.' The fact is, it's *both* what you know and who you know – or, at least, who knows you. It turns out the sheer beauty and brilliance of your idea often isn't enough all by itself to get your idea funded, especially when funding agencies have tight budgets. □



Dad.

1995 brought from Iowa the news I had been long dreading and long expecting. Late at night in a hospital bed in the Jackson County Hospital, William E. Wells, Sr., passed away after a long illness. My dad was dead. Mom was with him when he died.

A son expects to bury his father. I had a long time and too much practice in preparing for this day. How many deaths had I seen by now over the long march of years? How many close relatives, brothers, friends, and colleagues? Two dozen? No. More than this. Three dozen? Almost. Death and I knew each other well by now and I knew how to stand in its face unflinching. Even this time. Back in Iowa there were people to comfort and words of condolence to listen to from others who I barely knew or knew not at all. I think only Mom knew how I felt inside. Again and again she came over to me and asked me quietly, "Are you all right?" I would nod and smile a little for reassurance and put my arm around her each time.

At the funeral home the visitors came in a steady stream all day. Fifty. A hundred. A hundred and fifty. Then more still. A hundred faces I had never seen before, to whom Dad had been no stranger but a living part of their world for decades, dating back for many of them years before I had been born. Uncle Wayne came, looking very lonely. He was the patriarch of our family, now the last of the brothers.

We buried Dad in the little country cemetery near Fulton where my family from Mom's side are laid to rest. The day was chilly and rainy, the grass soaked and slick, and the wind rustled the canopy placed over the gravesite. Mom and my sisters wept briefly during the service and then they played taps and the

honor guard fired the rifle salute due every one of the American heroes who fought for our country against the enemies of liberty and justice after Pearl Harbor. They folded the American flag that draped Dad's coffin and gave it to Mom. She in turn passed its safe keeping to Bill. I would have liked that honor for myself, but Bill is the eldest son and it was his right, not mine, to receive the flag from our mother.

Bill and I spent much of the next day walking and talking with each other, little Marnie with us for a good part of that time. My brother had many more stories about Dad to share with me than I had to share with him. When he was Daddy he was my hero and the biggest man in the world. Then for a score and more years while I was estranged from him, he was never estranged from me. Then finally after a long healing we became father and son and son and father again.

When in later years they opened the World War II Memorial, I watched the ceremonies on television. I wanted to be my father's eyes as our country finally said thank you to the veterans of World War II. And I wished with melancholy the Memorial would have been built many years sooner. I would have taken Dad to see it, and I think he would have liked that very much. □

The Engineering in Boise Program further expanded in the '94-95 school year by adding three more faculty in mechanical engineering plus one in civil engineering and, of course, Axel. It was when these new professors arrived that we began to really see the first clear signs of a developing problem with our so-called partners in Boise State. BSU flatly refused to allow us any additional office space for the new people even though the entire third floor of the Technology Building was vacant. BSU officials claimed they were moving some of their own people – from a discipline having nothing to do with either engineering or technology – into that space. As it happened, this plan of theirs materialized like magic only after Jake Baker wrote an angry letter to Governor Batt protesting BSU's lack of cooperation in this cooperative program. Jake showed me a copy of the letter he had written. It blazed with a young man's zeal and a Marine's diplomacy. After I read it I told him, "I wouldn't send this if I were you." He just grinned at me. "Too late," he said. He'd already sent it. Jake's letter brought an unfriendly visit from SBOE member Tom Dillon, one of the new Governor's appointees to the State Board, and Jake came pretty close to getting into some pretty deep trouble over it. In the end, the UI had to build a large trailer complex next to the building to house our new people.

Under Idaho's Democratic governors the people appointed to the SBOE had been largely apolitical so far as their administration of the state's system of education was concerned. They tended to focus on higher education, leaving the day to day details of the K-12 public schools to the elected State Superintendent of Public Instruction, who was an *ex officio* member of the SBOE. Idaho's population is fairly small and the SBOE had always been pretty conscientious about making Idaho's limited tax dollars for education stretch as far as possible. One way they did this was to assign to each of the state's public universities largely non-overlapping 'roles and missions.' Under this very sound system, responsibility for engineering education fell to the University of Idaho, and that was the main reason the Boise program had been set up the way it was. Engineering education had begun in Idaho when the UI was first founded, and in fact this mission was written into the state's constitution, albeit in pretty vague terms. The "UI clause" is Article IX, section 10:

> The location of the University of Idaho, as established by existing laws, is hereby confirmed. All the rights, immunities, franchises, and endowments, heretofore granted thereto by the territory of Idaho are hereby perpetuated unto the said university. The regents shall have the general supervision of the university, and the control and direction of funds of, and appropriations to, the university, under such regulations as may be prescribed by law. No university lands shall be sold for less than ten dollars per acre, and in subdivisions not to exceed one hundred and sixty acres, to any one person, company, or corporation.

It probably seems a little strange that something like this should be written into a state's constitution, but to understand this one has to know a little about the history of Idaho. You see, Idaho is more like three different states: heavily Mormon east Idaho, southwest Idaho, and north Idaho. The three regions have never gotten along very well. In the territory days, southwest Idaho was largely mining country and the

Republican politicians in that region were then very anti-Mormon. In order to make sure the Mormon population in east Idaho would constitute a political minority after statehood, the southerners wanted to persuade the people up in what would become Idaho's panhandle to join themselves to their proposed Idaho territory. Their problem was the northerners weren't inclined to be part of Idaho at all. About half the northern population favored becoming part of Washington state, the other half wanted to join Montana. The southern politicians offered a deal: Join with them as part of the Idaho territory and the state capital would be placed in Lewiston, which is thirty miles south of present day Moscow and the UI.

After this deal was made, a session of the Idaho territorial legislature, meeting in the brand new capital of Lewiston, then voted to move the capital to Boise. Then as now, the main population center was in southwest Idaho and the representatives from this region had the votes needed. Well, that sparked a very angry reaction from the northerners, leading to the Lewiston militia surrounding the capital building and refusing to allow any government records or anything else to be taken out of Lewiston. At the same time, a lawsuit was filed seeking to overturn the legislature's vote. Idaho's territorial governor conveniently disappeared on a nine month 'duck hunting trip' into the wilds of Oregon in order to avoid being served with the injunction against moving the capital.

In response, federal troops were dispatched from Fort Boise to Lewiston, where they forced the local militia to stand aside. The capital was moved at gunpoint down to Boise in Ada county. At this point, north Idaho tried to break away from Idaho and take the panhandle into either Washington or Montana. The agreement to locate the state's land grant university in what became Moscow was a peace offering made as part of the effort to keep the panhandle from breaking away.

North Idaho has never forgiven "Adaho" for this betrayal of the original deal. I have always wondered if that might not have a lot to do with the fact that the dividing line between the Pacific and Mountain time zones takes an abrupt eastward jog just north of the small town of Riggins, which is where the unofficial 'border' between north and south Idaho lies. The north Idaho politicians did not trust the southerners to keep their word on the university deal after statehood and so they forced this deal to be written into the state's constitution, and that's why it's in there. Going even further, the representatives from north Idaho to the U.S. Congress also sought to make the university agreement even more ironclad, and that's the reason why Latah County, where the UI is located, is the only state county in the United States to have been created by a special act of Congress and Moscow is the only city in America that was made a county seat by act of Congress. Idaho has from its beginning been, politically, a colorful state.

So this is the backdrop behind the 'role and mission' for the UI set up by the SBOE. However, there is nothing in all this that legally forbids establishing engineering colleges at the other state universities, and BSU wanted one of its own very badly. In this desire they had the backing of some very wealthy Boise area businessmen, including some who were large shareholders in Micron Technology and had a lot of political clout. The November elections of 1994 gave them their chance.

Everyone knows the '94 election turned both houses of Congress over to the ultra-right-wing of the Republican Party. In Idaho a right-wing and fairly goofy extremist named Anne Fox was elected as the Superintendent of Public Instruction. After taking office, Dr. Fox actually told me to my face that the lobby for a BSU college of engineering had contributed to her campaign and so she was going to vote to end our program and set up BSU with its own college. I was more than a little stunned to hear such a frank admission of bribe taking from an elected official. *Only in Idaho,* I thought. Cecil Andrus, Idaho's governor in the years prior to the '94 elections, had previously appointed Joe Parkinson, Micron's founder and CEO, to the SBOE and everyone knew he was also supporting the move to get rid of us and form a new engineering college for BSU. Later BSU's engineering college would come to be called "Micron Tech" by many of us. But up to that point, our enemies on the SBOE were still in the minority and the President and the Provost of BSU were still at least paying lip service to support for the program.

But the election also brought us a Republican governor, Phil Batt. Some of the SBOE members' terms were up and rumors were circulating widely that Governor Batt had a litmus test for his new board

appointees: Support for a BSU college of engineering. The Governor denied those rumors, but I wasn't too convinced. Governor Batt is a good man and he has a long record of reasonably moderate-leaning public service to Idaho, but he had never been particularly known for paying much attention to higher education. Whether there was really a litmus test or not, he did in fact choose people who publicly supported BSU when he made his board appointments after taking office. Adding to all the fun, Micron Technology announced they would give a gift of five million dollars to the engineering program in Boise, but only if this program were given to BSU. From that moment on, the President and the Provost of BSU stopped pretending they didn't want us out. Both of them told me to my face they were going to get rid of the UI presence on their campus, and both of them did it with 'and-you-can't-do-anything-to-stop-us' smiles on their faces. I thought to myself, *Well, a guy doesn't very often see greed and corruption as openly flaunted as this.* Only in Idaho. Things weren't looking too good for us.

In the spring semester Mr. Parkinson brought a motion before the SBOE to do away with our program and give BSU what it wanted. Things might have gone very badly for us at that meeting, but I think the shadowy money men pulling the strings must have made a mistake. Just prior to that meeting, Boise was rocked by the news that Mr. Parkinson was being ousted as president and CEO of Micron. He would soon be leaving the state. I figured that had to be the work of Micron's board of directors, the most active member of which was multi-millionaire Allen Noble, the second richest man in Idaho after J.R. Simplot. What led to this sudden change of top management at Micron was and is a total mystery to me.

Whatever was behind it, this turned out to be a setback for BSU's political allies. I went to that meeting of the SBOE to observe first hand what they were going to do to us, and it just happened that I rode the elevator up to the meeting with Mr. Parkinson. Mr. Parkinson, who is a lawyer, was relaxed and smiling and looking in altogether too cheerful a mood for someone who had just had the company he had founded taken away from him. *What the heck is going on here?* I wondered.

I soon found out. The second Mr. Parkinson took his seat at the board table, the relaxed, smiling, cheerful man disappeared and a scowling, strident, rabid nut-case appeared. I had to admire the way the man could change his outward appearance like that in the blink of an eye. He introduced his motion and went on a rant against the University of Idaho, including a David Letterman-like routine of 'the top ten reasons we hate the University of Idaho.' His antics infuriated the other Board members and the entire audience watching the proceedings. Except for me. Now the elevator ride was making sense. Some of the audience started shouting at the Board, and I had to physically hold Bob, who was sitting next to me, in his seat. Bob's face was stop sign red and I've never seen him so agitated, before or since. Governor Batt was in attendance, sitting in the first row, and he kept shaking his head and putting his hand on his forehead. Not too surprisingly, the Board rejected Mr. Parkinson's motion. After the meeting, he left the building wearing a big cat-ate-the-canary grin. He had just pulled off a big *screw you* on the men who had ousted him. At least, that's the way I see it. I am convinced he deliberately torpedoed the BSU attempt to get rid of us. And nobody in that room except me saw what he was really doing. □

We saw an awful lot of our Dean of Engineering down in Boise that year as the political pressure to get rid of us mounted. Dean Jacobsen was a big man, known to one and all as Big Jake. His frequent presence among us down in Boise led quite naturally to Jake Baker becoming known as Little Jake. I liked Big Jake, but I'm not entirely sure he was the finest diplomat UI President Elizabeth Zinser could have chosen to work on our behalf with Boise's crop of politicians. Basically, Big Jake is a blunt-talking man who pretty much says what he thinks. Probably his most famous remark during this period came when one of the legislators asked him what his job was. "Prostitute," Big Jake replied.

I'm not too sure President Zinser helped our cause a lot either. Liz always struck me as a thin, nervous person and she definitely had a pronounced tendency to try to micromanage things. The more the political pressure mounted, the more she micromanaged. I know she was pretty much driving Big Jake crazy with constant phone calls, instructions, and so forth. Liz had an uncanny ability to annoy people, including governors, legislators, State Board members, and the wealthy 'local businessmen' who seemed to exert a

lot of influence on Idaho politicians and BSU presidents. I wasn't too surprised when she abruptly "stepped down" as UI President in '95, to be replaced in the '95-96 school year by an interim President and, later, by a new guy named Bob Hoover.

We had a few other changes in administration come in during that second year. Up in Moscow, Joe Feeley's term as department chair had expired and we had hired a new guy, David Egolf, to come in and take the helm in the EE department. In relatively short order, David and Big Jake developed the kind of warm and cozy relationship with each other reserved for such famous pairs as Chairman Mao and Chiang Kai-shek or Winston Churchill and Joseph Stalin. This tended to make life interesting for us; interesting, that is, in the sense of the old Chinese curse, 'May you live in interesting times.' Topping it all off, Bob was going through a rather messy divorce at this time. He understandably developed a pretty good case of the blues and Big Jake allowed him to take an educational leave. Bob went off to Colorado to work on getting his doctorate and we got a new program administrator, Larry Stauffer. I can't say I was too fond of all this turbulence, but it beat having weekly telephone conferences with John from EMC. I concentrated on my students and tried to ignore as much of the rest of this stuff as possible. □

Near the end of spring semester, David Egolf called me on the phone. Would I be interested in representing the department at a workshop on engineering education in Sweden? The workshop was scheduled to take place just after the end of the school year so it wouldn't interfere with my teaching, and since I'd never been to Sweden I was happy to do it. The workshop was being held at Växjö University in the city of Växjö in southern Sweden. I learned that the University of Idaho and Växjö University had a formal agreement for a Study Abroad program whereby undergraduates from the two universities could go to each other's schools and take courses that would count toward their degrees. This was why we had been invited to participate in the workshop. It turned out I was the only American who went.

So it was that in mid-May I took a flight to Copenhagen and from there boarded a little puddle hopper for the jaunt over to Sweden. Back home it was already summer but a light snow was falling when I arrived at the airport in Växjö. Ever since I'd had to give up skiing I haven't had much use for snow and after living in the heat of the Idaho desert the weather in Sweden felt pretty chilly. Basically Sweden is too close to the north pole for me, but it only snowed on the day I arrived and after that we had the kind of lovely weather that is called spring-like back in the States. It was already a bit late in the day when my flight touched down so I took a taxi to the hotel and made myself get some sleep when night came to the city despite the jet lag that had my body telling me it was still the middle of the day. This turned out to be easier to do than I'd expected because the bed was very comfortable and came with nice, thick quilt blankets that kept me warm and comfortable against the chilly night air.

The next morning my Swedish host, a superb gentleman named Thör who was the chair of their EE department, met me at the hotel and took me over to the university. I was a little worried about jet lag causing me to nod off during our meetings but my hosts had just the remedy for that: good Swedish coffee. Thör did warn me that their coffee wasn't American coffee – and I thought I detected just the merest hint of contempt for American coffee on the part of my new Swedish friends – but I loaded it up with cream and sugar and discovered they were right. Their coffee had a very different taste from American brands, almost a mild chocolate-like flavor, and it was just excellent. It was pretty strong stuff, the kind of coffee that nails your eyelids open, and jet lag was never once an issue all that week.

The workshop had attendees from all over Europe, especially from the Netherlands, Germany, and Poland. Notable by their absence were the French. There was one Brit there and he and I were the only native English speakers. That wasn't a problem, though, because the workshop was entirely in English and all the folks attending spoke English very well. The Polish guy was a little hard to understand at times, but his English was infinitely better than my Polish, which is non-existent. I found out that all the Swedes except their senior citizens spoke English very fluently, after allowing for that famous Swedish accent that gives their words such a charming musical lilt.

I like to pronounce things correctly, so I tried pretty hard to learn the correct way to pronounce the

Swedish names and places. I think this sort of amused my Swedish hosts. But they were tolerant of my American accent and gently encouraging. Thör told me at one point, with a little smile on his face, that if I were to spend a month in Sweden I'd soon be able to speak Swedish like a German. The others chuckled when he said that. I sort of got the impression that week that the Germans were the butt of a lot of jokes among the other Europeans. Especially among the Dutch.

One thing I learned that week was that all the different countries represented at that workshop had slightly different educational systems from one another, and all were very different from the American system. In most of them the students take only a couple of different classes at any one time but take them five days a week, as compared to the American system where most classes are only three days a week. A lot of their classes don't run for a full semester; instead they'll concentrate on two classes for half the semester and then concentrate on two (usually) different classes the second half of the semester. In the American system a student typically takes five classes at one time over the entire semester. Most of the Europeans were amazed that our system worked. They referred to it as a system of 'parallel' classes and marveled that our students could learn all those different subjects all at once.

Another big difference between the European systems and ours was exams. The Europeans have a system in which their students take all their examinations at the end of the year. In our system, of course, we have frequent examinations spaced throughout the semester with final exams at the end of each semester. Basically our system forces the students to keep up as we go, whereas the European systems tend to take the view that how fast a student learns the material is less important than how well he or she knows it at the end. Its sort of the difference between an assembly line education mindset vs. education as a work of craftsmanship. Personally, I think the American system is more effective but my European friends didn't like it very much at all. I am of the opinion that our system of frequent, periodic exams is probably the reason our 'parallel' system of classes works even if, figuratively speaking, it chains our students to an oar bench in comparison to their European peers.

Another thing the Europeans do differently is place much more emphasis on laboratory courses than we do. We have labs in our engineering curricula, of course, but these tend to be regarded as a supplement to the lecture courses. In contrast, my Swedish friends put a tremendous amount of time and effort into what they call 'practical' courses, 'practical' being what they call their lab courses. I toured the student laboratories at Växjö and was very, very impressed. There is a lot we could learn from them when it comes to laboratory courses I think. Their lab equipment was very modern, very up to date, in contrast to a lot of the equipment one typically finds in undergraduate laboratories in the States. I am under the impression that the Europeans invest quite a bit more heavily in education than we do. I think in the long run this is going to pay off handsomely for them; it is already the case that most of the best innovations in communication systems – cellular telephony for instance – are already coming out of European countries, especially Scandinavia. I came away from that workshop with the uncomfortable feeling that we are too complacent about our technological prowess in the States. America is disinvesting in higher education while the Europeans are doing the opposite. It should give us all something to think about.

While we were there our hosts gave of a tour of Växjö and the surrounding area. Växjö is located in the heart of what is known as The Kingdom of Crystal. It is famous for its many glass blowing factories, most of which have been in operation for three hundred or more years. Some of those factories have been standing since before the Pilgrims landed at Plymouth Rock and are still doing a brisk business today. The sight of modern process control charts – now a staple in factories throughout the States – hanging on those ancient walls seemed incongruous to me. I was treated to an exhibition of glass blowing at one of the works and saw a beautiful crystal goblet take form from pure molten glass. Before leaving for home I picked up several crystal goblets, plates, and statuettes which I later gave as Christmas presents to the folks back home.

Glass and crystal are to Växjö what automobiles are to Detroit. One of the interesting places I visited was the Glass Research Institute. This wasn't part of the university proper. It was a research institute

devoted to the study of anything that has to do with glass. They had a very big list of clients, each of whom paid something like a fifty thousand dollars per year retainer fee to the Institute. In return, the Institute would research anything they wanted so long as it had something to do with glass. The day I visited they had just finished researching what kind of dishwashing soap did the best job of cleaning glass. It wasn't an American brand.

The country around Växjö is beautiful almost beyond description. One of my new friends took me on a canoeing trip one fine afternoon on Lake Helgasjön. We must have paddled every inch of that very big lake, including paddling right up to Kronoberg Castle, a fifteenth century ruined fortress on the lakeshore originally built by the Bishop of Växjö. My friend gave me a rundown on some of the history that had taken place there, especially from the days when the Danes and the Swedes warred over that territory. If you ever visit Sweden, here's a bit of useful advice: Never get into a canoe race with anyone whose ancestors were Vikings. I was mighty stiff and sore the next day.

The young students of Växjö were a pure delight. Young people are pretty much the same all over the world, and the Växjö students were eager, polite, curious, a bit naive, and just darling. I liked them very, very much. I was the first American many of them had ever met, and so I was something of an object of curiosity for them. Some were shy, some were bold, all were charming. Immanuel Kant, the great German philosopher, said old people have the qualities of the sublime but the young are beautiful, and I think there is much truth in this. □

All through the summer and into the fall of '95 the political attacks on us continued without letup. The *Idaho Statesman,* Boise's main newspaper, started taking an active part in it. They seemed willing and eager to print anything and everything our opponents had to say about us, but not too interested in anything we might have to say. It was an outright smear campaign and the *Statesman* happily reported all kinds of false accusations leveled against the program without bothering to find out if they were true or not. The professors on BSU's faculty began to take part in the attacks; one of them told me the BSU administration had promised them raises if BSU was allowed to set up its own engineering college. The storyline that developed out of that was that it was somehow the UI's fault that BSU didn't pay its faculty very much. I don't know how anybody could buy that malarkey, but people did. Another story said that we had only one student laboratory in our program. That was a lie, too. A gaggle of Boise construction contractors complained we weren't teaching anything about computers or microchips. This bunch of jerks wouldn't have known a computer from a typewriter, but in any case that was also a lie.

The biggest and most effective swindle was pulled off by Micron Technology. Micron announced it had plans to build a gigantic, new, modern fabrication facility that would employ thousands of people. They were going to have what basically amounted to a nationwide competition to see what city would be selected for this new site, and they hinted that over time this new site would gradually become the center for their corporation. One criterion: the location had to have a good local engineering program. If Boise expected to be in the running, they'd have to address this 'problem.' The fact that Boise already *had* a good engineering program – we were right then winning stand-alone accreditation for the EE program from ABET, the national organization that accredits engineering and technology programs – was something the *Statesman* managed to miss in their reporting. But this was all a smoke screen anyway. They didn't really mean *Boise* had to have a good engineering program; they meant *BSU* had to have their own engineering program. This campaign seems to have had the desired effect on public opinion and on the politicians, who were desperate not to 'lose' Micron to another city. But it was all a hoax. I knew a guy out at Micron who showed me a report – I think it was put together by a local Boise company named CH2M Hill, although I don't remember this for certain – that said the Treasure Valley, where Boise is located, simply didn't have enough water to serve the gigantic integrated circuit fabrication facility Micron was planning. There was never the slightest chance that plant was going to be built in Boise. MIT could have opened a campus in Boise and it wouldn't have made the slightest difference. Somehow that report never made it into the *Statesman* either. But when Micron announced the 'winning' site – and it wasn't Boise – *that* fact made it into the paper, along with a read-between-the-lines accusation all this was

our fault.

The SBOE, now packed with Governor Batt's appointees, was busy too. They hired an outside consulting firm to come in and assess the Engineering in Boise Program for them and make recommendations. The consultant came in, went over us pretty thoroughly, and reported back to the Board that they had a pretty good program going here. That must not have been what the Board – who are also, by law, the Regents of the University of Idaho – wanted to hear because they brought in a second consultant. I guess they must have given this guy a little better briefing because his report said the Board should set up a new engineering college at BSU. That was the report that made the paper.

Another little item that happened during all this came at an SBOE meeting. One of our strongest factual arguments in favor of the program was that we had received extremely high marks from the ABET team that had come to evaluate our standing for accreditation. The official report and the granting of the accreditation wouldn't come until the summer of '96, but there was no doubt at all we were going to be accredited. The BSU administrators told the Board that if a BSU engineering college was established, the ABET accreditation would transfer to their program. That simply wasn't true. Either these guys were really and truly ignorant of how college accreditation works in the United States or else they were just telling the Board an outright lie. There isn't any third possibility. Big Jake then pointed out that ABET accreditation doesn't 'transfer' and a BSU program would have to start all over again from scratch. At that point, one of the new Board members asked who ABET's "competitors" were. I guess he must have thought college accreditation was a free-market enterprise in the United States and if ABET was a problem they could just do business with somebody else. I never heard a member of a board of education ever ask a dumber question. But Batt's appointees weren't exactly the brightest bulbs in the chandelier.

In the face of this malicious and despicable smear campaign our fate was a foregone conclusion. Nobody ended up being all that surprised when the Board voted that fall to end the cooperative program – which by then wasn't very cooperative anymore – and give BSU what it wanted: it's own college. To do so, they had to repeal the 'roles and missions' statement that had governed the administration of higher education in Idaho for decades. Their new 'roles and missions' were defined along regional lines. The UI would take care of north Idaho, BSU would take care of southwest Idaho, and Idaho State University would take care of east Idaho. To do so, the universities could set up duplicate programs to their hearts' delight. The fact that this would end up costing more money – tax dollars, to be precise – didn't seem to be a concern to them. But somehow the legislature managed not to go along with any ideas about raising taxes. If a university wanted to set up a new program, they'd have to pay for it by taking money away from one or more of their other programs.

The most childishly naive presupposition made by the BSU administrators was that we, the UI faculty, would be more than happy to simply become BSU faculty members. After all, wouldn't hanging on to a job be the most important thing to us? Charles Ruch – BSU's president, who we had taken to calling Fat Charley, which was a more polite epithet than we had for BSU's provost – called a faculty meeting after the decision that we were 'invited' to attend. The future was bright, we could all put the past behind us, yak, yak, yak. One thing he said really stuck in my mind. He said that BSU was really "a hundred million dollar a year entertainment business." That was the only thing he said I agreed with.

I had a mole on the BSU faculty from who I'd learn what they had been saying in their faculty meetings (at which *we* were never welcome). The prevailing view they had was there would be no problem and no objection on our part to simply staying on after BSU took over in the fall of '96. Somehow they managed to convince themselves that all the despicable attacks on 'the University of Idaho' were somehow or other not attacks on us personally and we wouldn't take it personally. That was one big cultural difference between Boise State and the University of Idaho. BSU is run by the administrators and the faculty just do what they're told. The academic programs in the UI are run by the faculty. It's called 'faculty governance.' The difference this makes is this: if you say the program is crap, you're saying the faculty is crap. Well, each and every one of us *did* take this campaign of lies and slander

very, very personally and we were furious. Our enemies had proven themselves to be men without honor, without ethics, and without honesty. Not one of us would stay on at BSU. We would have nothing more to do with these greedy and craven dastards. They were morally unfit to teach young people.

All our futures were very uncertain at that point except for Jim Peterson. Jim was already a tenured professor at the UI and his continued employment with the university was guaranteed. He could simply return to Moscow. That wasn't the case with the rest of us. I didn't know what I'd be doing except that whatever it was wasn't going to be at BSU. That was my one certainty in the midst of all this. We had been hearing rumors that the interim President up in Moscow, Tom Bell, was all for just cutting us loose. So long and good luck. I know for a fact the EE department in Moscow wasn't united in the idea about bringing any of us, let alone all of us, up to Moscow. For that matter, I wasn't so sure I *wanted* to move to Moscow. Boise was my home.

The one bright spot, at least for me, during this period was Bob Hoover. Bob was going to be the next President of the UI, and he came down and paid us a visit. Bob was a thoroughly likeable guy and would prove to be a very popular university president with the Board, the Governor, and the legislature. While he was meeting with us, he put his feet up on the table at one point and I noticed there was a hole in the bottom of his shoe. Right then I thought to myself, *this guy and I could be drinking buddies*. He was just that likeable. He didn't make any promises, but I came away from the meeting with a very strong feeling the University was going to do everything it could to keep us on the faculty. It was a good feeling.

But that meant I needed to start thinking very seriously about what my answer would be if they offered me a position on the Moscow campus. Would I go or not? In favor of going was the fact that I loved my job, loved working with the students, and what I was doing was in fulfillment of my Promise. On the other side of the question was what it meant to leave Boise. At the start of '96 Boise had been my home for seventeen years. I had roots here. I had friends here. I had a brother here. I didn't want to give all that up. But I knew I wouldn't go back to work for HP either. Those days were over for me. That I would have to find another job was certain; my personal finances were in pretty fair shape, but not nearly in good enough shape to let me simply 'retire' at the ripe old age of forty-two. So it looked like no matter what I did, the odds were very stacked against my being able to do it in Boise. So what would I do? I thought about something Emerson had written: *For everything you have missed, you have gained something else; and for everything you gain, you lose something.* Life is a series of tradeoffs. I'd been around long enough by now to know that was true, and I'd been around long enough to know there was a great deal of truth in what Emerson had said. I decided that whatever was to come, I'd just trust God and my faith it would work out for the best. If they offered me a job in Moscow, I'd take it.

One thing I will say: they didn't leave us hanging in the breeze very long. Just as the spring semester was about to begin, Big Jake called me into Larry's office (Bob's former office) and handed me a sealed envelope. In it, he said, was an offer to become a faculty member on the main campus in Moscow. I could have some time to think it over.

I trusted Big Jake and I didn't even open the envelope to look inside. Instead I stuck my hand out and simply said, "I accept." We shook on it. They found positions for each and every one of us. □

The UI stood by our students as well. Our previous graduating classes, including the class of '96, received accredited degrees because they were part of the accredited UI program in electrical or computer engineering. That year's juniors, on the other hand, now found themselves without an accredited program in Boise from which they could graduate. With just one more year to go to complete their education, the rug had been yanked out from under them. Even if BSU was able to put together something that resembled an EE program in time for the next school year, it would have been an unaccredited program and their degrees would be worthless. Accreditation requires the university's program demonstrate its competency over a multi-year period before the first accredited degrees can be issued. Our students, you will remember, were place bound students, financially rooted down in Boise. That was why they were attending the Engineering in Boise Program rather than going to school in Moscow.

The UI's administration really stepped up here. They dug up the money from somewhere and provided all our juniors with financial aid assistance that made it possible for them to take their final year in Moscow and graduate with a diploma from an accredited program. Every single one of our students took advantage of this, and they all graduated in the spring of '97. From the Moscow campus. With accredited degrees.

BSU hadn't given a damn about these students. Not the administrators. Not the BSU faculty. Neither had the SBOE. Or Governor Batt. Or Micron. Or *The Idaho Statesman.* Every single one of them was prepared to throw these helpless students to the wolves for their own selfish gain, and that's exactly what they did. The whole greedy, rotten bunch of them should be ashamed of themselves. But they weren't. And they aren't. The University of Idaho and its faculty and its staff were the only ones to stand by the students throughout this entire disgraceful, shameful, dishonorable affair. We were the only ones who were on their side.

During the smear campaign most people I talked to believed the villain behind the scenes in all this had to be J.R. Simplot. But you know, I don't think so. I wouldn't faint from the shock if some of his business cronies were. In fact, I'd be more likely to faint if somebody proved *none* of them were. But Mr. Simplot himself? I don't think so. He surfaced only once during the entire affair, after the *Statesman* had been running their stories about what an inadequate failure our program was and before the SBOE finally dropped its ax on our necks. And I must say, when he surfaced it was with style.

Mr. Simplot sent a message over to the Idaho Legislature telling them he wanted to talk to them. Our fearless Republican legislators called a joint meeting of the Idaho House and the Idaho Senate to hear what J.R. Simplot had to say. In a way, I suppose it could be said that Mr. Simplot, private citizen, called a joint session of the Idaho Legislature. Hey, only in Idaho.

At that session, he lectured the politicians on the importance of high quality engineering education to the growth of business – especially Micron's business; he was the biggest shareholder in that company. He basically gave them a pretty good tongue lashing. And then he said the words I most treasured. "It doesn't matter whose name is on the door," he said. Later that day I heard some of the BSU people complaining bitterly about that line, and I smiled. Those words are the reason I think J.R. Simplot didn't have a thing to do with our being run out of town covered with tar and feathers. □

The 1990 census placed the population of the city of Moscow at just over eighteen thousand, which was more than ten times smaller than Boise and about three times larger than Maquoketa. It was and is a fairly typical college town and I've never been sure what fraction of this eighteen thousand counted the students who live there. It's a question no one in Moscow seems to be able to answer. One of the first things I learned about my new town was that everything there except auto insurance cost more than the same thing did in Boise. That included houses. I had some trouble finding a house in Moscow that I liked well enough to buy. I finally did find a place almost the same size as the McKinney house in terms of square footage. My general impression was and is that in Moscow people pay more money for less house than they would in Boise. That was certainly the case for the house I bought on Ponderosa Drive in the northeast part of town. I really hated to sell my McKinney house in Boise, so much so that for awhile I tried to figure out if there was any way I could keep that house – sort of keep a foot in Boise as it were – and still buy one in Moscow. In the end, though, I had to admit that was a stupid idea so now someone else lives in the house I had planned to retire in and I live in one that I don't.

The move to Moscow ended up costing me about fifty thousand dollars net after buying the Ponderosa house and selling the McKinney house. I closed on the Ponderosa house in February of 1996 even though I didn't actually move to Moscow until May after the last school year of the Boise program ended. I'd have preferred to stretch the timing of that deal out, but the seller couldn't wait. I found out he was moving to Boise in order to receive better treatment for cancer than was available in north Idaho, and since acceptable houses – acceptable to me, that is – were hard to come by in Moscow, I reluctantly closed the deal earlier than I would have liked. The stock market had been fairly hot in 1995 and it wasn't

a good time to disinvest just in order to buy a house, so I did take out a loan to buy the new place. After the deal for the McKinney house closed in early summer I paid off the mortgage on the Ponderosa house and went back to making money from banks rather than giving money to them. □

With my brother our last summer.

In the midst of all the turmoil of 1996 down in Boise more bad news came out of Iowa. Aunt Sylvie had died. Now of all of Grandma and Grandpa Teters' children, only Mom remained. For some reason I didn't hear about it until it was too late to arrange to go back for the funeral. It was hard for me to accept the idea of a world without Aunt Sylvie in it and that I would see this kind and wonderful lady no more. When I was a little boy I learned so much about God from my Aunt Sylvie and I had learned how to be strong in the face of life's hardships by watching the way she faced adversity and hardships when they made their unwelcome intrusions. My Aunt Sylvie was a saint.

But there was still more awful news to come. I had barely moved into my new house in Moscow when Mom called to tell me. My brother Bill had been having headaches and the doctors had found he had a brain tumor. It was growing in the deep subcortical region of the brain where surgery was impossible. My big brother was going to die.

I was stunned by the news and after hanging up the phone a helpless rage swept through me. I paced back and forth in the basement family room of the house, fist clenched so tightly my fingernails cut into the skin of my palms, and I shouted at God for letting this happen on top of all the terrible things that had already come to pass one after another. This was the deepest challenge to my faith in all the days of my life and here in this strange town, where I myself was a stranger, I had no special place to which I could retreat. I was seized by an almost uncontrollable urge to smash and break everything I could lay my hands on, and I made myself sit down on the couch and I held my shaking fists between my knees until the violence of my feelings passed.

How long I sat there I cannot say because I was a man out of time, alone and ripped by misery. At first I demanded of God to know why this was happening, but even while I was doing this I knew deep inside there is no why. There is never a why. And in that same deep place of the soul I knew God would not answer this question. There is never a why. There is only what was, and what is, and what is to come. It is not the tragedies and the trials he faces that makes the character of a man. It is how he chooses to face them by which a man makes his own character. Slowly, slowly I remembered this and I asked myself, *What kind of man will you be?* and as I did I almost felt as if God had reminded me to ask this of myself.

In *Confessions* Saint Augustine wrote *Narrow is the mansion of my soul; enlarge Thou it, that Thou may enter in. It is ruinous! repair Thou it.* But Augustine was wrong to say this. God does not enlarge us, and God does not repair us. God leaves this for each of us to do for ourselves, and if anything at all is expected of us in life, it is this. And that we each can do this, that each of us is granted the power within to do this, is, I think, the greatest gift God gives us. Whether a man makes of himself a mansion or a hovel or a ruin is his own choice and his alone. What kind of man would I be? I would be a man who would face what life brings and find the strength to stand. I would be a man who could know rage but not strike out in rage. I would be a man for whom the grieves of life could be ruinous, but who would not make of himself a ruin. I would be a man who would not let shadows of evil make him blind to the just and the right and the good. This, I think, is what a man should demand of himself, and this, I think, is what God wishes for each of us to achieve.

I think somewhere deep inside I had felt these things since I was a boy, but before that day and night I had never articulated them for myself. As I did so now, I felt the calming of my spirit and although the sadness did not leave me, the misery slowly did. I learned that night of another special place God had made, and this one I would never need to be away from. It is the special place in my own heart.

I called Bill that night and we talked for a long time. He told me what the doctors had told him. After he had explained what they knew of the tumor, he said in a calm voice devoid of fear or self pity, "Basically, I'm screwed," and I was amazed to hear him even chuckle a little bit. My brother's courage filled me with pride that he was my brother and I was his. Later that summer I flew back to Iowa and went to stay with him for awhile in Cedar Rapids. Mom came with me and I spent as much time with him as I could.

The doctors had given up on his case, but Sherri had not. She learned of a clinic in Texas where they were trying an experimental treatment for cancer, and she took Bill down there. When I got back to Iowa he was taking the drug and his son, my nephew Nick, was taking care of him. Nick was twenty-one and a man, and he looked after both his dad and his sister, my niece Marnie who was then in high school. The medication had caused Bill to become swollen with fluids, and I think this bothered him more than the cancer did. My brother had always been vain about his looks. They said at the clinic that Bill should receive a lot of supervision from his doctor back in CR, but this bastard had refused to be involved in any way in Bill's treatment program. Nick had to shoulder the day to day burden by himself. For a time we had hopes the treatment would work, but the side effects of the medication ate away at Bill's dignity and self respect and one day he just refused to take the drug any more. He died in 1997 and we buried him in Cedar Rapids next to Maryann. I miss my big brother very, very much. □

Ning Choy at work in my laboratory in the MRC Institute. Ning worked as an undergraduate Research Intern (RI) in the electrophotography program for several years and his position was funded by the contract with HP. He became a U.S. citizen during the time he worked for me.

My first order of business after getting to Moscow and getting settled into my new home was to get my research laboratory set up and to rebuild my funded research program. Gary, Steve, and Mark had all finished their degree work, although Gary and Steve had to come to Moscow for their thesis defenses, and the Maxtor contract had been successfully concluded. The HP contract for the electrophotography research was still going, as was the neural networks grant, and I had some re-staffing to do. I had accepted an invitation to set up shop in the UI's Microelectronics Research Center (MRC) rather than to set up inside the EE department itself. This meant that in addition to being administratively 'under' David Egolf, the EE chair, I was also part of Touraj Assefi's research center.

The MRC had been founded in 1983 as a research center for inventing advanced microelectronics chips. HP had used an MRC-designed chip in Eagle but the bulk of MRC's research was under contract to NASA through Jet Propulsion Laboratory. Quite a few MRC chips have been used over the years on various space missions. Not long before I joined the UI, the founder and original director of MRC had taken a new job with the University of New Mexico and this had been a severe blow to the MRC. We had hired Touraj to come in and take over the Center in 1995. Touraj is a pretty interesting guy. Early in his career he had been part of the Viking missions to Mars and later a laboratory director at JPL. His resume also included stints as an executive at Lockheed and Boeing. His years with the space program and with the aerospace industry left him extremely well connected – Touraj is a super-networker – to the point

where I joke that he knows everyone on earth except for three guys in the middle of the Congo.

Like me, he had eventually tired of the Mickey Mouse that goes on in the private sector and, being by that time financially well off, he had also decided to 'go public' by entering the academic setting. Since coming aboard, he has breathed new life into the MRC by broadly expanding its research mission into other arenas and rebuilding its core of associated researchers. Thus, while NASA and JPL continue to be important partners for us, our clientele is now much broader and today, as the MRC Institute, we are the largest research institute at the UI with annual research contracts approaching ten million dollars. In 1996 this rebuilding process was just getting started and Touraj had wanted me and my lab in his organization. We have gotten along very well right from the start when I met him in 1995, and just as the fall '96 semester was getting underway he asked me to assume the post of associate director of the MRC. Since this didn't require me to give up any of my teaching or my own researches, I accepted and I've been his associate director ever since. It's a post I'm comfortable with and I have no aspirations to one day become the Director of the Institute. Nowadays I tell Touraj that he isn't allowed to retire until I do, and I'm not entirely joking about this. I didn't come to Moscow to be an administrator. Besides, I couldn't even begin to fill his shoes. He's the best.

My most urgent first order of business was to staff the electrophotography project since Gary had finished his degree work. Luckily I had just the man for the job, a brilliant young Master's student named Aaron Brennan. Aaron, too, had been part of my laboratory in Boise. He worked for a company down there – I don't offhand remember which one – and had come to me as a 'walk-on' – a graduate student who volunteers to work on research as part of getting his degree without holding an assistantship. I've always figured that if a university head football coach can have walk-on athletes, there's no reason I couldn't have walk-on Research Assistants. In Boise he and I had been working on a new kind of artificial neural network system based on a somewhat exotic type of computer circuit known as a 'content addressable parallel processor' (CAPP for short). The microcomputer chip Mark had designed for his Master's thesis project was based on the work Aaron and I did on the CAPP system.

When they ran us out of Boise, Aaron was still a little over a year away from finishing up his studies. Now I hired him as a paid Research Assistant in the electrophotography program, and he and his young family moved to Moscow so he could work full time on his degree. Aaron was one of the best young scholars I've had the pleasure of working with – smart, curious, eager, and enthusiastic. Adding to the fun of having him around, it turns out that his grandfather was Walter Brennan, the actor, who was always one of my favorites. Every now and again I could get Aaron to tell me a few stories about his granddad.

Aaron and his wife had a young son, a toddler at the time he was in my lab, and even with his RA stipend they were finding it pretty hard to make ends meet after Aaron quit his Boise job. I've rarely met a student of his high caliber and outstanding citizenship, and so I helped them out a little by creating a special private scholarship of one thousand dollars in memory of my dad. I don't give this out very often – a student has to be really, really exceptional both in scholarship and citizenship for me to consider doing this – but Aaron is and he was the first student to whom I awarded this scholarship. When he graduated I tried pretty hard to talk him into continuing on to get his Ph.D. – he's exactly the kind of person America needs very badly in our colleges and universities – but he saw it as his duty to get back into the private sector workforce and support his family. Today he works for a semiconductor company. I still get to see him once in awhile and we have remained good friends. □

The brouhaha down in Boise had seriously disrupted my work on electronic brains, and now that I was in the considerably more peaceful environs of Moscow I wanted to get that project back on track. It still wasn't funded – never has been, in fact – and during the tenure-winning years it necessarily had to take a back seat to funded work. But I wasn't getting any younger and I was determined to push this project forward. Over the many, many years I'd been doing this research I'd figured out how to build a lot of things, but I hadn't hit on anything I was willing to call a 'brain.' The problem wasn't really 'how to build it'; the problem was what to build. If I could figure out what to build, how to build it would be relatively a

lot more simple. That's typically the way it is in engineering. In all those years, the key missing ingredient, as I finally came to accept, was a little thing called 'mind.'

It's pretty much axiomatic in engineering that you can't build something if you don't know what it is, and I had reluctantly come to accept the fact that the key 'what' elements in anything I think could really be called an electronic brain weren't brain concepts. They were issues and questions of philosophy. In particular, they were what the philosophers call 'metaphysical' questions. By this I don't mean the kind of trash you see in a bookstore shelved in the so-called 'new age metaphysics' section. Scientifically, that stuff is pure, useless garbage and it's the sort of thing that gives philosophy a bad name. Like almost all engineers, my training had left me with a very dim view of philosophy in general and metaphysics in particular. But after thirty years of hitting one dead end after another, I finally had to grit my teeth and admit I'd largely been asking the wrong questions. What were the right questions? They were things like *What is 'mind'? What is 'thinking'? What is 'intelligence'?* and *What is 'reasoning'?* At root, these were the sort of questions that, instinctively, had been underlying my amazement that day I first heard Walter Cronkite call computers 'electronic brains.' These are pretty deep-weeds philosophy questions but without answers to these questions my quest for real electronic brains wasn't going to go forward one single inch. The problem with philosophy, as I saw it, was that it had long ago stopped regarding itself as a science and had come to wholly regard itself as a 'humanity' topic. This change in its self image goes back a long way – all the way to the first half of the nineteenth century.

To be of any practical use to me, philosophy would have to answer these questions *as a science would*. What I needed was philosophy-as-a-science and in all the different works of all the different philosophers I'd read over the years, I hadn't seen anything that came up to this mark. Perhaps, I thought to myself, some headway could be made if I could take somebody's philosophical 'theory' and make it mathematically rigorous. As it turned out, this was kind of naive in one way and not so naive in another. But that raised the issue: Whose philosophy? I had a long and illustrious list of philosophers and philosophies I already regarded as inadequate. Basically this list takes in all of them from the beginning of the nineteenth century forward. It also included Aristotle. And Plato. And a lot of other names, too.

But that still left one guy, generally acknowledged by philosophers to be on the 'big three' list of the all time greatest philosophers. Two of the names on this list, Plato and Aristotle, I had already ruled out. But I hadn't checked out the third guy. His name was Immanuel Kant. His most famous work was a book entitled *Critique of Pure Reason,* which sounded like it was at least topically the sort of theory I was looking for. I'd never read that work, but I decided now to give it a whirl. If it, too, turned out to be crap that would just confirm my pragmatic suspicions about philosophy and philosophers in general. If it wasn't crap, then maybe it could help me. Such was my attitude in the summer of 1996.

If I had realized how much work this was going to eventually involve when I started, I probably would have never even started. Fortunately, I was too naive to know what I was getting into. It took a long time for me to get through Kant's *Critique of Pure Reason* the first time I read it, and when I'd gotten through it there was just a whole lot of stuff in it I knew I didn't understand nearly well enough. I did come to appreciate the book's widely used nickname in philosopher circles: Kant's Opaque Masterpiece. Still, it wasn't one hundred percent opaque and from reading it I *felt* deep down in my gut that the old man was on to something here.

When I read numerous commentaries on Kant's work, I soon found out the world of philosophy isn't anywhere close to being united in what philosophers think Kant was saying. One big problem, I discovered, was that the English translations of Kant's works are very badly distorted. Translating from one language to another isn't just a matter of replacing a foreign word with an English word. The translator has to translate the author's thoughts out of his native language into a different language. It helps to understand what the author is saying in order to do this, but since nobody could agree on one understanding of what Kant was saying, how could anyone do this? That was the first serious 'uh-oh' I ran into. I couldn't completely trust the English versions of Kant's works; I was going to have to read

them in the German and the Latin he had written in. I was awfully rusty in both languages after all these years, but there was nothing else for it but to clear the cobwebs out and get to work. If I have one character trait all my friends and relatives would probably agree about, it's that I'm stubborn. No old German geezer who had been dead for almost two centuries was going to beat *me*. Kant was always talking about his 'system' and I'm a trained system theorist. I decided to take him at his word and figure out what that 'system' was. Either I'd find it or he wasn't the genius the world of philosophers said he was.

To make a long story short, it turned out my instincts had been right. It took me ten full years to put together a coherent picture of Kant's system – yes, he did have one – and before I was through I'd had to go through the whole twenty-nine volumes of Kant's collected works (in German and Latin). But what finally came out of all this research work was a model that answered *all* those questions I'd been asking plus a whole lot more of them it hadn't even occurred to me to ask. I had never intended to become a Kant scholar, but it turned out that's what I had to do. Probably the highlight of my career to this point came the day that I published what I had figured out. It had ended up being an incredibly massive tome – twenty four chapters and over twenty-four hundred pages – but it was all there: The architect's blueprint for what it is for any system to be entitled to be called a 'brain' in the sense of what 'electronic brain' meant to me when I heard Walter say it while I was still just a boy. I called my work *The Critical Philosophy and the Phenomenon of Mind,* and I published it as an E-book available free of charge over the Internet to anyone who wants to read it. It just happened to go on line on my birthday in 2006, and ever since then people have been accessing it at an average rate of a few hundred times every month.

By publishing my book in this way, I knew I was in serious violation of accepted academic practices for publishing research findings. In research work the most holy of holy rituals is called 'the peer review process' and my book isn't peer reviewed. The problem though, as I saw it, was "Who's going to peer review this?" It is a brand new science and there is no one I acknowledge as having the competency to really review this work. I'm getting on in years and I just didn't feel like I had the time to spend arguing with 'referees' who acted more like censors than scientists. I still have electronic brains to build. The work is a work of science; its ultimate proving ground is going to be in different scientists' laboratories, not on some journal editor's desk. There are people who are aghast at what they regard as my arrogance in this. To them I ask, "Tell me. Who peer reviewed Isaac Newton's *Principia?"* I don't claim to be in the same league with Newton, but I do claim the right to publish my work just as he did. If there's a mistake hiding in there somewhere, if some part of the theory isn't correct, then eventually someone will discover this *and prove it*. If that happens then it just means I was wrong about something, everybody will know it, and the science will be advanced. But I don't think that's too likely to happen any time soon. The *system* just fits together too neat and tidy. In the meantime, I'm not going to spend the time remaining to me arguing with people over mere matters of opinion. Let science be done. □

It was in the summer of 1996 that I had the interesting experience of being kicked out of the Republican Party. My expulsion came in the form of a letter from the Republican national organization. It started off, *Dear Mr. Wells: Are you still a Republican?* It went on to say that if I was then I would want to send them some money to support the Republican agenda for the fall elections. There followed a list of the Party's agenda items that would be passed after Bill Clinton (they never called him President Clinton) was defeated and a Republican was in the White House again. As I read down the list, I found that every single item on it was something that I not only did not support but actually opposed. That meant I wasn't a Republican anymore. Couldn't mean anything else.

There is an acronym that had been around for quite a while but had really become widely known after the Republican capture of both houses of Congress in the '94 midterm elections. It is RINO, which stands for "Republican in name only." The term had been started by the ideologues on the extreme right of the party who were out to purge the ranks of the party of moderates and its few "social liberals." The letter I received made it perfectly clear the RINO hunters were firmly in control of the national organization, and it made it equally clear that my views exposed me as a RINO. I crumpled up that letter in my fist and

threw it in the garbage can. I've never heard another word from the Republican National Committee.

Did this mean I was a Democrat? I wasn't entirely sure. The years of President Carter's administration and the years of the Vietnam War left me uncertain about this. If the liberals still controlled the party, the way the conservatives controlled the Republicans, I couldn't see myself as a Democrat. President Clinton was proving himself to be a moderate in deeds, although whether this was merely political expediency or not was something I couldn't really tell. Under his administration the federal deficit had been coming down each year, which I thought was a very good sign. Fiscal responsibility on the part of the federal government had always been something very important in my political views. Fiscal irresponsibility was something I firmly associated with the liberals and, prior to President Reagan's administration, something I thought the Republicans opposed. That the deficit had continued to balloon under President Bush even after the end of the cold war had disabused me of the notion I could look to the Republicans for this.

The other highlights of President Clinton's first term were things I viewed as kind of a mixed bag. I had mixed feelings about NAFTA, the North American Free Trade Agreement. If there ever could be such a thing as 'free trade' I was fine with the idea, but the free trade playing field has never been all that level a field and there are considerations other than economic that are important. One of them is war.

In *The Wealth of Nations* Adam Smith had written his whole hearted support of free trade. *To give the monopoly of the home market to the produce of the domestic industry, in any particular art or manufacture, is in some measure to direct private people in what manner they ought to employ their capitals, and must, in almost all cases, be either a useless or a hateful regulation. . . It is the maxim of every prudent master of a family never to attempt to make at home what it will cost him more to make than to buy. . . What is prudence in the conduct of every private family can scarcely be folly in that of a great kingdom. . . A trade which is forced by means of bounties and monopolies may be and commonly is disadvantageous to the country in whose favor it is meant to be established, as I shall endeavor to show hereafter. But that trade which is without force or constraint, is naturally and regularly carried out between any two places is always advantageous, though not always equally so, to both.* But one thing Smith did not consider in those days of sailing ships, muskets, and muzzle-loading cannons was the idea that the 'domestic monopoly' as represented by stock companies might altogether abandon its country in favor of setting up its production in a foreign country. Any prudent businessman can be expected to try to carve out a monopoly if he can; the monopoly is the most profitable of all markets and absolutely unrestrained free trade makes it possible to more closely approach achievement of a monopoly when the 'master' of a business can concentrate his operations in those places in the world where labor costs are most advantageous to him. In Smith's world he envisioned the loss of an uncompetitive domestic industry as an opportunity to employ the country's capital in other and more productive and beneficial enterprises. The fate and security of a nation was not seen then as being in any way dependent on what types of business enterprises were at home in that nation.

But times change and the world isn't in the eighteenth century anymore. Nationalism did not yet exist in Smith's day. Nor did the security of any country depend on its capacity for manufacturing. That is not the case today. The Civil War was perhaps the first illustration of this. Ultimately it was the industrial capacity of the North that overwhelmed the agrarian society of the South and decided the outcome. When America was plunged into World War II by the sneak attack on Pearl Harbor, it was America's industrial might and nothing else that let us prevail in that war. By 1996 the signs of American corporations abandoning their country and stripping us of our technological and industrial power were already visible. Whose side are these 'multinationals' on? Certainly not ours. I thought then and I think now that free trade wholly divorced from all but purely business considerations is folly and a recipe for grim national disaster in the future. A service economy is a third-world economy unable to protect our liberty.

I think anyone who discounts or ignores the patriotism of foreigners for their homeland just doesn't know very much about real people. As production engineering manager, my job frequently brought me into dealings with Japan. Japan was a notoriously closed market to U.S. companies, regardless of what the

politicians and the economics professors might say. HP had long had a subsidiary located in Japan, called Yokogawa Hewlett Packard (YHP), that was established to let us penetrate the Japanese marketplace. Even with YHP, I saw a number of instances of slick tricks by which Japanese organizations tried to keep our products out of Japan's home market. The one that sticks out most vividly in my mind started with a fax from YHP that angrily claimed we had sent an entire shipment of defective products through them to one of their important customers. Every single disk drive in every single one of the shipments was defective. I had those products shipped back to us so I could have my Failure Analysis team look at them. Sure enough, every single disk drive was bad.

Somebody in Japan had opened up the boxes and very carefully smashed the top of each disk drive with a hammer. It was sabotage, pure and simple. Do you think the Japanese are free traders? Think again.

The reality is that nationalism is alive and vigorous in every country on earth and all countries in the world look out for themselves first and anyone else not at all. I think the unregulated, unrestrained outsourcing of America's industrial capacity and technological expertise to foreign countries is dangerous to both providing for our common defense and to promoting our general welfare. I think this corporate outsourcing to foreign countries is an act of treason, intentional or not, in everything but the most narrow legal sense of that word. I don't think the United States is likely to ever go to war with Britain or Canada or Australia or Mexico in the future, but I wouldn't make the same bet when it comes to any other country on earth. It's not popular among either the conservatives or the liberals to say so, but in the final analysis I am an American. I care about *us* over and above any other nation, and I pledged my allegiance to America alone. So I was and am not very comfortable with NAFTA. But it doesn't seem to be an issue that one party or the other can be blamed for. As ignorant of economics and history as most corporate managers are, politicians are even more ignorant.

Then there was the health care reform plan. I never saw what that bill actually contained. I did see the vigorous advertising campaign mounted against it. It had been opposed by an alliance of conservatives, the American Medical Association, and the insurance companies. It wasn't hard to understand why the conservatives opposed it. The fiscal –as opposed to the religious – conservatives have always been on the side of what is usually called 'management' and against the side of what is usually called 'labor' – two labels that were fairly accurate in the nineteenth century days of the robber barons and a lot fuzzier today. Most companies don't like having to provide health benefits to the employees and only do it because their competitors do it. HP under Bill and Dave had been one of the few companies in America who introduced health care benefits for the employees for the sole reason that Bill and Dave thought it was the *right* thing to do, that it was part of what the *community* of a company meant. That had been in the 1940s. In the summer of '96 I had been working professionally for twenty-one years and in all that time the only changes to an employee's health benefits I had seen had been in the direction of reducing them. That's still the case today.

It wasn't hard to understand why the AMA and the insurance companies opposed the health care bill either. Many doctors and pretty much all hospitals love to suck every dollar out of a patient's wallet they can and insurance companies don't like to pay off on their policies if there is any way possible to get out of doing so. I knew the AMA and the insurance companies weren't on *my* side. To them I'm just a money tree from which they like to try to pluck a bushel basket full of leaves whenever they can. I didn't know if the health care bill had been a good bill or not, but I did know I'd welcome having somebody on my side for a change.

Then there had been the brouhaha of 'gays in the military' that culminated in the 'don't ask, don't tell' policy. My view about homosexuals has changed a lot over my lifetime. When I was a boy growing up in Maquoketa and in Bellevue I didn't even know what a homosexual was. "Homo" was among the names we boys sometimes called each other as part of the name-calling stage of having a fight, but I thought it meant the same thing as 'sissy.' Another name we used was "queer" but I thought that just meant

'different' in a bad and insulting way. The idea that a man would want to have sex with another man or a woman with another woman never even entered my mind. The places in the Old Testament where it said a man shall not 'lie with' another man and doing so was an 'abomination' had no meaning for me at all. I just thought the ancient Jews had some mighty strange ideas about sleeping arrangements.

It wasn't until college that I finally learned what a homosexual was. There was a small 'gay liberation front' group on the Iowa State campus and by then I knew enough about sex to understand what 'homo-sexual' really meant. And I was appalled. The very thought of anal sex disgusted me right down to the core. It still does. I spent a lot of time in locker rooms and the main bathrooms at the fraternity house weren't too different from locker rooms. The idea of being naked in a shower room in the company of some guy who liked to have sex with other guys was just the creepiest thing imaginable. As far as I was concerned, I thought there had to be something really wrong – unnatural – about guys who chose to be 'gay' or gals who chose to be lesbians. I even resented the appropriation of the word 'gay' by these people. It felt to me like they were stealing the word and making it dirty. There was something hedonistic about the whole 'gay liberation' thing so far as I was concerned. And I sure didn't want people like that anywhere around *me.* I wasn't afraid of homosexuals, and I didn't hate them in any 'hang the dirty queer' sense. But I didn't want them in any part of *my* life. I didn't even want to *know* there were such people. I felt nothing but disgust and contempt for them.

The day I flew out to San Francisco for my interview with HP, the first sight that greeted me as I came out of the walkway tunnel leading from the plane into the terminal was two men embracing and kissing each other full on the lips. I was ten feet away from them and I just cringed in disgust. *San Francisco,* I thought contemptuously as I hurried on past them. I mentioned it to my HP host who picked me up at the airport. He just shrugged.

I came to find out later that HP had a policy of nondiscrimination on the basis of sexual orientation. I wasn't too sure how I felt about that policy. It pretty much guaranteed that some of the people I worked with were probably homosexuals. But as time went by, I found out I couldn't tell whether a coworker was 'normal' or 'homosexual.' In the workplace there just wasn't any occasion for anything to come up where this mattered. I did come to find out that one guy in the finance department was 'gay.' He was a young man about my age named Dean and the way I found out was outside of work. My pals, Rich and Dick, and I used to go out on Friday nights for a few beers and then adjourn to Rich's apartment to grill some steaks and, usually, talk shop. One night Rich invited Dean to come along with us for some reason, and later when we at Rich's chowing down on steaks I was dumbfounded to hear Dean proposition Rich in what to me were the most obvious terms imaginable. Rich didn't get it; it all sailed right over his head. But Dick and I exchanged glances. I didn't say anything. I just sat there feeling very, very uncomfortable and disgusted. Dean never went with us again.

Two years later when I was working in Cupertino, I'd gotten used to the fact that homosexuals existed and that some of my coworkers – who I had no way of knowing – were probably homosexuals. It had never intruded on me in the workplace in any way and I no longer gave the matter any thought. Then one day the news came out of San Francisco about the murder of the Mayor and the gay city supervisor, Harvey Milk. The murderer was a former supervisor and was well known to be a fundamentalist so-called 'Christian.' He had resigned his seat and then changed his mind, but Mayor Mosconi wouldn't reinstate him. That was why he had shot the Mayor. There wasn't any mystery about why he also murdered Mr. Milk; the sole reason was Milk was openly gay. I still didn't like gays, but I never had the least doubt that this murder was an act of inexcusable evil. Not even the distorted religion of the fundamentalists is so distorted as to condone cold blooded murder for *any* reason. The episode made me think.

Many years later up in Boise, after I had started hanging around the music scene, I casually met a group of three young guys, all twenty-one years old, who had formed a band and were trying to break into the hard-to-get-into business of getting bar gigs in Boise. I met them at a Pengilly's jam session one Monday night. They were pretty good young musicians and a few weeks after I first met them they were

excited to announce they'd gotten their first paying gig at another Boise bar. My friends I was sitting with started giggling and when I asked them what was so funny they told me this particular bar was a gay bar. I hadn't even known Boise had any gay bars. These young fellows weren't gay – at least I don't think so – and they, too, didn't know this place was a gay bar. After my friends had enlightened me, I chuckled about it, too. I never did hear how their first gig went; it wasn't a bar I was going to hang out in. Not now.

I had also met a talented young female musician who had a following of women fans. I came to find out this group of women were lesbians. I must have been mellowing with age or something, because when I found this out my reaction was, *Oh, that's a pity.* A couple of these women were real lookers and the pity was that they dated other women instead of men. Me in particular. As I said, a couple of these gals were real knockouts. Privately my pal Tom Simpson and I referred to this group as 'the twisted sisters' – there was a rock band by that name – but I got to know them casually and found out, rather to my surprise, that I even liked them as casual music scene acquaintances. But they were women, not men, and I discovered I didn't have the same gut wrenching disgust for lesbians as I did for gay men. There wasn't much chance of me being in a shower room with lesbians, after all.

A few years later, as I was finishing up managing Coyote IV, I was stunned to hear that a lab engineer I'd known casually, and who had a reputation of being a pretty good engineer, was going to have a sex change operation. As part of getting ready for it, he had started dressing as a woman and he, or I should say 'she,' had changed his name to Rhonda. I happened to bump into Rhonda down at the Sand Piper Restaurant a couple weeks later, where I had gone to catch one of John Hansen's gigs. I didn't recognize her until she came over to my table and spoke to me. She asked if she could join me – the place was pretty crowded that night – and common politeness demanded that I say it was okay. Besides, I was very curious because before she'd become Rhonda she had always seemed like a pretty regular guy to me. I didn't think Rhonda was ever going to win any beauty contests, but we talked for awhile and as we did I felt less and less uncomfortable about the situation. I'd never planned to date Rhonda when she was a man, and I didn't plan to date her now or any other time. But I did find out that, gender aside, she wasn't any different from the guy I had known. The situation felt strange to me, but Rhonda didn't seem like a stranger. Mostly she explained to me why she was doing what she was doing, and I found myself able to listen to what she was saying and even to understand it at least a little bit.

I was studying neuroscience in my off hours then, and one thing I came to learn from these studies is that there may very well be a biological basis for sexual preferences. The evidence isn't all in on this even today, but there *is* some scientific evidence for the hypothesis. To me that made one very important difference. I had always assumed that being gay or being lesbian was simply a matter of choice. But the science says otherwise. If the hypothesis holds up, it means there is nothing 'unnatural' about a person being homosexual. Uncommon, yes. There are a lot more heterosexual people than there are homosexual people. If it's true that this is just the way they were born, then that means God made them that way. And that means it is wrong for me to judge them the way I always had. God does not make mistakes. Not ever. Of course, the hypothesis might be wrong. But I don't *know* how that's going to come out, and that means I can't justify making moral projections onto homosexual people because their sexual nature is what it is. It's easy to hate and abhor abstract people; it's different when you're talking to someone you've known a long time, as I talked with Rhonda that night. I still don't want to be in a locker room in the company of a homosexual man, but I've come around to knowing that it really doesn't make a difference, good or bad, to me that some people are homosexuals. I can accept them for who they are. In a way, you could say that night at the Sand Piper with Rhonda really taught me what *tolerance* means.

When the 'don't ask, don't tell' thing happened, I thought it was kind of an empty thing. There *have* been 'gays' in the military before, I'm sure. And the military still treats them the same way now as ever if their homosexuality is discovered. What was accomplished? In ancient Greece the toughest army around was the Spartan army, and it is an historical fact that a lot of them were homosexuals. Maybe the answer to the whole thing is just to recognize there might be four sexes rather than two. Why not? It wouldn't change anything in my life if there were. Would it change anything in yours? If so, how?

One thing the Clinton administration did do during the first term was put the federal government on the Internet. The Internet had been around for years. For most of that time it was known as the DARPA net and it was closed to all but mainly the military and a minority of universities engaged in research and development on military projects. Now the technology was there to make it usable by a great many rather than a privileged few, and opening up DARPA changed the face of the American economy. It also opened up government to America's citizens.

Whether it was President Johnson and Vietnam, Nixon and his gang, President Reagan and Iran-Contra, or the Idaho Republicans in their closed caucuses, secrecy in government is the single greatest threat to liberty and justice for everyone that exists. Throughout the ages, tyrants have depended on it. Oppression relies on it. Slavery comes out of it. In one stroke, President Clinton and Vice President Gore made it much, much harder for the men who are supposed to be our elected representatives to hide from us. It was a victory for freedom and I completely liked what they had done.

So, did being kicked out of the Republican Party make me a Democrat? I wasn't sure. I only knew for certain that the Reagan Coalition was dead and I was no longer a Republican. As the 1996 election came and it was time to make a choice, I chose to vote for President Clinton. □

Jang Yi working in the electrophotography lab.

After the tumult of the Boise fiasco, the '96-97 school year in Moscow was pretty uneventful. All the important events in my life were taking place fifteen hundred miles away in Iowa. I published some papers, obtained funding renewal for the neural networks and electrophotography projects, taught some classes. In the fall of '96 I received my third year review. This is the one and only review between the time a tenure track professor is hired and the time he comes up for tenure review. It's usually a fairly uninformative event, and this was how it was in my case. The review basically said 'keep teaching, write some papers, get some grants.' It didn't say how many papers or how many grants or how much grant money. This sort of vagueness tends to promote a fair bit of uncertainty down the road when the tenure decision comes up, but it seems to be the kind of thing where no news is good news. It was a pretty stark contrast to the annual performance evaluations I was used to at HP, but the academic setting is a good deal less hidebound and dogmatic than is typically the case in the private sector. The '96-97 year was a time to meet new faces on the Moscow campus, pick up the pieces from the Boise disaster, and maintain a sad vigil for my brother as I received news of his condition and the progress, if one cares to call it that, of his fatal illness.

While we were in Boise I had developed three new graduate level courses for the department, and in the spring of '97 I developed a new senior-level undergraduate course. The topic was called 'coding and information theory' and it pertains primarily to mathematical techniques that are used in modern communication systems. The topic is typically taught, when it is taught at all, at the graduate level. My new course aimed to bring the basic principles of this topic to a wider range of students who in the main would not go on to graduate school and would instead be putting these methods into practice when they started work in the private sector. To satisfy the somewhat different needs of this student audience, I wrote an undergraduate-level textbook for the course. It was published in 1998 by Prentice-Hall under the name *Applied Coding and Information Theory for Engineers.* The book wasn't a particularly big hit in the United States, where by and large undergraduates are not exposed to the topic, but it was very popular in Europe, Canada, and South America. It was later translated into Korean and is now used in South Korea as well. I found out more recently that pirate copies of the book are doing a brisk business in China.

The new course also led to a discovery that turned out to be a pretty good deal for my research lab. His name is Jang Ho Yi. Jang was a senior in computer engineering who was finishing up his degree that semester and he happened to take my new course. It didn't take me too long to recognize there was something pretty special in this quiet, reserved young man who didn't talk a whole lot. Every once in a very rare while a professor comes across a student possessing a scholarly capacity far beyond even the best of his peers. Jang is one of these. He had immigrated from South Korea with his family to San Jose, where he had obtained his green card. He had learned English when he was well past the age where normally a person can learn a second language without an accent, yet Jang spoke with almost no trace of an accent at all. The only time you can hear it is when he gets excited and starts to talk fast. That is, I'm told by the experts, an incredible gift for languages.

From San Jose he had kind of drifted on his own up to Boise and decided to go to college there in our computer engineering program. I hadn't had him in any classes down there and with his quiet demeanor his talents had escaped my notice. Jang has kind of a pronounced tendency to sort of drift through life with no particular plan in mind. He was graduating that semester and hadn't yet even bothered to start looking for job to go to afterwards. Nor had he given any particular thought to graduate school. But with Aaron's graduation looming on the horizon in the not too distant future, I badly needed an excellent man to take the baton and help me carry on with the HP project. Jang looked like just the guy – and as it turned out, he was. After the final exam, I treated the class to some refreshments down at one of our local watering holes and sounded Jang out about the idea of coming to work in my lab and pursuing his Master's degree. When he found out he could get paid for going to graduate school, his reaction was, "Oh. Okay." He didn't even ask what the stipend would be. I thought at the time this kind of resembled the Forrest Gump School of Career Planning, but if it worked for him, it sure worked for me. We shook hands on it and I said, "Welcome aboard, son." He shot right back with, "Thanks, dad!" and a big grin. I knew right then there was a wiseguy after my own heart hiding inside that solemn exterior.

That was the start of a terrific and very productive six year working relationship between us. I had my man. The next trick was convincing HP to sweeten the deal a little so I could afford to have Aaron and Jang overlapping each other on the project. Greg had by then become the lab manager and I'd been working with a new partner at HP named Ken Lindblom. It turned out I didn't have much of a selling job to do there. Ken immediately saw the benefit of continuity in our research partnership and he had no trouble selling that idea to Greg. □

The 1997-98 school year was a fairly slow one for me. My new on-campus lab was starting to roll but we hadn't yet done enough research work to yield out anything I thought was worth publishing. Things were in the works but they weren't ripe yet. It was in this time period that word drifted up from Boise that the Disc Memory Division had finally been disbanded once and for all. This didn't come as any particular shock to me; it was something I'd foretold all the way back at the time they'd made the decision to go into the jellybean market. Even while I'd still been down on the BSU campus the handwriting was already on the wall. One of my friends from DMD, a physicist, had worked a stint with our program as an affiliate professor teaching electromagnetic field theory; he had told me word was going around that if the current crop of new products under development didn't succeed the division was finished.

He was plainly worried about things out at DMD but there wasn't much I could say that would be of any comfort. In Greg's old section we had always been pretty hard-nosed about the nasty realities of pushing a new product into the market, but I'd never detected any similar hard-nosed attitude on the part of the managers in the other R&D sections. Like Vashro, most of them seemed to me to be more interested in promoting peace and love in the workplace than in pounding out product in the face of what is for suppliers an unrelentingly hostile economic environment. The first major new product after Coyote IV had missed the all-crucial market window by failing to provide decent enough prototypes to their potential customers. My guess is that the all-or-nothing nature of the OEM market must have come as a pretty big shock to them. Then their next new product development had gotten into schedule trouble as well. As a manager, I'd been criticized from time to time for the way I would sometimes push people to

get results nailed down, but I'd never lost sight of the fact that companies – and divisions – *could* fail if they didn't deliver what their market was demanding. I never got the impression my fellow managers in DMD, Greg excepted, ever really understood that or that our Golden Age of disk drives was gone and would never come back.

I am convinced a lot of those guys never got it. One of the things I had been upset, but not surprised, to hear about was that sometime after I left the upper management had decided to turn Building 22 over to the production operation that fabricated three-and-a-half-inch disks. Not drives. Just the disks that went into them. The box product line factory was taken down and shunted off into a corner someplace back on the Boise site. In one move, they screwed up the only high profit production operation they had going so they could pour millions of capital equipment dollars into an operation that was entirely a cost center. I'd seen dumb decisions from time to time over the years, but this one really took the cake. What would my decision have been? There were companies out there in the world who made pretty good thin film disks by then; I'd have started buying my disks from them and I'd have shut down our own unprofitable disk fabrication operation and sold off the equipment. But that wouldn't have been a move that promoted peace and love.

Now, at last, the game was over for DMD and the division was disestablished. I was worried about what happened to my friends down there but, fortunately, HP was a giant company and they were able to arrange for a lot of the people there to find jobs in other places in the company where profits were still being made. A lot of my friends from engineering ended up over on the Laserjet side of the business. Laserjet printers are 'box' products, HP owned about sixty percent of that marketplace, and it was still very much a high profit seller's market. In the years to come that was going to attract a lot of new competitors into the business, but at least for now it was a terrific business to be in. Some of the rest of them, including my brother Vern, ended up becoming a kind of R&D colony in Boise for the tape drive division in Bristol, England that John Stedman had set up back in my Eagle days. Others ended up being placed in what was known as the Integrated Circuits Business Division, which was the part of HP that designed and fabricated custom application-specific integrated circuit chips for the operating divisions. ICBD had always been a strange division in the sense that it was geographically distributed all over the world so its circuit designers could be embedded in the divisions ICBD served. Its main integrated circuit fabrication operation was in Colorado. My friends who ended up in ICBD were circuit designers and so were also able to remain in Boise.

Why did DMD fail? In my opinion it isn't a mystery. Partly it was bad business management, partly it was appalling ignorance of economics. But above all else, they broke the social contract, and without it they lost the ability to lead, to build synergy, and to mobilize the human spirit essential for success. □

The financial problems accompanying the disestablishment of DMD did have one direct effect on my lab. With the belt tightening that had to go on down in Boise, HP's management felt the company needed to take a second look at its philanthropic support for universities. The money from this had always been a grant rather than a contract, the difference being that with a grant the university had no obligation to deliver some end result back to the funding organization, whereas a contract always has such a deliverable. My neural networks funding was a grant; the electrophotography modeling funding was a contract. HP corporate headquarters down in Palo Alto had always let HP's local sites manage their philanthropy decisions locally. Now, or so I heard, Palo Alto had reconsidered this and decided that in the future HP's university support would be entirely contract-based. This brought an end to my neural networks grant from HP, and so as we entered the '97-98 academic year it was without this source of funding. It was a blow to my research program because at the time the neural networks grant was four times larger than the electrophotography contract. It was a significant setback for me.

As a result, I spent most of that school year teaching courses in communication system theory, setting up a new lab course, based on what I had learned from Växjö University, to augment our lecture classes in that field, doing electrophotography research, and looking for new sources of funding to replace the

lost neural networks funding. I was also starting to become known by other folks on the Moscow campus, and one result of this was I started receiving a number of requests to serve as a committee member for graduate students by professors in other departments. This is a wonderfully broadening experience for a professor because it promotes working in more interdisciplinary arenas. At present 'interdisciplinary research' is a big national buzzword, but in '97-98 it hadn't yet become the big deal it is today. I found myself becoming more involved with colleagues working in mechanical engineering, computer science, and network security areas. This gave me a broader base outside of electrical and computer engineering and helped me establish my reputation among my peers up on the Moscow campus. As I write this today, I have served or am serving as a non-major-professor committee member for seventy graduate students, the great majority of whom are from disciplines outside of electrical and computer engineering. This all got started in '97-98. It was a year of base building for me. □

Mom in 1997.

Mom turned eighty in 1997. After Dad died and she no longer had to spend her days caring for him and nursing him, she had developed a pretty spry and active life as a senior citizen. She had to be a little careful because she had osteoporosis, a disease that afflicts many older women and causes the bones to become very brittle, but even so she was on the go a lot. She had become buddies with a younger senior citizen, a woman only in her seventies, and together they would hit the river-boat casinos and do I-don't-know-what-all. She even bought a nice new car, and my brother-in-law Ronnie was amazed and astounded by the way Mom beat down the car dealer in negotiations over its price. He thought he was dealing with a naive little old lady; that was his big mistake.

So, things were going pretty good for Mom and it warmed my heart to hear little snippets of stories coming out of Maquoketa about her exploits. Some of the family thought it would be fun for Mom to go on one of those ocean cruises down in the Caribbean, and she called me to ask what I thought of the idea. I guess the plan was that Mom, Sherri, and my cousin Doe (Dolores) would go together, sailing out of Miami. Without really thinking it through, I said it sounded like a fun adventure and I thought she'd really like it. As things turned out, I wish I hadn't said that. I wish I'd thought it over more deeply.

You see, Mom didn't know how to swim and had never liked the water. Later, in retrospect, I wondered if the reason she had asked my advice might not have been to find an excuse to not go. It didn't occur to me at the time because I love the water and I love boating; Mom didn't. But Sherri and Doe wanted to go, or at least Mom told me they did, and now I wonder if the reason she finally agreed to go might not have been that she didn't want to disappoint my sister and my cousin. They wouldn't have gone if Mom didn't go. But that thought never entered my mind the day Mom called.

The three of them flew down to Miami and checked into one of the hotels there. That was as close to the cruise ship as they got. That very evening when they were on their way to dinner, Mom was talking to Sherri and Doe and not watching where she was walking. The hotel had one of those little two-level floors in the corridor, the kind where there's a couple of steps down and no handrails or other things that make it obvious when you're coming up to the steps. Mom didn't see them and stepped into air. She fell and broke a bone.

They took her to a Miami hospital, and if the medical folks there had just confined themselves to

taking care of her broken bone, things would have turned out okay in the end. But they didn't. There was one doctor there who thought he had spotted something in her blood tests, and he kept running test after test until he could finally announce that Mom had a heart problem that called for immediate bypass surgery. Mom had had a bypass operation back when I was working in the original Eagle R&D group in the mid-eighties. I'd been terribly worried back then, but Mom had simply sailed through the operation and even laughed at me for being so worried. The idea of undergoing multiple bypass surgery didn't phase her in the least, and she always had more faith in doctors than a saint has in Christ.

Nobody asked me what I thought of the idea, but even if they had I can't see Mom taking my advice over that of a medical doctor. But if I had been asked, I'd have passionately opposed the whole idea. Yes, maybe Mom *might* have had a heart attack some day if she'd refused the surgery. *Maybe.* But I think this guy was just looking to make some money by plying his trade on Mom. I've never for one second been convinced that operation was in any way necessary. Mom had really been enjoying life, had been active and on the go, and had been living a life *worth* living. She did sail through the surgery okay, but in its aftermath her happy, active, on-the-go lifestyle was ended. That damned quack managed to convince her that she was really a frail little old lady who required a lot of treatment and medical attention after she got back home. Mom flew back to Iowa accompanied by an oxygen tank like the one Aunt Hazel had had.

She was never the same after that. Back in Maquoketa she ended up under the 'care' of two different doctors, one to look after her so-called heart problem and another to look at a 'lung problem' the guy in Miami managed to convince her she was 'suffering' from. These two miserable quacks stuffed her full of expensive pills. The quack prescribing medication for her lungs prescribed pills that interfered with the ones the other quack was prescribing for her heart. So he'd change her heart medication to other pills that counteracted the lung pills. Then the lung guy would change his prescription – usually just by adding more pills or upping the dosages – and that would fight against what the other guy was doing. Instead of treating my mother, they got into one of those 'well I'll show you!" pissing contests with each other. I am completely, totally convinced that between them these two quacks ruined her health. In their hands, they really did turn Mom into a frail little old lady. I will never forgive these three guys for what they did to my mother. Sherri and Melody quit telling me details of what was going on because I'd get so furious.

Unfortunately, I think guys like these three are typical of American doctors any more. I think they are members of a profession largely made up of people who don't have much of a clue what they're doing. □

Things began to get much busier for me as the 1998-99 school year got under way. Funding from HP for the electrophotography modeling project that year more than doubled as HP continued seeing ever more possibilities in the benefits of our research partnership. This additional money allowed me to set up an experimental research laboratory where we could carry out our own experiments on the physics of laser electrophotography. Up until this time our modeling work had been theory based and had used a number of approximations developed over the years by previous industry-based R&D. This was fine so far as the interaction between the laser and the photoconductor of a printer is concerned (this physics establishes what is known as the 'latent image' – it's kind of like what is on photographic film before this film is developed). But as it turned out, this theory was not entirely accurate. With the new laboratory we were able to improve the accuracy of the theory and begin to develop a precise theory of the process by which the laser exposure is turned into the print that ends up on paper. This is called the 'development' process of laser electrophotography. No one had a good quantitative model of electrophotography development yet and our mission was to come up with one.

Another new thing on my plate that year was civil engineering. More precisely, the MRC had begun to explore collaborations with the civil engineers at the UI's National Center for Advanced Transportation Technology, NCATT. I had met NCATT's director, Dr. Michael Kyte, shortly after I moved to the Moscow campus and we had hit it off well. Mike was interested in exploring how electrical & computer engineering could collaborate with civil engineering in the area of transportation systems for the purpose of improving America's highway and city traffic systems, and we had been discussing ways of doing so.

During the summer of ’98 I had been a participant at Mike’s strategic planning sessions for NCATT (which became an institute, NIATT, later that year). These meetings had brought in Mike’s external advisory board members (a kind of academic counterpart to the board of directors of a private sector company except that this kind of board only advises and does not direct) as well as high ranking officials from the U.S. Department of Transportation and the Idaho Department of Transportation. One critical national need identified in these meetings was the need for better tools that civil engineers could use in designing the system of traffic signals that controls the flow of vehicles in cities. Civil engineers use computer models of traffic flow in designing these systems and the basic problem was that real traffic controller electronics behave differently from the rather simple models of traffic controllers used in these tools. To make the situation even more interesting, how these traffic controllers really behave differs from one brand to the next and traffic controllers produced by different companies behave differently even when they are designed to the same set of standards. These differences can and do make the flow of real traffic on real roads different from how the computer model said it would be, and this can cause some major problems. One you might have experienced firsthand is enormous traffic congestion during rush hour.

Mike’s strategic planning meeting was a multi-day affair and during the brainstorming discussions that took place near the end an idea was proposed for addressing this problem. I don’t remember who it was that came up with it, but the idea was simplicity itself. If the problem was caused by mismatch between real traffic controller boxes and the computer models, why not find a way to incorporate real traffic controllers directly into the model? This idea became known as ‘Hardware in the Loop Simulation’ or HILS. To make this possible, it would be necessary to invent a new kind of device that would allow real traffic controllers to ‘talk’ to the computers the civil engineers use in their work. The proposed device became known, naturally enough, as a Controller Interface Device or CID. As it happened, this idea had first been proposed by a civil engineering professor at the university in Louisiana not long before, a young guy named Darcy Bullock. Dr. Bullock had developed a proof-of-concept model at Louisiana and was then carrying on additional research on his idea at Purdue University, where he had recently gone to work. Darcy had already shown the idea was very promising but his original CID demonstrator had some drawbacks in terms of expense and lacked the flexibility needed in a commercially practical CID.

The reason for this was pretty simple. Darcy wasn’t an electrical engineer and the electrical engineers at his home institutions weren’t too interested in collaborating with him to further develop his idea. There are usually some pretty high walls that get built around the different specialties in different academic departments at universities; this is often the main barrier in doing interdisciplinary, collaborative research. But Touraj, coming from his background, believed in the necessity for interdisciplinary collaborations and made that one of the goals for the MRC Institute. I was at Mike’s meeting not only because he and I liked each other and got along well, but also because Touraj had made it one of our Institute’s objectives to help Mike’s Center (soon to be Institute) succeed.

For an electrical engineer, development of a CID was more a matter of product development than it was research. But for the civil engineers it was very much an applied research project in an important research arena in their field. It turns out that’s often the way it is in interdisciplinary research. Some members of the interdisciplinary team spend their time applying already well known methods to solve the problem at hand, while others are breaking new ground in their field. The trick to making an interdisciplinary program succeed is teamwork; the successes and academic credit garnered by the individual members of the team are *team* successes. A lot of professors have a hard time getting used to that idea because the great myth in academia is the myth of the lone researcher working in isolation with his research assistants. In engineering at least, the world is a bigger place than this. My years at HP had taught me how to build good, strong teams, and Mike is by nature also a team builder. The CID program would have to be a lot bigger than just designing a CID. A part of it, for example, involved extending the capabilities of the modeling software the civil engineers used to accept the use of CIDs in the simulations.

Mike and I worked together in the weeks following the strategy meeting to put together the CID

proposal. One of Mike's very best moves was the decision to involve Darcy Bullock of Purdue as a full fledged member of the team. Darcy, as it turned out, was excited and overjoyed to find a partner for his research at Purdue. Thus, our program was not only interdisciplinary but went beyond the confines of our university. The DOT back in Washington, DC liked the proposal so in January of '99 my lab received a research contract funded by the DOT of just under a quarter of a million dollars to develop a CID box. This was part of a much larger research contract going to NIATT (NCATT had become NIATT by then), and this contract turned out to be one of the crucial research contracts for eventually propelling NIATT to the forefront of U.S. research institutes in America's civil engineering research infrastructure. For me it meant tripling the size of my research laboratory in one fell swoop.

Another initial collaboration also got started as the '98-99 academic year began, although this one would not actually bear fruit in the form of research funding for another few years. A new guy, Dr. Yang-Ki Hong, had just joined the UI's Department of Material Science and Engineering that fall. Yang-Ki was a physicist by training, a former executive in a company back in Korea, and was already a pretty well known scientist in the field of magnetic materials. You can see that 'new' when applied to him only meant 'new to the University of Idaho.' Yang-Ki is one of the more traditional types of university folks in the sense that he is a specialist. He studies a material known as barium ferrite and that's all he studies. The academic world has a lot of people like this, people who spend their entire careers trying to learn everything there is to know about one very, very specific thing. This is, in fact, very much the norm at universities; there are relatively few generalists like myself to be found there. That is one facet of my field, system theory, that is quite different from the other academic specialties. The most world famous scientist at the UI is a chemist named Dr. Jean'ne Shreeve, and Jean'ne has spent almost half a century studying the chemical fluorine. She's probably the world's foremost authority on fluorine chemistry. I never knew there was that much to know about fluorine.

Yang-Ki had gotten in touch with me not long after arriving in Moscow because he knew of my work in magnetic recording. In Yang-Ki's particular field, interest in his material (barium ferrite) depends very much on its practical applications and so he needed a partner from the engineering side of things with whom he could work on the applications end. It turns out that barium ferrite not only had potential applications to disk and tape drives, but it also had applications to circuits in high frequency communication systems. He wasn't yet far enough along in developing his new ideas for us to be able to immediately start seeking research funding for its applications, but our discussions in '98-99 were laying the groundwork for that to come later on.

All the while, my unfunded research work on electronic brains was continuing apace. By this time I was deep into those fundamental questions involved with 'what is mind?' and was making sufficient progress in this to give what I was doing a name that neatly described the nature of the work. I called it 'mental physics' because its fundamental aim is to produce the kind of mathematical theory of mind that could stand on par with the other arenas of 'hard' science such as physics, chemistry, and biology. The science of psychology, by contrast, belongs to the class of sciences termed 'social' sciences, a class often regarded as a lesser science by 'physical' scientists but which, in fact, is a much more difficult science than physics. In many ways, physics is the easiest of the sciences, and this is why it is also the most highly developed science. I saw – and still see – mental physics as the first truly new 'hard' science to come into being in over a century. Because this work was unfunded, I was spending a lot of my after-work time doing this research while my normal daytime hours were spent teaching and doing the funded research studies, all of which had graduate students and a few undergraduate Research Interns carrying out the main, time-consuming details of doing the work. My role was part researcher, part teacher, part coach, part mentor, part manager, and part marketing department. I was finding all those years of experience as a project leader and a manager at HP to be extremely valuable in wearing all these hats and juggling all these balls in the air.

Most of the time my professor job kept me busier than I had ever been at HP but, in compensation, the stress levels were by comparison almost non-existent. The '98-99 school year was, however, an exception

to the more usual low-to-no-stress condition because with the start of calendar year 1999 would come my tenure review. As I mentioned before, the consequences of being denied tenure are fairly fatal to the career of a professor. I knew my work was going well on all fronts, and nobody was making any disquieting noises about my job performance. But on the other hand, the Boise business had severely disrupted things for awhile and I wasn't sure whether or not my output of journal papers was going to come up to the mark required by the three different levels of tenure review committees. There weren't any specific hard number criteria for publication productivity that anyone at the University would admit to, so I was completely in the dark about whether my record was good enough to pass muster. This was making me very, very nervous. The stress showed up in three ways. The first, and most upsetting to me, was a big spike in weight gain. My body seemed bent on mimicking Big Jake, the Dean, who was a very big guy. The second and just as visible sign was my beard; it had now turned snowy white. It was around this time I started receiving a lot requests to play Santa at various people's Christmas parties. The third was a brief return of my dry eye condition. This happened just as my tenure review package was threading its way up the review chain, and so for awhile I was back on the eye drops again.

There was one entertaining incident that happened just a couple of days before the already-tenured faculty in my department were scheduled to vote on my tenure application. One of my younger colleagues, a very talented guy named Harry Li, one day unexpectedly invited me to join him for a soda pop down at the Student Union. He'd never done this before – and he never did it again – but I liked Harry a lot and was happy to take him up on the invitation. Although he was several years younger than me, Harry had joined the department straight out of graduate school and was by then a tenured associate professor. He was one of the guys who was going to be voting on my tenure.

We went down to the SUB (Student Union Building) and chatted pleasantly for awhile. Then, out of the blue, Harry asked me how long I expected to be working as a faculty member. The question caught me by surprise, but I answered, "Well, my guess is I should have at least another twenty good years left." Harry looked surprised and murmured, "Oh, that long?" Suddenly I understood, and I laughed. "How old do you think I am, Harry?" I replied. I was forty-five years old, but I guess my white beard must have made me look a lot older than this. It was amusing but also a little bit disquieting because I sensed that the reason we were sitting there was because Harry had been wondering if he wanted to vote in favor of tenure for a senior citizen. I don't *know* if that's what he was thinking, and it wasn't the kind of potentially trouble-making question I was about to ask with the vote coming up. But it's certainly possible that was what he was thinking, especially since he seemed to relax a lot after he heard my answer. If that's what he was really thinking, though, then I'd just had my first encounter with age discrimination. That was a factor that up until then had never entered my head. It gave me something else to worry about.

There was one comfort to counterbalance, in part, the worry that my tenure review was causing me. My personal investments and savings had continued to grow at a vigorous pace since 1983, and because I was debt free I would be able, with very careful budget management, to shift everything over into U.S. treasuries and probably live out the rest of my life in retirement if the tenure decision went against me and I couldn't find another job that I wanted to work at. In fact, my paper gains from my investments had been far greater than my UI salary for the last few years, and until I started selling off my holdings these gains were not taxable. So I was in pretty fair shape even though 'Plan B' would mean being stuck in Moscow the rest of my days. But it was mathematically do-able if I paid careful enough attention to the tax consequences in converting my holdings. However, this was something that would only be a last resort, and I didn't want to have to go with this plan.

As things turned out, I was worried over nothing. The tenure review went off without a hitch and near the end of the school year I received official notice that I was being awarded tenure and promoted to the rank of associate professor effective July 1, 1999. I'd made it and, quite literally, my worries were over. To add icing to the cake, during the month of July '99 my personal net worth reached a rather nice milestone; I had become a millionaire. That's a lot of bottles of soda pop even at today's prices. This was my first time for reaching this mark, as it would turn out; the days Fed Chairman Alan Greenspan would

famously characterize as ‘a period of irrational exuberance’ were about to come to a screeching end the next year and I’d end up dropping back below this mark and having to do it again. But for the boy who had nearly despaired of being able to go to college in the 1960s because his family didn’t have the money, for the young man who lived on a single one-dollar hamburger a day during his drive out to California in 1975 and still had to borrow money from his new employer just to get there, July 1999 felt very good indeed. It was a trophy accomplishment. □

Late in the year in 1998, during a lame duck session after the November elections, the nation was treated to a blatant display of abuse of power by the right-wing Republican House of Representatives: the impeachment of President Clinton. Our would be Republican rulers had been consistently going after him since the smear campaign started during the 1992 election, the one where I’d received that phone call when they had called him a sleaze bag. Special Prosecutor Ken Starr had been conducting an endless series of investigations since 1993: Travel-gate, Whitewater-gate, You-name-it-gate, and the House Republicans pounced on what was probably perjury by President Clinton during a deposition he made on his relationship with Monica Lewinsky. This came during a lawsuit brought by a nobody named Paula Jones, who happened to have a pretty good legal team for someone who impressed me as being pretty much the kind of person that in the old days they used to call ‘poor white’ in the South.

The Lewinski scandal had broken in January of ’98. At first I’d had trouble believing President Clinton could possibly have been dumb enough to have really done this, but it turned out he was. I deeply disapproved of what he had done and I was deeply disappointed in him as a man for doing it. A marriage vow is a promise and one thing I expect of everyone is that they keep their promises. A lot of times people don’t, and I know this, but it is a standard of conduct against which I judge the moral fiber of a person. But as much as I disapproved of his infidelity, I also saw it as a private matter between Bill Clinton and his wife. As for his Paula Jones deposition, I thought he acted pretty much like a weasel and I wasn’t the least bit surprised by his denial.

What did surprise me was the way the Republican House used this to try to ram an impeachment through. I don’t know what the legal penalty for perjury in a civil lawsuit is, but I know it doesn’t come up to the standard of ‘high crimes and misdemeanors’ which is the constitutional ground for impeaching a President of the United States. To the charge of perjury, the House also added an ‘obstruction of justice’ charge, which was basically one of the same charges made against Nixon. All in all, the House Judiciary Committee approved a total of four specific charges after a very perfunctory hearing along straight party-line votes on December 11th and 12th. Debate by the full House was considerably livelier and they ended up passing two of the articles, the perjury and obstruction of justice charges.

There isn’t any ambiguity in the intent of the impeachment language in Article Two, Section 4 of the Constitution. Why? Because Alexander Hamilton had plainly stated the intention in *The Federalist,* (Number 65):

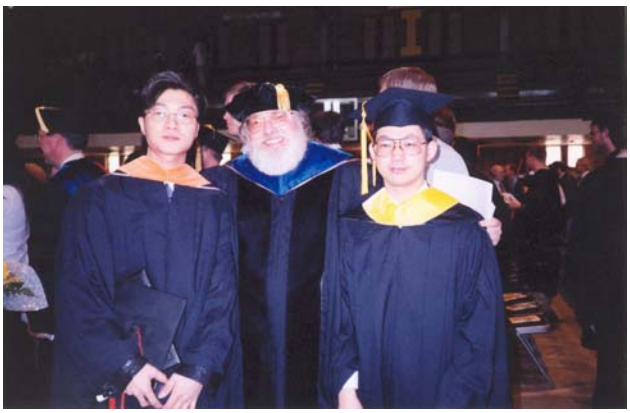
> A well-constituted court for the trial of impeachments is an object not more to be desired than difficult to be obtained in a government wholly elective. The subjects of its jurisdiction are those offenses which proceed from the misconduct of public men, or, in other words, from the abuse or violation of some public trust. They are of a nature which may with peculiar propriety be denominated POLITICAL, as they relate chiefly to injuries done immediately to the society itself.

Somehow I doubt whether very many of the Theocrats calling themselves Republicans in the ’98 House of Representatives have ever bothered to read *The Federalist.* They just saw an opening and used lawyer tricks to ram through an impeachment in full violation of the intent of the Constitution every one of them had sworn an oath to uphold and defend against all enemies, foreign and domestic. They had themselves become enemies of the Constitution and they were oath-breakers.

In 1996 I hadn’t known if, after being kicked out of the Republican Party, I would actually become a member of the Democratic Party again. After the House impeached President Clinton I no longer had any

doubts on this matter. It wasn't news to me that the Party of Reagan was dead; that had been obvious for quite awhile by now. But now I thought I could clearly recognize what that party had become. I'd seen this sort of thing before. It had returned to being the Party of Nixon. This time it wasn't just a rogue, criminal President and his gang; the cancer had grown across the body politic of the Republican national organization. For me rejoining the Democrats was no longer a matter of choice. It was now a matter of Duty. There's certainly no guarantee this will in the end turn out any better than when I became a Reagan Republican and trusted that he could keep the conservatives checked. The liberals aren't dead and gone from within the Democratic Party. But there was no other practical, viable choice for standing against what my old party had become. There was no other practical, viable thing I could do to keep *my* pledge of allegiance to my country. The day the House passed the Articles of Impeachment, I became a Democrat.

For twenty-one days, leading up to February 12th of 1999, I followed the impeachment trial in the Senate, waiting to see what the outcome would be. In the end, 45 Democrats and 10 Republicans voted to acquit the President on the perjury charge, with 45 Republicans voting to convict. Then the Senate split on a 50-50 vote to acquit on the charge of obstruction of justice. All told, only five out of the fifty-five Republican Senators stood by their oaths to the Constitution to the end. The Republican *coup d'etat* failed. Their national religion party leaders howled their disappointment and damned the rest of us for our lack of morality. Like Nixon in '62, they would not keep the pouting pledge they made to withdraw from politics forever. They're still out there and they still infect American politics as a cancer. □



With Jang Yi (left) and Hua Lin (right) at commencement (1999).

The close of the '98-99 school year saw a number of graduations from our corps of graduate students. One of these, Hua Lin, was my last graduate student funded through the old HP neural networks grant. By some fairly careful budget management I had managed to scrape together enough support to see him through to the completion of his degree. Hua's thesis was entitled "An Image Extraction and Recognition System Using Neural Networks." What this system did was take scanned images of printed text, figure out where the individual letters of the text were regardless of the type of font in which they were printed, and then identify what each individual letter was. The principal challenge for this system was to be able to see through the differences among various fonts, e.g. A vs. 𝔄, and still correctly identify the letters with a high degree of accuracy. This is something human beings do very well but getting a machine to do it has its challenges. Hua developed a new learning algorithm by which our neural network could come to be able to do this by being trained on a relatively small number of examples. The neural network proved to be accurate better than about 99% of the time with printed characters but it had much lower accuracy when we would ask it to identify letters produced from handwriting, which would have been our ultimate goal for this neural network if the funding hadn't run out. Still, it was a very promising start. This particular neural network was just a machine and didn't yet qualify as a "brain" under my mental physics definition of what an electronic brain had to be able to do.

Another graduate that year was Jang Yi, who had completed his Master's degree work and would be continuing on with his doctoral studies. Jang's thesis was based on our electrophotography modeling work funded through the HP contract and was entitled "A Xerographic Simulation Model." He had completed his Master's studies in two years, which is the minimum amount of time needed by a graduate student who has a full research assistantship appointment. An RA is required to work twenty hours a week on his research job, and to do so our graduate college mandates a maximum number of credit hours of classes per semester a student so employed can take. That is why an RA requires two years to complete

his studies instead of only one. Because many of his classes were classes I taught, he and I had an interesting but altogether typical professional relationship: half of the week he worked for me in my lab; the other half of the week I worked for him as his teacher. It's a very cool relationship and one totally unknown in the world of industry.

Jang had grown professionally a great deal during his two years of Master's studies and I was pretty proud of how far he had come already. I mentioned before that Jang didn't like to talk much, so you might guess he'd really hate to stand up in front of a room full of people and give talks. If you guessed that, you guessed right. One of the things I had required him to do late in his first year was make a presentation of his research to our weekly research colloquium. There would be around fifty or so people in attendance at these things each week, and this was the first time Jang had to face this kind of situation. His very first professional presentation had been something less than splendid. He was so nervous he ripped through about seventy slides in twenty minutes, almost all of which he spent with his back turned to the audience. Pretty much nobody in that room had much of any idea what he was talking about. Afterwards I told him the next time I was going to outfit him with one of those electronic shock collars they make for dogs and give him a jolt every time he sped up like that or turned his back on the audience. I was kidding, of course, and he knew that; but he got the message. By the time he had to present and defend his thesis, he had developed into a pretty good speaker – and also a much better writer – and he continued to hone those skills during his doctoral studies. Today he's an excellent speaker and writer. He talks more, too.

Another of Jang's big learning experiences during his Master's research was the discovery that highly idealized mathematical theories don't always work. Theory does work, of course, if the theorist puts all the relevant factors into the theory. But what are the relevant factors? Theorists quite often will 'simplify' the mathematical theory by leaving out factors they assume are 'minor' or 'inconsequential' to the model. This happens in every field of science. The problem is that mathematical equations don't come with an owner's manual that says 'use me here and here but not there.' Mathematics is the language of science but it is not the science itself. So how does a theorist know what factors are 'relevant' and what factors can be safely ignored? In a nutshell, the answer is 'through laboratory experiments.'

Over the past twenty-five or so years, one of the things I have noticed is that as science and engineering education has come to make more and more use of the availability of personal computers – every student has one nowadays – there has been a growth in reliance upon computer simulations and a downplaying of laboratory experience. This has, I think, grown to an unhealthy level in America and places like Växjö and other European schools have a much better balance in their programs. In the terminology of engineering, the word 'practical' means 'able to be reduced to practice' and this is what laboratory experience teaches. A computer simulation is not an experiment. A computer will just compute whatever mathematics you put into it and it is completely incapable of knowing or caring whether your mathematics is correct or adequate. As the old timers used to say, 'Garbage in, garbage out.' However, students tend to believe everything that comes out of a computer is the gospel truth. The fact that it is not usually comes as an awful shock to them. One of the worst things a scientist can do is fall in love with his theory. It tends to blind him to those bothersome things we call "facts."

One quiet morning as I was sitting at my desk, Jang had come to my office wearing a long face. "I've got bad news," he said. "I've just gotten the data from the experiment."

I just looked up, grinned at him, and asked, "How can data be bad news? Data tells us what is true."

What had happened was that when he'd put theory to the experimental test, the experiments had given him an answer other than what he'd been expecting from the theory. That didn't come as any surprise to me. I knew just how simplified the theory published in the literature was and the purpose of the experiment had been to see how accurate – or perhaps it would be better to say 'inaccurate' – the conventional model was. Quite a bit inaccurate, as it turned out, which was what had brought Jang to my office that morning. We sat down and I explained a few things to him about how theories are developed and what the role of experiment is in developing theory. I think that day was a kind of milestone in Jang's

development as a scientist. It was the first time he'd really had to think about the relationship between mathematics and nature. Data, provided the experiment is reliably and carefully done, is never a 'bad thing' in science because a theory that provides wrong answers is worse than no theory at all. As Will Rogers famously said one time, "It ain't what we don't know that gets us into trouble. It's what we know that ain't so." Jang's data that day led to our developing of a *better* theoretical model.

By the spring semester of '99 my own work on what I was now calling mental physics had made sufficient progress that I felt comfortable enough with it to present some of my findings at our research colloquium. My talk was entitled "The Problem of Pseudo-natural Machine Intelligence," and it was the first ever presentation to anyone to come out of all my years of work on the problem of electronic brains. Up until that time there hadn't been anything to say about the work that I felt was worth anyone's time to listen to. The date was April 16th, 1999. The talk generated quite a little beehive of excitement among the graduate students and professors attending the colloquium that day. If I'd had funding for this research, I could have signed up half a dozen enthusiastic graduate students to work on it that day. □

Nearly every university has what is known as a 'core curriculum' – 'the core' for short – that every undergraduate student is required to complete. The original intent of the core is based on the idea that there are some things every educated person should know. The UI core was fairly typical of the core curriculum found elsewhere across America. However, in my opinion the 'what every person should know' content of university cores had deteriorated badly following the days of the radicalization of the humanities and social science professors during the turmoil of the sixties. Today as then, the main theme one hears where the core is concerned is 'relevance.' It is the pouting old whine of the radical years.

During the 1998-99 school year, a task force had been formed to re-design and 'modernize' our core curriculum. In the spring this task force was holding forums for faculty members to come to and make known their opinions on what 'the new core' should become. In May I went to one of these to make my pitch for the kind of core I wanted to see.

I didn't go with a great deal of hope that I'd be able to have much influence. You see, I am something of a dinosaur these days. I am one of very few scholars who is a Great Books advocate. The Great Books is the name given to a somewhat loosely defined collection of the works that had the greatest impact on the development of Western civilization, culture, and thought. This is represented in philosophy by the works of Kant, Plato, and Aristotle. In government and society it is represented in the works of Locke, Rousseau, *The Federalist*, Mill, Montaigne, and others. In literature there are many representatives, including Homer, Shakespeare, Dickens, Twain, and many, many more. Yes, these are the dusty old works many people find boring and 'irrelevant' if they are fortunate enough to be exposed to them while still in high school. Not many are these days. Echoing the cry of the radicals in the sixties, people today demand to know what any of these old writers, long dead, could possibly have to say about the modern world we all live in. How could they be relevant? But these are the works that spelled out the ideas that made us the people we are today. What could possibly be more relevant than learning *why* Western civilization developed as it did, *how* it evolved into what we know today, and *what* the great issues and problems of the past were that those who came before us were confronted with on the path leading to the modern world? In short, why are we the people we are today and who are we capable of being? That is what the Great Books talk about. What could be more important to know than this?

It's not popular to advocate teaching and learning the great ideas of the West today. People outside of academia think the only important thing is for their children to learn a trade. People inside of academia tend to think we should pay equal attention to Eastern mysticism and the culture of the Mayans, Incas, and so forth. They think this promotes 'diversity' and 'cultural understanding.' To this I say, how do you expect us to understand other cultures if we don't even understand our own? Include some lessons in these things, yes, but first teach the lessons of America's heritage. Personally, I care a great deal less about the Mayans than I do about the great ideas upon which our own government and society, our own mores and folkways, are built. What good is it to teach tolerance of other cultures if we have no tolerance

for our own? Today many people seem to take it for granted that young people know about our own heritage. Do they think children are born with this stamped into their minds by genetics? In fact, almost all the students and young faculty I meet are entirely ignorant of this.

I don't blame my colleagues for this, nor do I blame the teachers in the public schools. It has been forty years since the destruction of the old Great Books core in the sixties, and the professoriate of today were almost all students in the time *after* these precious lessons had ceased to be taught. I would know nothing of the Great Books myself if I had not been so fantastically lucky to be exposed to their existence as a boy in the Civil Air Patrol's moral leadership classes. Professors do not teach these things today because they themselves were never taught about these things. That is the great fragility of education: mistakes once made in setting the curriculum propagate and last for generation after generation to come. How else do you suppose dark ages come about? They don't happen just because of the sword.

It isn't today's students who would oppose a Great Books curriculum. The students I know are fascinated to learn the topics contained in the Great Books had once been thought about and debated. The students I know are hungry for exposure to exactly these kinds of questions and answers. I think most people badly underestimate the young freshmen coming to us from high school. They aren't children. They're young adults. Naive, impressionable and often cocksure at the same time, true enough, but adults nonetheless. I treat them with respect, listen to what they say, and what I find is a maturity of outlook they are not usually credited with having by older people. Can we build tomorrow's leaders if we treat them as children today? Young people wish to learn great things. I think we should teach them great things.

Anyway, as I said, I didn't go to this forum with particularly high hopes of bucking the dominant trend of today. The best I hoped for was to at least get some kind of discussion going where inclusion of the Great Books in the new core would at least receive some somber consideration and debate. Unfortunately, I couldn't achieve even this much. The debacle of the sixties had done its work too well and no one was prepared to listen to a dinosaur. The new core eventually featured something called 'the core discovery courses,' and they turned out to be nothing but baby pabulum and trash. Every student I have asked has told me he or she hated the core discovery courses and regarded them as a complete waste of time. I agree. That's what they are. □

Periodically NASA announces a research competition called a "Grand Challenge," and in May of '99 Touraj and I got word of their latest one. A NASA Grand Challenge is a research question on par with Bob Allen's old Blue Sky projects except on a much greater scale. It is a research problem so challenging that no one knows whether or not it can even be answered, much less accomplished. Because a Grand Challenge problem is so challenging, the research is a two-phase process. Phase I is the proof-of-concept phase and has a duration of one year. At the end of one year, the project that has delivered the most convincing and successful result is awarded funding for Phase II, the phase where the proof-of-concept is turned into a full blown, practical implementation capable of going on a space mission. Funding for Phase I is relatively modest; funding for Phase II can amount to tens of millions of dollars in research money.

A Grand Challenge is overseen by Jet Propulsion Laboratory in conjunction with the California Institute of Technology, popularly known as Cal Tech. Usually around a half dozen independent research teams are chosen to work on the Challenge, and it is very common for these teams to team up with researchers from Cal Tech itself. Even being selected to compete in a Grand Challenge is very prestigious. In 1999 the Grand Challenge was: Find a non-earth-centric way to discover the signature of life on other planets. 'Non-earth-centric' was part of the stipulation because there is no guarantee life on other worlds would evolve along the same lines as life on earth. You can probably see the challenge in this. Life on earth is the only life we know and can study. How, then, can we look for alien forms of life without doing so by the methods used to study and understand life on earth?

Touraj and I had a meeting to talk about the Grand Challenge and to see if there might be something we could propose that would have any kind of reasonable chance of being selected for the competition. It didn't take us long to figure out that we lacked the expertise within the MRC Institute to do this and we

would need help from someone with deeper expertise on living organisms. Touraj knew just the guy: Dr. Ron Crawford, the director of the UI's Environmental Biology Institute. Ron's Institute was devoted to the study of bacteria and viruses and was closely tied to the UI's Department of Microbiology. From what was already known about Mars and the moons of Jupiter, it seemed like a pretty safe bet that if life existed at all in these places, it was going to be microbial life. Ron and his folks were natural partners.

In mid-May just after final exams we met with Ron over at his Institute to talk about the problem. It was kind of a brainstorming session and it turned out Ron was indeed just the right guy to talk to. One of the most fundamental characteristics of 'life' is the presence of metabolic processes. These are the physical and chemical processes taking place in living cells that are responsible for such things as nutrition and cell reproduction, two properties biologists regard as being features that distinguish between living and non-living matter. When an organism dies its metabolism ceases.

At root, a metabolism works through a series of energy conversion processes, like the one by which an organism turns its food aliments into an energy source to power its cells. Going deeper still, this process of energy conversion always involves chemical reactions that move electrons from place to place in the cell's atoms in a precise way. This is known as 'the electron transport chain.' It depends on very basic thermodynamic properties not tied to the other characteristics of any particular kind of living cell. Every living thing on earth has an electron transport chain at work down at the molecular level. It is the one thing nothing that can be called 'living' can do without. Its presence, therefore, is a universal 'signature of life' and its absence implies likewise the absence of life.

If we could somehow detect whether an electron transport chain was present in a sample then that would satisfy the core requirement of the Grand Challenge. It would be a non-earth-centric way to detect the signature of life regardless of what sort of life form it was. Our discussion continued as we kicked around various ideas about how an electron transport chain might be detected, and whether our ideas of how we might do this were technologically feasible. By the end of the meeting, we had our ideas firmed up well enough to put into proposal form, and over the next few weeks we were able to add sufficient technical and scientific details to establish our concept well enough to be able to make a convincing argument to the Cal Tech panel that would review Grand Challenge proposals and select the teams that would be funded for the competition. Ron was the obvious choice to head the science team and lead the overall project, and Touraj put me in charge of leading the engineering team that would be responsible for making what Ron's science team came up with something that could be built, miniaturized, and put into a space probe. We also identified the other key members of the research team based on the areas of expertise that would be needed to accomplish everything. We put together a proposal, entitled "Measuring the Chemical Signature of Life," and sent it in to the Grand Challenge review panel at Cal Tech.

Later, in December of that year, we heard back from the Grand Challenge review. Our proposal had been one of six selected for Phase I. The other five teams were all from big name universities and every one of them had teamed up with researchers from Cal Tech itself. They had selected teams from five giant institutions and us, the itty bitty University of Idaho, popularly known down in California as 'U-Who?'. We were running with the big dogs now. JPL awarded us a quarter of a million dollars for the research contract and so began our Signatures of Life (SOL) project. □

By mid-summer of 1999 the CID project was in the lab prototype stage and we were preparing to take two prototypes down to Las Vegas to exhibit at the annual meeting of the Institute of Transportation Engineers. I had two graduate students working on the CID design, a bright young woman named Ying Zhou, who was doing the hardware and microcontroller design, and an equally bright civil engineering graduate student, Zhen Li, who was doing the software design needed to let a CID interface with the simulation software package most popularly used by practicing traffic engineers. In addition, we had a bevy of hard working undergraduate electrical engineering students working on the design as Research Interns. I have always made it a practice to employ undergraduates in all my research projects whenever I've had the funding to pay them. This is fairly unusual at many universities, where the professors usually

want Ph.D. students to do the real work and Master's students to, figuratively speaking, wash the dishes. As for undergraduates, well that depends on if there are heavy things to lift and carry. I exaggerate a bit here, but not too much. Personally, I think the usual attitude is a fairly appalling waste of the talent pool available and getting undergraduates involved in research projects greatly improves the quality of their education. The trick lies in how you manage the project. In my lab the undergraduates work under the direction of the graduate students, which turns out to be a really good way of giving the undergrads an opportunity to accomplish all they're capable of accomplishing – which is often quite a lot – while, at the same time, giving the graduate students a little taste of the experience of leading a small project team. At the project management level, it helps me get the most bang out of every precious research dollar. Everybody comes out a winner.

The Las Vegas exhibition was going to be crucial to Mike's success in growing NIATT. The project was part of a national program by the U.S. Department of Transportation (DOT) to establish a few 'centers of excellence' in transportation research at different universities across the U.S. This first year there were quite a few centers being funded by the DOT program. In the upcoming year this number was going to be cut back and the funding that had supported the centers that were dropped would be re-assigned to enhance the centers that had proven themselves the most successful in delivering research contributions that supported the nation's infrastructure needs. The decision makers from the DOT were going to be at the Las Vegas meeting and what they saw there was going to be a factor in deciding which research centers were still going to be around and receiving DOT dollars the next year. My friend Mike is sort of a thin nervous person under the best of circumstances; with this crucial checkpoint coming up fast he was so jittery he'd make coffee nervous.

Back in my Delcon days an event of this sort was called a 'field trial' and Las Vegas would be the CID's first field trial. For reasons I've never been able to figure out, lab prototypes have a habit of saving up their nastiest technical bugs (problems) and not exhibiting them until just a few days before field trials. That was the case for our CID prototypes as well. The team was all over them day and night finding and fixing bugs, trying to get the units into full working order. I'd more than half expected something like this because I'd seen the phenomenon over and over and over across the course of my career, so I was down there mostly keeping the young folks from panicking, occasionally lending a hand myself with the debugging (I'd seen thousands more bugs in my time than the youngsters had), and every now and again reaching up and pulling Mike down from where he'd be fluttering like a moth around the ceiling lights of the lab. I was enjoying myself tremendously.

As I'd expected, we got both prototypes working just in time to box them up and load them into the van, along with tools, spare parts, the traffic controllers, the computers, and a few hundred feet of cables, to make the drive down to Vegas. The undergrads took off in the van and the next day Mike, Ying, Zhen, and I flew down for the meeting.

Las Vegas in early August has a tendency to get a wee bit toasty, and when we got there we found out the air conditioning in the exhibition hall wasn't working. As the temperature in the hall climbed toward the hundred degree mark it would have been a good day for going around in shorts, sandals and nothing else, but decorum prohibited that. My concession to the heat was limited to not wearing a tie and keeping the top of my white shirt unbuttoned just down to the point where nobody would think I was from Hollywood. During the first day of the exhibit the heat got to one of the prototypes and it started malfunctioning. Fortunately, nobody noticed this except for us – and poor Mike – and at the first available break we took the sick unit upstairs to one of our rooms. We used a hair dryer to find the part that was caving in under the heat and replaced it. Then we took the unit back down to the hall. By the next day they had the air conditioning working again and we didn't have any more problems with the units for the rest of the exhibition meeting. We saved the malfunctioning part so we could do a failure analysis on the unit when we got home and figure out what we had to do to fix the problem permanently.

This being a convention of civil engineers, I didn't have much interest in going to the sessions where

they were presenting their technical papers, so after the exhibition ended I wandered off to the hotel's casino and tried my luck with the slot machines. As fortune had it, I happened to find a hot machine and won a couple of jackpots from it. I went home with about nine hundred dollars more than I'd come down with. All in all, a very good trip. The DOT people were impressed with the CID and later in the year Mike was overjoyed to learn NIATT was one of the winners and would be receiving a million dollars in DOT funding for the next year. Ah, Vegas! □

After the Las Vegas exhibition we began the production prototype phase of the CID design. Now, a university isn't a manufacturing company and in November we had a meeting over at NIATT with the Vice President of Marketing and the Chief Engineer of McCain Traffic, a company that manufactured and sold traffic equipment. The reason for the meeting was to discuss licensing the CID design to McCain. In university lingo this is called 'technology transfer' and it is the principal way by which things discovered and invented in a university make their way out into the private sector. The university receives a royalty from the licensing agreement and the private sector company takes care of manufacturing, sales, and support for the product they've licensed. At the UI, the inventors of a technology licensed to the private sector receive a cut of the royalties received by the University as an incentive.

Effective technology transfer was one of the things the DOT used to evaluate the centers their funding supported and had been an integral piece of the NIATT strategic plan from the beginning. Our meeting with McCain went very well and not too long afterwards a licensing deal was struck with them. One of the things we factored in to the production prototype design was McCain's production process. They had a few specific requests – conditions, really – for what they wanted the final design to look like, and these were easily incorporated.

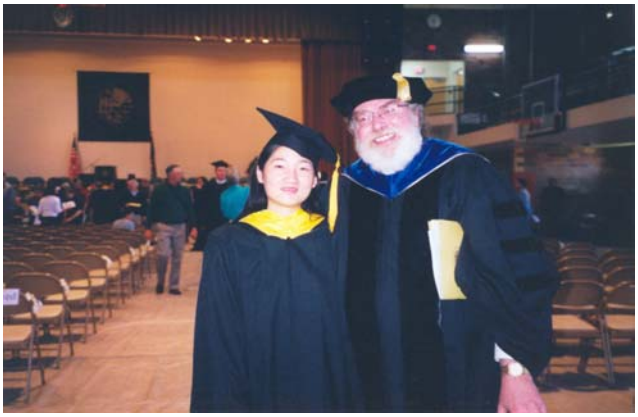
As it happened, I had another meeting that day immediately afterwards with Ron. We had just gotten advance word that our Signatures of Life proposal was being funded by JPL, with the funding and the official word slated to come in December. On top of this, in late July at a meeting with Ken from HP we had agreed to expand our research program beyond the electrophotography model itself and add a second project. Although the HP contract had already been approved and funded back in May, I was being designated an HP Master Researcher in December and along with this was coming a second project contract that increased my total funding. Then there was my electronic brain research, and I wasn't about to let that go for any reason. All this, added to my regular teaching assignments and committee assignments on various EE department committees, was about to make me a pretty busy guy.

My DOT contract – which was really a subcontract through NIATT – would run out at the end of December, but with Mike's success in keeping NIATT in the DOT's select group of funded centers of excellence there would be another contract coming in January of 2000. I had a big time problem coming; that was very plain to see and something was going to have to be done about it. It wouldn't do at all to let any of the contract projects suffer because of my time problem, and it wouldn't do either to turn any of them down. After all, Touraj and I were still working to build up our Institute's funding.

As it just so happened, one of my younger colleagues in the EE department, Brian Johnson, was just then going through a funding lull. That happens fairly regularly in the university setting. Some years just about every proposal you send in gets funded and then a professor finds himself busier than a one-legged man in a butt kicking contest. Other years next to nothing gets funded, not infrequently because the funding agencies have fixed budgets and pretty much always ten or twenty proposals submitted to them for each one they can afford to fund. Research funding is a very competitive environment and has a kind of feast or famine character to it.

Because my name wasn't vital to NIATT's funding and Brian had some time on his hands, the solution to my time problem was pretty obvious. Brian's specific training is in power engineering, but he is a generalist like me, has excellent people skills, is very, very smart, and I had a lot of respect for his abilities. I knew he could step in and take over the liaison with NIATT and do just as good a job as me, maybe even better. Certainly, I knew, he'd do a better job than I could with so many big projects on my

hands all at once. I went to see Brian, explained the situation, and asked him if he could take over for me with NIATT. To my relief, he agreed. The next thing was to sell Mike on the idea. Mike didn't know Brian all that well at the time, and he was understandably nervous about the whole idea. Of course, Mike tends to be nervous most of the time anyway, so that wasn't unexpected. It helped a lot that Brian is probably the smartest guy in the department, in my opinion at least, and I was able to give Mike my guarantee that he'd like Brian and was going to be impressed by his abilities. So it was that in mid-January of 2000 Mike, Brian, and I sat down for a meeting to kick off the NIATT project work for that year and Brian took the helm for the CID and the follow on work that was going to come that year. I still sat in on CID meetings for a little while after that, mostly just to provide a transition and to make sure Mike and Brian got off to a good start with each other, but soon I was pretty much out of the loop and free to give my full attention to my other projects and responsibilities. Brian did an excellent, excellent job, just as I knew he would. □



With Ying Zhou at commencement (2000).

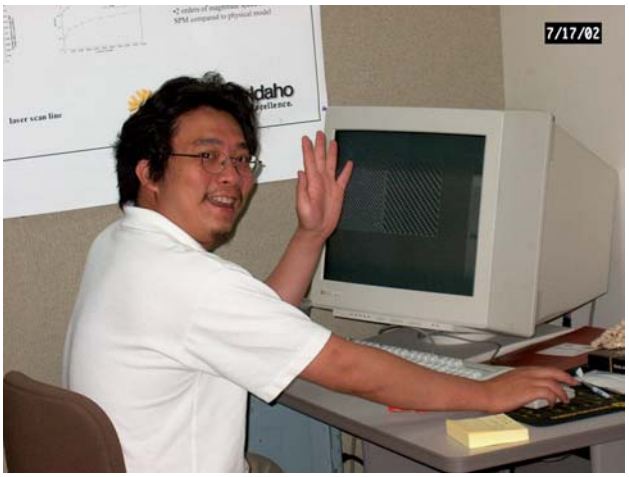
Ying, my RA on the CID project, was graduating in May of 2000 and needed to spend more and more of her time writing her thesis and preparing to defend it. In addition, most of the undergraduates on CID were also graduating. Thus, one of the things Brian had to do was bring on board a new staff of students to work on the NIATT jobs. One of his choices was a youngster named John Fisher I can't resist talking about. I had first met him in the 1998-99 school year when John was just sixteen years old. It's not unusual to meet prodigies in the college setting, kids who are so smart that they're college students before they're old enough to shave, and John was one of these. My initial impression of him was that he was one of the quiet, shy, serious kids who was probably something of a loner. That turned out to be a pretty big misperception on my part. He was already active in the student chapter of the IEEE (Institute of Electrical and Electronic Engineers, the main professional society for electrical and computer engineers) and if he wasn't already an officer in the chapter he became one soon afterwards. It turned out, too, that there was an impish sense of humor hiding just beneath that serious exterior of his. For the annual end-of-the-year Awards Banquet the student chapter held in 1999, at which I was one of the honorees with my second Outstanding Teacher Award from the students, he had gone around taking electronic photographs of all the members of the faculty. He'd caught me in the hallway for this, and when the slides came up at the Awards Banquet he'd doctored the photo. There I was for all the world to see standing in the hallway – playing a banjo! The photos of all my colleagues on the faculty had likewise been doctored to show them doing various odd or strange things. It was absolutely hilarious. John later went on to graduate school and received his Master's degree in electrical engineering in May of 2002. □

The new project being added to the HP program was a neural network project. When a laser printer's print engine is designed, the optics and mechanics are designed to achieve a specified density for the number of pixel dots per inch (DPI) it can print. However, it turns out the nature of the physical process by which the print engine's photoconducting drum is exposed to the laser beam makes it possible to print at a higher resolution of dots per inch by modulating the laser beam on and off in a very precise way. For example, it is possible to make a printer designed to print at 600 DPI print at 1200 DPI instead. Depending on the specific way this is done, the method is called Resolution Enhancement or Resolution Doubling ("RES-doubling"). It had been invented several years earlier and was being used in some of HP's Laserjet printer products.

The quality of the printed outcome depends in a very crucial way on precisely how the laser beam is modulated on and off, and it depends on what the surrounding pattern of pixels looks like. It also depends

crucially on a great many physical parameters in the print engine, and what works for one brand of print engine often does not work well for another. For this reason different print engines have to be supplied with print controllers that contain a custom-designed pattern-recognizing computer circuit called a 'modulation template.' The physical process involved is so complicated that no one has yet been able to figure out a mathematical description from which modulation templates can be analytically designed. Problems like this are said to be 'ill-posed problems' by the mathematicians. Instead, modulation templates were designed using a trial-and-error process that more or less followed a heuristic procedure. The word 'heuristic' just means 'helping to discover or invent' and a heuristic procedure is basically just a way to look for a solution that has usually worked in the past but has no guarantee it will work this time. An engineer would basically make an educated guess at a set of modulation templates (more than one is required for the printer), test his guess by printing out a test page and evaluating the quality of the result, and then he'd modify his guess and do it all over again. It was a slow, tedious, time-consuming process and the engineer who'd be assigned to it usually hated doing it. It was part of the 'art' of engineering.

The challenge Ken laid before me was: Is it possible to automate this process and still come up with modulation templates that give as good or better results than a human being could achieve? Nobody, me included, knew the answer to this question but I did know one thing: If it *could* be done, a neural network could 'learn' how to do it. Ill-posed problems are a neural network's specialty. Furthermore, because we had such an accurate computer model of the physics of laser printing, and one that could be set up to simulate any set of print engine parameters, I knew we would be able to completely automate our neural network 'template designer' provided that a neural network did end up able to solve the problem. It really isn't boasting to say my lab was the one place on earth where we had the tools and the expertise to solve this problem. If it could be solved.



Akaraphunt Vonghunghae, popularly known as Kwan. Kwan was my RA who worked on HP's neural network project. He is from Thailand and today he's a professor back at his home university.

For my RA on this project I hired a newly arrived Ph.D. student from Thailand with the jaw cracker name Akaraphunt Vonghunghae. It takes a bit of practice to learn how to pronounce his name, and most people never do quite get the hang of it. For that reason, he went by his nickname, Kwan. Kwan had recently received his Master's degree from Vanderbilt University for work in robotics and had come to the UI to continue his graduate studies.

I first met Kwan as a disembodied voice. In the fall of '99 I was teaching our senior level course in communication systems, which is where our electrical engineering seniors and graduate students learn how radio, television, modems, and the like work and how to design such systems. The UI has one of the oldest distance education programs in the nation – it's called the Engineering Outreach Program – by which live courses are videotaped and sent to students (mostly graduate students in the private sector and the armed forces) all over the nation and, sometimes, all over the world. For example, someone on active duty in the U.S. Army, Navy, Air Force, or Marine Corps can earn a professional Master's degree in electrical engineering while stationed anywhere on earth. I've had quite a few graduate students in the service get their Master's degrees through this program, and that fall my course was being offered through EO from one of our TV classrooms.

I had an unusually large enrollment of on-campus students that fall, too, and the classroom where I was lecturing wasn't large enough to accommodate all of them. What we did was set up an 'overflow room' in a nearby building on campus and students who couldn't find a seat in my room would sit in the

overflow room and watch the lecture live on television from there. We had a talk-back system where each student had a microphone in front of him and could ask questions from the overflow room. EO trained a camera on those students, and I could see them on a TV monitor built into the lectern where I was standing so I had some feedback on whether or not the students in that room were understanding what I was saying. Most of them, that is. It turned out the camera couldn't pick up every seat in that room and there were blind spots. Kwan always sat in that room and he always sat in one of the seats just outside the camera's field of view.

And he asked a lot of questions. He speaks English with a very heavy Thai accent, so his voice was immediately recognizable. I'd look at my TV monitor to see who was asking the question, but when it was Kwan I could never see the person I was talking with. He was a disembodied voice coming over the speaker. It wasn't too hard to guess that the name Akaraphunt Vonghunghae on my class roster probably went with that thickly accented voice, but I didn't have a clue what he looked like. It wasn't until late in the semester when he came to my office one day for help on a homework assignment that I was finally able to put a person with that name and that voice.

Kwan had been an exceptionally good student in my class and he has a personality I'd describe as lovable and a little bit goofy. Over the years I'd met a couple other guys from Thailand and they, too, had the same delightful, joyous personality Kwan has. If these guys are typical of the Thai people, Thailand must be a very happy country. That combination of brains and a lovable personality was something I looked for in my RAs who worked on the HP contract because the ability to get along well with the folks down at HP was just as crucial to the success of our research partnership as our technical results were. HP in those days was very, very much a people company where teamwork was paramount. There was a good reason why over the years HPers would joke that HP stood for 'Have Parties.' Kwan, with his demonstrated knowledge of signal processing theory, his background in robotics, and his infectiously happy personality, was perfect for the new neural network project. When the contract for this project was awarded, I offered Kwan a Research Assistantship to work on it. His face lit up like the sunrise coming up over the Idaho mountains, and to my astonishment he grabbed me and gave me a giant bear hug. That was the first and only time I've ever been bear hugged by a student. I took it to mean he accepted the offer.

My electrophotography lab now had two graduate students, Jang and Kwan, plus two undergraduate students, Ning Choy and nineteen-year-old Mark Pigman, working as Research Interns assisting Jang. The last I heard, today Ning works for Boeing and Mark – who just dropped in to see me a couple of days ago – works for one of the electric utility companies. As January of 2000 got under way, one of the first things I had to do was start teaching Kwan about neural networks. His background in robotics from Vanderbilt didn't extend to neural network theory and neural networks are a bit different from other kinds of systems. The principal difference is that neural networks are self-modifying systems; they change in response to the inputs they receive and the outputs they produce in reaction to these inputs. In technical terminology, they belong to the class of systems that are called 'adaptive' systems. Bernie Widrow, my old professor at Stanford, used to say his course in adaptive systems was a class in 'machine psychology.' In a slightly romantic sense, a neural network is said to 'learn from experience.' All the way back on the Watchdog project at Delcon, twenty-three years earlier, Willy and I had started to look into using very primitive neural networks in that design. When I had given that division review presentation to Bill Hewlett and the Board, I'd remarked that Watchdog would self-improve its performance as time went by, and Bill had remarked, "Like a fine wine."

What all this means for the engineer is that he doesn't actually design the neural network. Instead, he designs how that network will design *itself*. A neural network's ability to design itself is what makes it capable of solving ill-posed problems. In engineering you usually can't design something that solves some problem unless you can adequately state that problem in mathematics. The inability to do this is what makes ill-posed problems ill-posed. But the problem of designing a neural network's ability to design itself is *not* an ill-posed problem. A well designed neural network will proceed to pick away at an ill-posed problem, sometimes just by trying things and seeing how they turn out, until it succeeds in

coming up with the best solution it can given the way it has been designed to evaluate its own performance. There aren't many kinds of systems that work this way. The human brain is one of them. The brains of mammals and most other animals are another. The artificial neural networks engineers build are another. Other kinds of adaptive systems are yet another. Electronic brains will be some day. That's pretty much it.

But most engineered systems aren't this way and almost all of an engineer's education is geared to the design of that vast body of systems intended for well-posed problems. That meant Kwan had a pretty big conceptual stumbling block he had to get over; he had to unlearn a lot of the habits of thinking all his years of engineering training had given him and learn to think in a different way. He had to forget about designing the neural network per se and learn how to design its ability to design itself. My years of experience in teaching this subject have taught *me* that this is usually the hardest thing for the student to grasp. It goes against the grain of a lifetime of education and training. The most rudimentary principles of neural network design aren't hard to grasp (although the sophisticated and advanced body of knowledge developed over the years can be). I've taught juniors how to put together simple working neural networks. But changing how one *thinks* about neural network design is tough. Habits die hard. Kwan is pretty bright and he picked up on the theory well enough pretty quickly. But it took him quite awhile to learn to overcome the temptation to try to design the neural network's *solution* to the problem we were giving it rather than the network's self-learning process by means of which *it* would find the solution.

In the end we were successful and by the year 2004 Kwan's neural network was producing modulation templates for Laserjet printers that produced images every bit as good as those obtained by human design. Sometimes even a little bit better. Compared to Hua's earlier neural network, this one came a good deal closer to satisfying the criteria that define what an electronic brain must be, but it still fell well short of this mark and is just another machine. But HP wasn't paying for an electronic brain; they were paying for this machine and I believe in giving the customer what he wants to pay for. After all, it's his money. □

In March of 2000 I had an unexpected experience with our criminal justice system. It began when the phone in my office rang one Monday morning. The call was from one of my students and he was calling from the Latah County jail.

The whole incident had begun late the Saturday night before. He and his girlfriend had been living together off and on in his apartment; as I understand it, she had an apartment of her own but it wasn't getting used very much. Apparently their relationship hadn't been going so well lately, and that night he had told her they were through, he wanted his apartment key back, and for her to take her stuff out and go back to her own place for good. After a long and noisy argument he got his key back, she got her stuff, and it looked like that would be that. But then she came back, pounding on his door, and when he wouldn't let her in she opened a window and crawled through it back inside. I guess that's when the real fireworks had started. In the process he had laid his hands on her, and when the Moscow police showed up they broke up the fight and arrested him on a misdemeanor battery charge. His bail was set at a couple hundred bucks and some of his friends were able to raise that. That should have pretty much been that; he'd have gone to court a few days later and, since he was guilty, he'd have spent a few days in jail and that would have been the end of it. I probably wouldn't have ever heard about it.

Unfortunately for him, that wasn't the end of it. We have an assistant county prosecutor here who I'd describe as a radical feminist. The next morning she saw an opportunity to make an example of my student and had him re-charged with felony domestic battery under a new law the Legislature had passed the previous session. Now he wasn't looking at a few days in the county jail; he was looking at two years in the state penitentiary down in the desert outside of Boise. Now his bail wasn't a couple hundred bucks; it was five thousand dollars. The police had re-arrested him on the new charge, he was back behind bars, and for him five thousand bucks might as well have been five million. He was calling me to ask for help – specifically, for bail money.

After I heard the details, I was indignant. I happen to think the punishment ought to fit the crime, and

in this case the charge and the penalty it carried was out of all proportion to what had happened. I didn't have any doubt that my student deserved to spend a few days in the county's accommodations. I also didn't have any doubt he did *not* deserve to spend two years in the state pen and he did *not* deserve to have his entire life ruined. What was happening to him didn't have one single thing to do with *justice* and it had everything to do with radical feminist politics. That's the way I saw it. I drove down to the county courthouse and gave them a check for five thousand dollars. I knew the student was a good kid and I wasn't worried about him jumping bail. About a half hour later the side door at the jail opened up and out he walked. And I gave him a pretty good talking to. He didn't yet appreciate just how much trouble he was in, and that was something I helped him understand. I told him flat out he deserved a few days in jail; I was helping him because I didn't think he deserved two years in prison. By that afternoon he'd found himself a lawyer. A pretty good one, as it turned out.

His hearing on the felony charge didn't happen until three months later in early June. Since I had a personal as well as a monetary interest in his case, I attended the hearing. The presiding judge was Judge John Stegner, whose brother happened to be a representative in the Idaho House. The hearing was on a motion to dismiss the felony charge my student's lawyer had filed.

I'll never make a lawyer. Try as I might, I couldn't follow the legal arguments going back and forth between my student's lawyer and the assistant prosecutor. Fine point upon fine point, technicality upon technicality; the whole thing soon became a legal haze to me. It kind of sounded like the argument was over the *intent* of the Legislature in passing this law. Probably the only three people in the courtroom who knew what was going on were the two lawyers and the judge. Then the prosecutor made a mistake and even *I* knew it was a mistake. She read into the record the language of an early *draft* of the bill that had established the law under which my student had been charged. Specifically, she read into the record the language *that had been dropped from the final bill.* I had to admit that under that language this young man would have soon had a pretty clear daily view of sagebrush and sand from a barred window in Idaho's not-so-cozy accommodations down south.

But that was just the point. This language had been specifically *dropped* before the bill had been passed. I couldn't believe what I was hearing. It seemed to me the prosecutor was presenting the clearest argument possible this case *wasn't* what the Legislature had intended. She was sinking her own case.

Apparently Judge Stegner thought so too. I was watching him closely during this and I thought the expression on his face said very clearly, *What does she think she's doing?* Our persecuting prosecutor didn't seem to notice. After she finished, the judge gave her what I would characterize as a very sharp reprimand. The fact that this language was dropped was significant, he said. That fact clearly showed it was *not* the intent of the law that it be applied to this case. Etc. Etc. Then he dismissed the felony charge and re-instated the original misdemeanor charge but with bail set at one thousand dollars. My guess is this might have been because it was now summer, school was out, and he thought there might be a bigger risk of a student not showing up for trial because of that. This raised the question, asked by Judge Stegner himself, if the party who had posted the original bail (me) would still be willing to post bail this time. They all looked at each other. That was when I stood up from where I'd been sitting in the audience seats. The judge looked at me.

"Your Honor," I said, "I'm the person who posted the bail and whatever you decide is okay with me." That settled that. I got four thousand of my five thousand dollars back that afternoon, and the rest of it after the subsequent trial. My student spent a few days in jail and that was the end of it.

I got involved because of the blatant injustice the prosecutor's office was trying to pull off. It seems to me from this incident and from others I read about in the paper or see on the news that there has been a growing trend in our justice system going on for quite a few years now. Legislatures pass laws that curtail judges' authority to exercise judgment. Extremist political groups get laws passed that make felons out of more and more people. More and more, a lot of our laws are starting to look like the sort of inquisition charges that got heretics burned at the stake in Middle Age Europe. The laws are being written to punish

abstract people stereotyped to fit what some mob of fanatics dedicated to some cause think their pogrom should do to whoever they don't like. One example that stands out in my mind was a tragedy I read about a few years ago. There was a single mom who was living in a motel room with her three children, ages thirteen and, if I remember correctly, five and three. The mother went to work one morning leaving the thirteen year old to baby-sit his younger siblings. The kid fell asleep, the two younger kids wandered out to the motel swimming pool and, sadly, had an accident and drowned. The police arrested the mother and charged her with felony child endangerment.

Under that precedent, today they'd be able to charge my mom for the same thing because my cousins babysat Melody and me when we were little. Is this justice? I don't think so.

Another of my favorite examples of stealth lawmaking was passed many years ago by some group who took it upon themselves to decide we were all wasting too much water when we flushed our toilets. This group got a law passed that outlawed toilet tanks above a certain volume and forced commode makers to only make and sell tiny little toilet tanks. Never mind that a lot of people ended up having to flush two or three times to get their business down the drain, thereby using up more water than before.

When I first moved to California back in the seventies, there was a dim-witted special interest group that was lobbying to make the standardized tests they used in the public schools easier. Why? They wanted more kids to score above average. Hey there, Mary Poppins: 'average' *means* half the kids score more and half the kids score less. I guess you missed class the day they taught that, eh?

The terrible fact is today we have a lot of fanatical special interest groups deciding their view of crime and punishment, or education, or social responsibility, or religion, or child-rearing should prevail, and they are getting lawmakers to quietly pass new laws to sanction their opinions. They use the justice system to unilaterally impose their rule over how the rest of us have to think and behave. Why not just toss out the state codes altogether and put *Leviticus* in their place? That's what stealth lawmaking to sanction special interests is anyway: the use of force to dictate social mores and folkways without debate in order to make other people dance to your tune. To these people, I say, "go screw yourself."

Lawyers and judges these days are fond of saying the justice system is about the law, not about justice. I think there's something fundamentally broken in any justice system that doesn't put justice first. □

One of the things that makes working at a university interesting is all the different people from all different disciplines, backgrounds, and points of view you get to meet. In March of 2000 I took the opportunity to become involved with a very interesting group in a program called 'Tools R Us.' This program was organized by three professors the UI named as Humanities Fellows that year. They were: Assistant Professor Michael O'Rourke from Philosophy, Associate Professor Rick Fehrenbacher from English, and Professor Dan Bukvich from our Lionel Hampton School of Music. Dan is a dignified older man who has so much talent in music that I've never been able to tell what his scholarly specialty in the music field actually is. I do know he's one fine conductor and composer. I had wanted to meet Michael for a long time by then, ever since coming to the Moscow campus. At a faculty workshop I'd struck up a friendship with a very brilliant guy from the business school named Ray Dacey. Ray is an extraordinarily well read scholar with whom you can converse on any subject as long as you can keep up with him, and he is, as the Irish say, a darling man. He had told me of a bright young philosophy professor interested in the philosophy of mind named Michael O'Rourke, and had described Michael as "a big elf." How could I not want to meet this guy? Rick Fehrenbacher looks a lot more like a cowboy poet than an English professor, and his area is Medieval Literature with special focus on the Anglo Saxons. I like him a lot but whenever I see him I usually can't resist asking, "Hey, Rick! What's new in Medieval Literature?" Turns out that occasionally something is. A few years ago he was excited to the glowing point over a new translation of Beowulf. He also told me a story once about when he went on a trip to Ireland and met Ireland's Poet Laureate. The two of them were talking over whiskeys in a pub, and Rick was amazed and impressed that his companion started speaking in verses. Whatever they talked about, the Poet Laureate conversed in poetry right there on the fly. I sure can't do that.

The Tools R Us program was focused on the topic of how technology ('tools') affects society as a whole ('us') and how society affects the development of technology. It drew people from all the different colleges and dozens of fields for interdisciplinary discussions on a wide range of questions, problems, and issues. Not the least of these was a fascinating discussion of ethical issues new technologies tend to raise. We never had any problem finding plenty of people to fill both sides of every topic we talked about. The diversity of viewpoints and opinions was astonishing, as was the uncovering of the many blind spots each different specialist brought to the debates. Since everybody involved was a college professor, there didn't turn out to be any 'pushover' issues, no 'if you knew more about this or that you'd see things my way.' The interaction between social issues and technology turned out to be far more complex than I'd ever appreciated before. I'm pretty sure everybody there learned a lot of things they hadn't known before. I sure did. A lot of food for thought was served up in the Tools R Us workshops and discussion groups.

One of our workshops was held at the UI's field campus just outside McCall, Idaho, which is about two hundred miles south of Moscow and a hundred and ten miles north of Boise. One warm summer afternoon after the workshop, my new friend Michael – who *is* sort of like a big elf – organized a volley ball game. My knees felt okay that day and I used to play a lot of volleyball in my days at Iowa State, so I eagerly joined the game. As usual, I was pretty close to the shortest person playing. There might have been a couple of women who were a little shorter than me. By then I also had put on a fair amount of excess weight so I looked like anything but athletic. But I still had pretty quick reflexes and I could still jump, so I managed to surprise a few people who'd assumed I'd be the weak spot in the defense and not much of an offensive threat. Michael in particular was impressed. Or maybe amazed is a better word. There was still a bit of the boy in the old, white-bearded Santa Claus character that day. I've always liked surprising people who underestimate me on the ball field, no matter what the sport. And I still don't like to lose.

Of course, any more I end up using a lot more Ben Gay afterwards than I used to. □

UI's Signature of Life Grand Challenge team. Front row left to right: Ron Crawford, Touraj Assefi, Chen Wai; Middle row left to right: Andrzej Paszczynski, Dan Erwin (RA), Frank Cheng; Back row left to right: Giancarlo Corti (RA), Tony Anderson, me, Bruce Barnes (RA), Q. Lang (RA).

The SOL project – NASA's Grand Challenge – was fully under way, and under Ron's leadership we were making the fastest progress I'd ever seen a major project make. In addition to Ron and myself, the team included Dr. Chen Wai and Dr. Frank Cheng from the Chemistry Department, Dr. Tony Anderson (my colleague from our Boise days) from mechanical engineering, and Dr. Andrzej Paszczynski, a microbiologist from Ron's Institute. In addition we had an impressive squad of graduate and undergraduate students working on it. My RA, who was doing the electronics to support Frank's chemistry, was a very non-traditional Ph.D. student named Bruce Barnes. Bruce is older than I am by a few years. His goal in life was to teach at a teaching university and since a Ph.D. is pretty much mandatory for getting this kind of job, he'd gone back to school to get one. He was married with adolescent children and it was a real tight stretch financially to support a growing family and go to school at the same time. His RA appointment covered the costs of his schooling and his wife worked to bring in the rest of the money they needed. In such circumstances, academia refers to this as 'working on her Ph.T.' (Putting Hubby Through). I've always thought the university should honor the wives who do this with some sort of sheepskin to publicly recognize their indispensable contributions, without which their husbands' successes would not be possible. It wouldn't be an academic degree, but I can't think of too

many things more honorable and more deserving to be honored than a Ph.T.

The science team was very much leading the charge and our results were spectacular and completely vindicated our hypothesis that the electron transport chain could be detected and was a signature of life. The process we used is interesting and I'll try to describe it here without getting into too many esoteric technical details. A soil sample would be placed in a small metal chamber – Tony designed this and we called it 'the pipe bomb' because it looked like a pipe bomb – and the biological matter was extracted using what is called 'supercritical CO_2.' This is a special state of carbon dioxide gas produced through a combination of temperature and high pressure, and it acts as an extractor of chemicals. For example, supercritical CO_2 can be and is used to extract caffeine from coffee grounds. Chen Wai is one of the world's leading experts – maybe even *the* leading expert – on supercritical CO_2 and its uses. He and Tony and their students were teamed up to do this part of the instrument.

The supercritical CO_2 extraction process also ruptures the bacteria cells, after which the extracted molecular constituents were transferred to another gizmo that performed what is known as chemical electrophoresis. This is a process by which different kinds of molecules and atoms can be physically separated out of the chemical 'soup' produced by Chen Wai's and Tony's extraction process. The chemicals travel down a long, specially constructed tube and the electrophoresis process causes them to move at different speeds – lighter molecules go faster than heavier molecules. In this way, different chemicals reach the end of the tube at different times in a kind of batch process. At the end of the tube we placed an electrometer, which is a gadget consisting of three electrodes that can measure the properties of the current flow produced by the different chemicals as they exited the electrophoresis tube. Frank is an expert in electrochemistry and this measurement was the way we detected the presence or absence of the electron transport chain.

Finally, the molecules were sent into an instrument known as a mass spectrometer, which is a gizmo that measures the masses – think of it as the weights – of the different atoms present. Each atom has a distinct mass, and the mass spectrometer told us specifically what elements were present in the biological sample. Combined with the current measurements from Frank's electrometer, it was possible to positively tell if we had an electron transport chain and identify, by post analysis, what kind of electron transport chain it was.

The whole thing worked so well that by July of 2000 we were able to present our first paper on the system at a conference held at the Lunar and Planetary Institute in Houston. It appeared in the journal *Concepts and Approaches for Mars Exploration.* We would eventually publish three more papers on it in 2001 and 2002, which appeared in *Icarus* (the journal of the American Astronomical Society), *Analytical Biochemistry,* and *BMC Microbiology.* During the course of our work, Ron and Andrzej also came up with another and even simpler method that provided additional verification of the signature of life. It used a chemical reaction called 'dye reduction.' This measurement could be done using chemicals and what is known as a light spectrometer, a gadget that can tell what colors of light are present. Our paper on this won an 'Editor's Choice' award from *BMC Microbiology.*

We did all this work in the laboratory using off-the-shelf instruments and components. To make our method practical for space exploration, all these things had to be miniaturized and the process fully automated. During the second half of calendar year 2000, a lot of my time on the project was going into designing the system we would propose building for NASA. This is known as a 'block diagram design' because it is essentially a very detailed set of technical specifications for how the overall system worked and what each major subsystem within it had to do. One of the things Tony and I had to do was make sure that everything the science team came up with *could* be built in such a way that it could be placed in a space vehicle and flown to Mars or wherever NASA decided to send it. It had to be compatible with all the power, size, and weight restrictions imposed on it by the space vehicle, and it had to survive the very harsh environmental conditions found in outer space and on the other planets and moons of the solar system. For the mechanical and chemical components of the system we were planning to use what is

known as micro-electromechanical systems (MEMS) technology, which is a relatively recent engineering field credited to a challenge laid down one time by Richard Feynman, the Nobel Prize winning physicist who had investigated the Challenger disaster. The rest of it would use custom designed microelectronic chips, which was and is the central core of our expertise in the MRC Institute.

At the end of calendar year 2000, JPL held their final review and evaluation of the Grand Challenge research projects. Of the six teams, we were the only ones who had *demonstrated* that we knew how to detect living organisms in a non-earth-centric way. The itty bitty University of Idaho had taken on the big dogs and solved the Grand Challenge when they did not. We'd beaten them all. I felt six feet tall.

I was licking my chops at the prospect of the millions of dollars of funding that would now flow to us for Phase II of the Grand Challenge. From here on out, the emphasis would switch from the science team to the engineering team, and this team would be greatly expanded in size. Unfortunately, events in the bigger world took a hand at this point. While we had been solving the Grand Challenge problem, NASA had experienced two spectacular back-to-back failures of Mars missions. One of them was caused by an incredible blunder on the part of an engineer at one of NASA's contractors and led directly to the crash of a hundred million dollar mission. This guy had used the English system of measurements, instead of the specified metric system of measurements, in his design and this had caused the numbers coming out of his subsystem to be incompatible with the rest of the space vehicle's systems (in other words, wrong). It was a painful embarrassment for NASA, and the expense of these failures led directly to major cutbacks in a number of other areas within NASA. One of these was the Grand Challenge. All the funding for Phase II was cancelled so the money could be redirected to NASA's efforts to recover from the mission failures. I understood NASA's decision; I would have made the same one if I'd been running NASA. But I was very disappointed that incompetent engineering done elsewhere had cost me my Phase II project. Clearly for the space program, we weren't in the sixties anymore. □

Another new thing got started during the late spring and summer of 2000. I first learned about it at the Tools R Us workshop in McCall from my friend James Foster, who was at that time a professor in our computer science department. A diverse group of professors, including my new friend Michael O'Rourke, had just begun holding informal meetings to discuss the formation of a new graduate program in neuroscience – the study of the brain. James was already part of this group, he knew of the work I was doing on electronic brains, and he thought this was something I'd be interested in getting involved with. Was I interested? You bet!

The initiative to form the new neuroscience program was led by a young assistant professor from the Biological Sciences Department named Deb Stenkamp. Deb had come to the UI in 1997 after receiving her Ph.D. from Johns Hopkins University and putting in a few years of postdoctoral work. I was very impressed from the start by her leadership capabilities and her skill at building a team out of a diverse group of professors from all age ranges. Although biology has been studying the brain for a century, the field of neuroscience itself is a relatively new young science. Most neuroscience programs focus on just one of the three major subdivisions of neuroscience: biological neuroscience (the traditional and most commonly found subdivision), cognitive neuroscience (psychology applied to brain study), and, newest of all, computational neuroscience (the mathematical theory arm of neuroscience). Additionally, the sciences of chemistry (in the form of pharmacology, the development of drugs) and biophysics also play important supporting roles in neuroscience and, very recently, the science has admitted philosophers to its ranks in order to address the difficult problem of understanding the links between our understanding of the brain and what it is we mean when we talk about 'mind.'

Washington State University, eight miles down the road on the other side of the Idaho-Washington border, already had a traditional neuroscience program, which is to say they had a biological neuroscience program. The UI and WSU have cooperated with each other for a long time by cross-listing each other's courses, and students – both UI and WSU – can take cross-listed courses at either university and receive full credit for these courses at their home institution for no additional fees. The two schools even

coordinate their calendars so classes begin and end on the same days of the year and semester breaks likewise coincide. Classes at WSU start on the hour, those at the UI start on the half-hour to give students time to ride the free bus that runs back and forth between Moscow and Pullman, WA all day Mondays through Fridays. With WSU right next door, it wouldn't have made much sense to create a second traditional neuroscience program on the UI campus. Instead, under Deb's leadership, what we were proposing was a program that would promote interdisciplinary learning that cut across all three wings of modern neuroscience – biological, cognitive, and computational. Students in our program would be required to take three 'core courses' – one in each of these three subfields – before specializing in their chosen particular subfield. In this way we would be augmenting and supplementing what WSU was already doing rather than going into competition with them with a redundant traditional graduate program. Deb and three other professors from Biological Sciences – Mark DeSantis, Mike Laskowski, and John Byers – along with Nick Natale from the Chemistry department were representing the biological wing of the program. Four professors from our Psychology department, and also Michael O'Rourke, were handling the neuropsychology wing. A couple of other professors from Statistics and Computer Science and I comprised the computational neuroscience leg of the stool.

You might well wonder how someone like me, an electrical engineer by training and experience, could come to be accepted as a professor in a neuroscience program. The answer lies with my specific area of training and expertise, namely system theory. System theory is basically a discipline aimed at understanding and modeling how very complex things work. For example, the field of neural networks was originated by two psychologists – Walter McCulloch and Walter Pitts – in 1943, but since then most neural network theorists have come out of the discipline of system theory and most system theorists start out as electrical engineers because electrical engineering is the most mathematically intensive field of engineering. To a system theorist, the brain is just another system (albeit the most complicated one humankind has ever undertaken to study), and it can be treated by the same methods we use for less complicated systems. A system theorist has to be able to understand and use the special sciences that study the particular types of systems he works with, and the more he or she knows about those special sciences, the better. But once a mathematical model of a system has been developed, that system is now on our 'home turf" and we can bring our own special scientific tools and training to bear on it.

Under Deb's leadership, our group slowly crafted a curriculum for the new program we were proposing. The Neuroscience Program was to be a 'program' rather than a department. The difference is an important one. University faculty members 'belong' to departments, their salaries come out of their home department's budget, and their supervisors – to the extent that term actually means anything in the academic setting under a system of faculty governance like we have – are the chairs of those departments. A 'program' on the other hand is a somewhat looser organization inasmuch as its faculty members usually come from many different departments. The arrangement isn't altogether different from the matrix management organization I had known at DMD where people from R&D, marketing, manufacturing, and the other functional areas of the division took part in new product development. In a way, a university department is like a company's functional area while a university program is like a product team. In a program the academic counterpart of my old job on Coyote IV is the program's Director.

The Neuroscience Program was drawing its faculty from pretty close to all the colleges in the UI, and this meant we needed the support and cooperation of all the various departments to which our faculty members belonged as well as the support and cooperation of all the college deans in the colleges to which these departments belonged. Once we had a curriculum designed, the next vital step was getting this cooperation and buy-in, first from the departments' faculties and then from the deans. That order of precedence is another of the many things that make universities different from businesses in the private sector and is often something business people don't really understand about universities. In the business world if you want something you start with upper management and work down. In a university, you have to start with one or more faculty members and work your way up through the department (or program) next and then to the dean of the college. Chairs and deans aren't managers; they're administrators. The

faculty runs the academics of a university and the administrators are there to see to it things run smoothly. In a sense, a university is very much like the kind of republic our Founding Fathers envisioned. If you want a university to do something special for you and you think getting a dean to agree to it is all you need to do, you're likely to be disappointed. You see, the faculty doesn't work for the dean; they barely work for their own department chairs who, by the way, are *elected* by the department's faculty. Most of the time it's more accurate to say the chair works for his faculty. *That* is *true* republicanism. You'd like it.

But I digress. After we had the curriculum we were going to propose, we next worked on getting faculty buy-in from our contributing departments. That turned out to be pretty easy although Deb had to spend a lot of her time going around making presentations at various department faculty meetings. In the main, the faculty of the various departments were either enthusiastic about the idea or at worst indifferent. Nobody opposed it. Once the departments' faculties had bought in, the chairs came along. Next came selling the deans on the idea. This, too, didn't prove too difficult after we had the departments in our corner. One question that had to be answered early on was: To what college will this program belong? The answer everyone agreed to was that since this was entirely a graduate degree program as well as a very interdisciplinary program, the place where it most naturally belonged was the College of Graduate Studies rather than one of the special colleges.

Once all this had been accomplished, the next step was obtaining approval from the University Curriculum Committee. It isn't enough to get the nod from the departments and colleges. The university as a whole also has to give its approval. In many ways the UCC was the toughest step. Once the UCC had approved it, getting the Provost and the President of the UI to agree wasn't hard. Then came the last and biggest step: Getting the Idaho State Board of Education to give its approval. Throughout the rest of 2000 we worked on the curriculum, all through 2001 we worked our way up through the colleges, and in 2002 we worked our way through the university levels, particularly the UCC. Finally in 2003 our proposal went down to the SBOE, which gave its approval during the spring semester of 2003. In the fall of 2003, our new Neuroscience Program officially opened its doors and admitted our first graduate students. We elected Deb to serve as the Program's first Director and the rest of us became professors of neuroscience (in addition to our home department appointments). □

As the November 2000 elections drew near, one of the things I seriously thought about was if now wasn't the time to sell off many of my stock holdings and put the money into something a little safer. A new President coming into office meant new unknowns for the country and the stock market has a habit of changing directions when a new guy takes up residence at 1600 Pennsylvania Avenue. I was never in doubt about who I thought was the best man in 2000; I was supporting Vice President Gore. But I wasn't impressed by the Gore campaign nor by the tone coming out of the Democrats that year. I was all in favor of a more moderate Democratic Party, but in some ways the Democrats that year sounded a bit too much like the Republicans for my tastes – especially since they sounded kind of like timid Republicans.

HP was another factor in my investment considerations. Lewis Platt, who had taken over as HP's president and CEO after John Young retired in 1992, had retired in July of 1999 and HP had brought in an outsider, Carly Fiorina, to replace him. One of the things that had happened on Lew's watch was the Agilent spinoff. HP had split itself into two unequal parts, with the company's computer business keeping the HP name and the company's test and measurement, analytical products, and other non-computer businesses making up Agilent. Agilent had been called a 'seven billion dollar startup company.' From a purely business point of view I never understood that move. One of HP's strengths had always been its ability for one branch of the company to carry other branches through tough times, and HP's great diversity had always been the key to that. The spinoff looked like something designed to appease Wall Street, and when a company starts managing itself on the basis of what's good for the stock price that's pretty much always a huge blunder. I also didn't like the fact they'd brought an outsider in to take the helm. Ms. Fiorina knew nothing about HP and the now-popular myth that a manager only needs to know how to manage and doesn't need to understand in detail the company or its business is just bunkum. She had come out of Lucent, which once had been Bell Telephone Labs, and Lucent by then was well on its

way to becoming one of the more prominent lack-of-success stories in the high tech world, its stock price at the time notwithstanding.

I still owned several thousand shares of HP stock, so the matter was of considerable importance to me personally. The terms of the Agilent spinoff were a little complicated and one feature of these terms took the form of certain restrictions on when I could sell either my HP stock or my soon-to-be converted Agilent stock. I still had faith in HP's directors, particularly since my old *capo* Dick Hackborn was still around to keep an eye on Carly, but I was nervous. As it would turn out, hiring Carly Fiorina ended up being the worst disaster in the history of HP. But I listened to my head instead of my guts in 2000 and decided to stay invested rather than shifting money into safer havens. That would turn out to be the biggest investment blunder of my life, although up through the summer of 2000 it didn't look like a blunder. The Dow had actually peaked in mid-January of 2000, and the NASDAQ had peaked in early March, but my own investments didn't peak until August of 2000.

By autumn of 2000 I was already very concerned about what was happening to my old company under Carly's reign. The secret to HP's success had always been that company culture called 'the HP Way,' which described its distributed system of managerial power and authority, its respect and caring for its employees, the loyalty, teamwork, and dedication its employees reciprocated, and everyone's careful and thoughtful adherence to the guidance provided by the corporate objectives. I was still plugged in pretty good to the internal HP employee grapevine – I probably knew a lot more about what was going on down in the engine room of HP than Ms. Fiorina and her brood would have liked – and what I was seeing looked like the early signs of the eroding of the HP Way. Decision making was becoming more and more centralized at corporate headquarters in Palo Alto and the people doing the real work were becoming increasingly afraid to speak up when they saw something going wrong. Still, up through September of 2000 Dick Hackborn was still chairman of the board and I trusted Dick. Always had since I'd first met him in 1979.

But on September 22nd he stepped down as chairman and now Ms. Fiorina assumed that post as well. Two months later, just after the Keystone Kops farce of the November elections, the ax fell on HP's – and Agilent's – stock. As Wall Street so colorfully puts it, the stock price fell out of bed and began the longest, deepest, and fastest price decline in the history of the company. Measured from the high to the point where I finally threw in the towel and got out, that plunge ended up costing me three hundred thousand dollars. I still ended up making a net profit – I'd owned that stock an awfully long time – but when my net worth drops by that amount in that short a time – well, I kind of notice that sort of thing.

To make matters worse, the rest of the market – or, at least, the part of it I was invested in – followed suit with a long, slow, erosion-like decline. I wasn't actually hurt that much by what has become known as 'the stock market downturn of 2002.' But I couldn't find a way to stop the bleeding. When the bear takes the market down, everybody goes with it. The years 2000 through 2002 were the first (and so far only, knock on wood) years since I'd started investing that my investments showed a net loss. My own personal bottom came in September of 2002 at a level half a million dollars below the high of August 2000. That's a lot of bottles of soda pop, too. I wasn't a millionaire anymore. It took me from October of 2002 to November of 2004 to climb back out of that hole and cross the million dollar mark in net worth again.

As for the November elections themselves, I was thoroughly disgusted and angered by what I saw. I'm sure the people of Florida can't possibly be the boobs they looked like on election night and the days that followed, as we were treated to the spectacle of 'hanging chads,' recounts, the blunders of the news hounds in calling and then un-calling the outcome in Florida, what looked to me like the blatantly political actions of Florida's Republican commissioner of elections to secure Florida's outcome for the Republican candidate (who happened to be the Florida Governor's brother), and, last but certainly not least, the Supreme Court's unprecedented act of, in effect, handing the election to George W. Bush. As American presidential elections go, 2000 wasn't the most controversial in history. The 1824 election, in

which the House of Representatives ended up handing the presidency to John Quincy Adams despite the fact Andrew Jackson had won a plurality of electoral college votes, makes the 2000 contest between Gore and Bush look like a little boys' fistfight on the playground. But one thing on election night bothered me more than anything else. After mistakenly calling Florida for Gore, the news went to where George W. Bush was sweating it out waiting for the returns to get his reaction to Florida. As I watched him, I said to myself in amazement, *My god, he's pouting!* I thought he looked and acted like a little boy who'd just been made to go clean up his room. *This* was the man who might become our next President? I was very shaken by what I'd seen, and even more so after all the dust and ruckus settled and he did become our next President. *Boy, oh, boy,* I thought to myself, *I sure hope nothing too important turns up over the next four years.* I was hoping for nothing worse than quiet mediocrity. □

I had continued having numerous discussions with my pal Yang-Ki Hong on the topic of blending his research into barium ferrite with applications to high frequency communication systems, particularly the sort of systems used in satellite communications. By late autumn of 2000 we had something taking shape and were able to put in a major proposal with Yang-Ki as principal investigator and six others of us as co-investigators. That paid off in May of 2001 when we received three quarters of a million dollars from the Office of Naval Research. My own part of this contract was pretty modest. My RA, Feng Xie, and I were doing some computer modeling of the ferrite materials being developed under this contract. But my main role was basically that of an interpreter, translating the language of the material scientists and physicists into language my colleague in electrical engineering could understand, and translating his language into theirs. That's one of the challenges in interdisciplinary research. All the players speak different technical languages and here is found another contribution a system theorist brings to the party. A system theorist, by the general nature of his work, has to learn to understand the languages of the special sciences and the special branches of engineering. He or she therefore finds a natural niche in an interdisciplinary project in helping all the different specialists communicate with one another. By this time my partnership with Yang-Ki had led to my being offered an adjunct associate professor appointment with the Department of Material Science and Engineering, which I had accepted. An adjunct professor is a professor who belongs to a different department in the university but who is regarded by the appointing department as a de facto member of their faculty as well. In my case, I was a non-voting member of the MSE faculty but the appointment brought me into contact with more of the folks over there and I started serving as a graduate committee member for more and more of their graduate students.

Also that fall I was teaching my graduate course in adaptive systems and adaptive signal processing through Engineering Outreach, and in that particular year this ended up leading to something pretty interesting. This course is about a topic that doesn't lend itself very well to traditional in-class exams. In place of this, I borrow a page from the playbook of my old professor, Bernie Widrow at Stanford, and the students' grades are based upon individual, semester-long research term projects. I usually have about a dozen or so students, on- and off-campus combined, in this course and each student proposes and carries out his own research project.

One of my students that term was a military fighter pilot. I won't be telling you which branch of the service for reasons that will become obvious. He had a rather keen interest in finding out if some kind of adaptive antenna and signal processing system could be discovered that would solve the problem of picking out enemy radar signals from friendly radar signals. Typically a pilot can assume he isn't likely to be shot down by his own side, but when his aircraft is lit up by an unfriendly radar, nasty things usually happen soon afterwards. In a complex combat environment where there are radars in operation by both sides all over the place, telling friend from foe can be a bit challenging. It turned out he was able to find and give a proof-of-concept adaptive system that suppressed picking up friendly radars and highlighted unfriendly ones. He turned in an excellent research report. The really interesting thing happened later on. After his term of service was up, he continued on with our armed forces as a civilian contract engineer and was able to further develop this system. His work is now highly classified – so classified he can't even tell me anything more about it. But I think it's a pretty good bet that America either has or will soon

have yet another key technology edge over our enemies. And it started in my course in the fall of 2000. A good teacher is a catalyst for his or her students' minds.

And, no, you can't see his term project report. After I learned his work had become classified, I made sure no one could. □

X. The Second Bush Years

In late January of 2001 I got a phone call from out of the blue from Dr. Jean'ne Shreeve. In the world of university research in the state of Idaho that isn't quite the same thing as a parish priest getting a call from the Pope, but it's close. Jean'ne is one of the most remarkable people I've ever known and, like Large Al, is probably best described as a fundamental force of nature. Her first passion is the chemical fluorine, which she has studied for almost half a century and has written hundreds of scientific papers on. Her second passion is research in general. She had first come to the University of Idaho in 1961 as a young assistant professor of chemistry after receiving her Ph.D. from the University of Washington in Seattle. I was a Junior Fire Marshal then. She had been Head of the Chemistry Department from 1973 to 1987, Associate Vice President for Research, Dean of the College of Graduate Studies and Director of the University Research Office from 1981 to 1991, Vice Provost for Research and Graduate Studies from 1991 to 1995, and Vice President for Research and Graduate Studies from 1995 to 1999. In 2000 she had announced that she wasn't getting to spend enough time in her lab anymore and stepped down from all her administrative posts except one: she was still the Principal Investigator for Idaho EPSCoR. EPSCoR is a major National Science Foundation program. The acronym stands for Experimental Program to Stimulate Competitive Research and its main purpose is to raise the level and quality of research performed at America's smaller and less big name public universities.

I had only met Jean'ne one time previously, and that had been at a new employees' orientation back in 1993 after I first came aboard. Her message to us on that day had been pretty simple: Do world class research and do it second to none. One of the things I would soon come to like about Jean'ne is that I never had to guess where I stood with her and I didn't need a secret decoder ring to understand what she was saying. I didn't always like what I was hearing, but I always needed to hear it. And Jean'ne leads by example. She's the best in the world at what she does and all she ever asked of me was to be the best in the world at what I was doing. Professionally speaking, when I grow up I want to be just like Jean'ne.

EPSCoR was what Jean'ne wanted to talk to me about and she came straight to the point. I was going to define a significant focus area for engineering research that industry would be interested in enough that companies would write letters of support saying this was important research. I was going to get them to write those letters. I was going to put together a research team to focus on doing it. And I was going to serve as the focus area leader responsible for getting it done. I had seven working days to come up with something before I had to tell her what it was.

Hello? Are you talking to me?

Oh, yes. She was.

Well, I was already busier than all get out, and I basically didn't want to take on anything more. But it turned out Jean'ne has a peculiar hearing defect. She can't hear the word "no." Nor the word "can't." Nor the word "won't." Her ears just can't hear those words. It's no use to say them to her.

"Look," I finally said in irritation, "why in the world would I want to do this?"

"One million dollars," she replied.

Oh. Well, why didn't you say so in the first place?

After getting off the phone with Jean'ne, I wandered down the hall to Touraj's office to tell him about the weird thing that had just happened. He just laughed at me. He'd already known all about it before it happened and it was he who had told Jean'ne I was the person she wanted for this. It looked like I was

about to become a focus area leader. Whatever that was.

In truth, I felt that taking this on was more or less my duty. We make very heavy use of computers in the MRC Institute, and although my HP contracts year after year had let me equip my own lab with up to date machines, those of the Institute were getting pretty long in the tooth and needed to be replaced. We had other infrastructure needs as well. On top of this, and most importantly, the graduate program in the electrical and computer engineering department had grown more rapidly than funding to support graduate students had, and there was a need to bring in more research money to support our students. A million dollars in funding would certainly take care of our infrastructure needs and support a lot of students.

But I could easily see this was something that was going to chew up a lot of my time, and that being the case I wanted this project to be something that would support my electronic brain research in some tangible way. Nobody had to tell me I couldn't propose 'electronic brains' as a 'research focus area' for EPSCoR; nobody on earth would agree to fund that. Idealist slogans to the contrary, funding agencies are very, very conservative about what kinds of research they are willing to invest in. I had already learned from personal experience the National Science Foundation, despite its lofty mission statement, only funds projects that are almost sure to succeed in meeting the proposal's stated aims. The popular ironic joke about NSF is that you have to do the research first before you can get it funded. Most of what they will fund is incremental contributions to scientific knowledge and very little of it is 'breakthrough' research. The National Institutes of Health, NIH, is pretty much the same way although generally their contracts are much, much larger than NSF contracts. Department of Defense (DoD) agencies are even more conservative. Despite the ridicule periodically heaped on them by Congress and the press, America's federal research agencies are very, very frugal stewards of the taxpayer's money. It's a good thing scientific advances do not exclusively depend on getting the financial blessing of the federal agencies. If they did, we'd have the best darned iron lung you've ever seen but no vaccine for tuberculosis.

Jean'ne had been specific that this 'focus area' had to be something that industry would endorse through letters of support, and I also knew no company was going to endorse electronic brain research. The 'artificial intelligence' (AI) community had been over-marketing what they could accomplish for forty years and had succeeded only in thoroughly discrediting the whole idea in the eyes of industry and, for that matter, most other people as well. If a research community makes a practice of seriously misleading the rest of the public, sooner or later the public finds out about it and the reaction is just what anyone would expect from someone who has been lied to. I think about the only thing that keeps AI going is that there is always a new generation of younger folks coming up who don't know anything about the history of artificial intelligence and so can be enchanted by romantic visions the phrase 'artificial intelligence' conjures up. I certainly had been, and AI was still in the bloom of its youth the day my class had gone to visit the Museum of Science and Industry. In science your reputation is everything. Good reputations take years and years to build; bad ones can be made in a heartbeat. No, I couldn't take 'electronic brains' to Jean'ne. It had to be something else we 'focused' on.

Neural networks, on the other hand, were another matter. They had already earned a respected place in the ever-practical world of engineering and although they aren't the answer to everything, there are some things they do better than any other kind of system we know about. Like AI, the history of neural network research isn't free of hype. Brassy claims about the promise of neural networks made in the sixties was a contributing factor in federal agencies abruptly cutting off all funding for neural network research in 1968. My old teacher, Bernie Widrow, liked to say neural networks 'died' in 1968 and were 'resurrected' in the mid-1980s. Strictly speaking this is a slight exaggeration. There were a very few researchers who kept going throughout this period. Stephen Grossberg of Boston is one of these and he made many very important discoveries during this period, most of which went unnoticed for over a decade until the field 'came to life' again. I call the period from 1968 to around 1985 the 'Dark Age' of neural network research.

But since then most of the hype has been eliminated and by 2001 'artificial neural networks' had

proven their worth in solving many practical engineering problems. The Industrial Electronics Society of the IEEE, which is one of the most practical, down-to-earth, old fashioned technical societies I am familiar with, always has several technical sessions devoted to the application of neural networks every year at IECON, their big annual meeting and conference.

Most people aren't aware of this, but neural networks are responsible for today's digital computer. In 1943 McCulloch and Pitts published a landmark paper in which they first showed that networks of 'neuron-like elements' were capable of implementing any proposition in symbolic logic. This created quite a stir because at the time scientists held the belief that 'the laws of logic' were responsible for the human ability to think. This turned out to be nothing more than a romantic notion, and we know today from hard evidence unearthed by psychological research that it just isn't true. But throughout the 1940s and 1950s, the 'brain as a logic engine' paradigm was accepted by pretty much the whole scientific world. The McCulloch-Pitts discovery quickly came to the attention of one of the twentieth century's most important mathematicians, John von Neumann. He generalized the McCulloch-Pitts result and used it as the basis for a new kind of machine, which he originally called a 'computing device' and which soon after became known as a 'digital computer.' The great, great majority of computers today are based on the original 'von Neumann computer' and von Neumann is generally regarded as 'the father of the digital computer.' The von Neumann computer was essentially a neural network made up of McCulloch-Pitts model neurons. It was regarded as a machine that approximated how the brain worked, and that is why science fiction writers and journalists called computers 'electronic brains' when I was a boy. Today's computer is without any doubt the most important application to have yet come out of neural network research.

(If you happen to be a history buff, I should mention that von Neumann's computer wasn't actually the very first digital computer. A few years before the McCulloch-Pitts paper appeared, an obscure physicist at Iowa State University named John Vincent Atanasoff had wanted a machine to help him solve differential equations and so he built one. It turned out that this machine used many of the same ideas that would later be used in the von Neumann machines. He is today regarded as the 'inventor' of the computer but not as the 'father' of the computer because practically no one knew of his work. It wasn't 'physics' and he himself didn't regard his machine as anything all that important. The only reason we know about him today is because in 1968 Honeywell sued Sperry Rand and IBM – Sperry held the basic patents on the von Neumann computer – and lawyers unearthed the Atanasoff story.)

I figured that research into 'neurocomputers' was something enough people would understand that I'd be able to line up some industry support for the idea and Jean'ne would be able to sell it to NSF. In point of fact, this is something von Neumann himself had always said was the next direction for 'electronic brain' research to go, but his early death from cancer in the 1950s, coupled with the amazing business success of the von Neumann computer, aborted this research direction before it could really get going. In the late 1990s this idea was just starting to come back in the world of neural network research, where it was and is known by the name 'neurocomputing.'

As it happened, the ECE department ('electrical and computer engineering,' as we were now known) had recently hired a new professor, Dan Wilamowski, to replace Jake Baker down at the UI's Boise Graduate Center. Little Jake had elected to stay in Boise after the fiasco, but I guess he felt like he was too out of the mainstream of things down there all by himself. He had decided to jump ship and go to work for BSU, presumably because after they had gotten rid of us, a lot of the villains who had participated in the smear campaign were themselves shunted to one side or sacked by BSU's upper administration when their new college was set up. This wasn't because of what they had done to me and my colleagues; in that these guys were just obeying their master's voice. It was because they weren't competent to take our place. BSU used its own people and then threw them to the side once the deed was done. I couldn't understand how Little Jake could stomach working with these people after what had happened, but somehow he managed to. Dan had come in to take his place at the Boise Center and his area of research was electronics for neural networks.

Dan was 'new' only in the sense of being 'new around here.' He was a great big man in his early sixties and had been a professor since the early 1970s. He was very well connected and was about to become the president of the IEEE's Industrial Electronics Society. He was a Fellow of the IEEE, which is the highest grade of membership that professional society has and which is a very prestigious recognition. At the time I held the grade of 'Member' of the IEEE, although in May of 2001 I would be elected to the grade of Senior Member. (Not too long after that happened, somebody asked me what it meant to be recognized as a Senior Member. "It means I'm old," I replied).

I called Dan on the phone and explained what was going on. He was happy to take part in it and together we roughed out the basic ideas, contributions, and objectives for this 'focus area.' At Dan's suggestion we decided to call it 'Neurofuzzy Soft Computing,' which was a then-popular buzzword for a particular segment of neural network research. The full title of the proposal ended up being "Neurofuzzy Soft Computing via Silicon Structures" to emphasize the point that this research was aiming at electronic technology development for neurocomputing. Jean'ne came to refer to our team as her 'Fuzzies.'

There were some other people I very much wanted to have on this team as well. One of them was a younger colleague in our department and in the Institute named Jim Frenzel. Jim is an expert in what is known as VLSI circuit design. The acronym stands for 'Very Large Scale Integration' and basically it is what most people call 'computer chip' design. Since we were going to be researching neurocomputing, it made nothing but sense to have a computer design expert on the team and it so happened that at the time Jim was going through one of those lulls in external research funding and could use a financial boost.

Another guy I wanted very badly was my old pal from the computer science department, James Foster. James' area of expertise is in something called 'evolutionary computing.' EC is a methodology for using computer algorithms to solve problems that are presently too complicated for human beings to figure out how to optimize. The algorithms are based on making an analogy to the processes of biological evolution and the method is in one sense something that can be described as 'design by organized trial and error' using a 'survival of the fittest' design strategy. EC algorithms churn through 'generation after generation' of designs, eliminating the least fit and basing the next 'generation' on the most successful designs to have 'evolved' up to that point over time. To most people this doesn't sound like a very elegant or even particularly brainy approach, but the trick is to get the process to produce optimal designs in a practical amount of time. The method is based on much, much more than pure random chance and good EC algorithms require a great deal of expertise to invent. To be honest, I was very skeptical of the whole EC idea in 2001, but James had been telling me for years that EC was going to put *me* out of a job some day and I figured, "Well, buddy, here's your chance. Go for it." I wasn't worried.

James introduced me to another guy, a brand new recently graduated assistant professor in computer science named Terry Soule. Terry's last name is pronounced 'soul' and he was jocularly known around his department as their 'soul man.' Terry's area was also evolutionary computing and since he was just starting out – and since I liked him right away and knew we could work together – including him in the EPSCoR project team was just the thing I could do to give him a hand in getting his career launched. As it later turned out, Terry's work was so good and so significant and so impressive that he made a believer out of me when it came to this whole evolutionary computing idea. His results were so amazing that these days I kid him by telling other people, in Terry's presence, that he could design a flying carpet for them if they wanted one. He always winces whenever I say that.

A fourth guy I wanted on the team was my old pal Bob Rinker. Bob was back in Moscow now and leisurely putting the finishing touches on his doctoral dissertation. He hadn't yet defended it and finished up getting his Ph.D. – his leisurely pace would soon become a source of a great deal of humor at his expense around the college – but since we were doing 'neurocomputers' I wanted someone on the team who could fit seamlessly between the world of hardware electronics and the world of real people who would one day use this new kind of computer. Bob was perfect for that role. Unfortunately, at my first meeting with Jean'ne she blocked this because Bob did not yet have his Ph.D.

She also wasn't happy that my whole team consisted of UI people. I had to bring in somebody from Idaho State University, located in east Idaho at Pocatello, and somebody from BSU. I agreed to find somebody from ISU readily enough; I could see her point that Idaho EPSCoR was about Idaho, not just Moscow. But I flatly refused to have anybody from BSU on *my* team. Nobody gets a chance to put a knife in my back a second time, and I haven't forgiven those people at BSU for what they did to us when we were supposed to be partners and teammates in the Engineering in Boise Program. Even though many years have now passed and the people there now aren't the same ones who were there then, I've never seen one single thing coming out of BSU's administration that makes me think for a second that this leopard has changed its spots. Quite the opposite. The faces have changed but the dishonorableness remains the same. Jean'ne tried her best to appeal to my reason and common sense, but I was adamant. I wasn't going to be associated in any way with *those* people. She and I were at an impasse until I finally pointed out that Dan was down in Boise and so 'Adaho' wasn't without representation. Reluctantly, she gave way on this one point. You see, I can be pretty stubborn about some things too. After Jean'ne and I reached our compromise on this issue, I searched ISU's website until I found a likely looking candidate. He was a young assistant professor named Vitit Kantabutra, another native of Thailand who was now a U.S. resident. I got in touch with him, he seemed okay to me, and he agreed to take part in the team.

Over the next several months I worked with Jean'ne and her staff to fill in the details for my team's part of the proposal. I was able to get letters of support for our project from HP, Intel, and Micron, three fairly heavy hitters in the private sector. Our project was just one of three focus areas included in the whole package, and of the three we were the smallest team. The entire proposal ended up being a nine million dollar proposal, of which Jean'ne gave her Fuzzies one million four hundred thousand dollars spread out over three years. The contract was awarded by NSF in January of 2002 and we started work on it February 1st.

Considering Micron's role in the Boise business back in '95, some who were familiar with what we'd gone through had been a little surprised Micron supported us in this. But things were very different down in Micron by 2001. Not too long after we'd been run out of town, another brouhaha had erupted when Mr. Nobel, who was more or less the eight hundred pound gorilla in the kitchen on Micron's board of directors, tried to oust Micron president Steve Appleton. It was never clear to anyone outside of Micron why this happened, but the story that went around was that Micron's entire senior management staff had gone to Mr. Simplot with an ultimatum: If Appleton went, they'd go too. Mr. Nobel might have been the eight hundred pound gorilla, but Mr. Simplot was the two thousand pound gorilla and when the dust settled Steve Appleton stayed and Mr. Nobel went. Not long after he ceased to be the power on Micron's board, Micron started mending fences with the UI, and today Micron and the University get along very well with each other. A lot of my former students work at Micron now and a couple of Micron's higher middle managers are casual friends of mine. Sometimes the leopard does change its spots. □

The changing company culture within HP was starting to show even to outsiders such as myself by the winter of 2001. Ken began holding twice-a-year University Research Review Meetings down in Boise, which was something we hadn't done before. I didn't need to be told what was behind this. By now there was a lot of micromanaging of the company coming out of Palo Alto, and the commencement of these meetings was a pretty sure sign that Ken's technology group was coming under increasing pressure to show why HP, once one of the world's premiere high technology companies, should continue to invest in high technology research.

These meetings were not without interesting benefits. In addition to my laboratory, Ken also had a large group working on various things from Purdue University led by Dr. Jan Allebach, who was a Fellow of the IEEE and is very well known in the image processing field. Another smaller group was comprised of two very interesting guys from RIT who were likewise working on image processing related topics. I can't tell you anything specific about what these two teams were doing because that information is confidential, but I can say that I liked my fellow university researchers very much and what they were doing was very interesting.

The spring semester of ’01 saw us putting the last wraps on our Phase I work on the SOL project. One of the conditions for this contract called for us to turn over the hardware we had developed to JPL, and even though Phase II of the Grand Challenge had been cancelled we still had to turn over our stuff. I wasn’t under any particular illusions about the future of our SOL work. Our method had now been published – that, too, is a requirement – and if NASA ever did get around to implementing our instrument we were not necessarily the folks who would get this contract. This was a big disappointment but that’s life in the big city. The manager types in the private sector tend to think ‘competition’ is something that universities don’t know much of anything about, but these guys have never tried prying money out of the federal agencies that fund research. NSF, for example, funds only one out of every ten to fifteen proposals they receive each year and this isn’t because most of the proposals are bad; it’s because that’s all they have the budget to fund.

The end of the SOL funding meant I needed to come up with another source of research funding in order to continue to support Bruce, my Ph.D. student who had worked on SOL. There isn’t any rule or law anywhere that says a professor is responsible for doing this; it isn’t unknown in academia at all for a graduate student to find himself all on his own when a research contract ends before he has completed his degree program requirements. I wasn’t required to worry about what would become of Bruce now. But I think any professor who doesn’t feel a responsibility to find a way to get his or her students through in these circumstances lacks something pretty important in the makeup of a little thing called ‘character.’ Students don’t come to a university to serve the professors; the professor’s job exists to help the students. This is something I regard as an essential part of the social contract that binds a university community together. I have a fair degree of contempt for colleagues who forget this or cop out to the plea *What can I do about it?* My answer to this is always the question, *What have you tried to do about it?* In Bruce’s case I arranged a Teaching Assistantship (TA) for him to carry him through the fall ’01 semester. After that, Plan A was to put him on the EPSCoR project, assuming this funding was going to come through. In the meantime, I was putting in other research proposals to various agencies just in case. □

Melody and Aaron (1978).

Shortly after I moved to Moscow, I had started taking my Iowa visits in the summertime rather than at Christmas. I missed being back there for Christmas a lot, but winter travel conditions in and out of Moscow are fairly unpredictable and are always extremely inconvenient. It just made much more sense to go in the summer when the weather was good and traveling more predictable. It also meant that it was that much easier for Mom to get out and about during good weather in Iowa now that her health was going downhill.

My trip in June of 2001 was very special. My nephew Aaron had just graduated from college and was getting married. I wasn’t about to miss that for any reason. Besides, Melody had ordered me to be there for it and I knew better than not to do as I was told when my little sister was doing the telling.

The wedding was in Iowa Falls, which is a town in central Iowa and one I had never visited before. As I sat in the church that day watching my nephew – tall, slender, and now a handsome young man – taking his wedding vows, I was both filled with pride and at the same time filled with nostalgic memories, little vignettes of him while he had been growing up. I remembered that night in 1977, a few days before Christmas, when I’d walked into my parents’ house in Maquoketa and Melody had thrust baby Aaron into my arms so I could meet him for the first time. Little Aaron had sort of curled up in my arms and contentedly drooled all over my suit jacket as I held him. I remembered him as a little boy of ten, when I picked him up and gave him ‘airplane rides’ in the living room while he shrieked with delight. I remembered him as an adolescent in high school and seeing what a good big

brother he was to little Donald and Danielle, his younger brother and sister, at their farmhouse outside of Delmar. Now on this day Donald was a lad about to turn thirteen in another month, Danielle was a sweet little lady of eleven, and Aaron was a tall, strong young man about to embark on his life as a new teacher devoted to helping little kids with special learning challenges. I couldn't have been more proud of him if he were my own son. I don't remember what the weather was like that day in Iowa Falls, but for me it was a day bathed in golden sunshine.

Aaron with his son Holden, my great-nephew.

By now Mom was living in a care center for the elderly in Maquoketa. One of her two quacks had convinced her she could not live alone anymore and, in truth, their 'care' for her had by now turned her into a frail little woman who needed a wheel chair to get around and on which the ever present oxygen tank they convinced her she needed would go with her wherever she went. Both Melody and Sherri had tried to talk her into moving in with them, but Mom wouldn't have any of that. Mom had said to me one time, the last year she lived in her own house on the family settlement Sherri owned, "You kids never asked to be born. It was our choice to have you and our responsibility to take care of you. It isn't your responsibility to take care of us." Mom was a proud woman and it was a point of honor to her that she would not be a 'burden' to her children in her old age. She was a woman duty-strong her entire life.

The care center was an old house on Judson Street in Maquoketa. By coincidence it was only a block from our former house, and the old place could be easily seen from the front yard of the center. Mom had loved that house and had never liked it when we'd moved to Bellevue after my sophomore year of high school. I couldn't help but wonder what her feelings might have been seeing that house so close to where she now lived, but I thought it best not to ask. For me, standing in the front yard of the center and looking down the street to that house where so many boyhood memories hovered like ghosts, feelings both good and melancholy were thick in the air around me. The brand new car Mom had so proudly bought only a few years before she could now no longer drive, and she insisted I use it during my visits to get back and forth between Maquoketa and Ronnie's and Sherri's house out on their farm near the town of Oelwein. The care center weighed down on my spirits. I felt it a gloomy, depressing place where its tenants came to last out their final year or two. Many of Mom's housemates were senile, many too feeble to do more than sit on couches in the front room and watch the television with glazed eyes. The staff at the center were good and caring and devoted people, but, still, to me this was not a place to live; it was a place to wait for death. But Mom always said she liked it there, and I noticed that she and one old gentleman had struck up a friendship and they kept each other company. And so I kept these thoughts to myself and I put a mask over my feelings and I did what I could to bring cheer to my mother in this grim and awful place. And I silently cursed the incompetent witchdoctors who had put her here. □

I'm not overly fond of dentists, but as the 2001-02 school year got underway I found myself in need of one. I had developed a pretty bad toothache and just after Labor Day I was forced to admit to myself this was something that needed to be looked at. I asked around for different people's opinions on the local dentists, and Jeff Young, my next door colleague in the Institute, enthusiastically recommended his own dentist, a Dr. Jeff Kline. So it was that the next day I showed up at his office for my appointment.

I must say, I was and am very impressed with Dr. Kline. After examining me, he described what was wrong using dental terminology that I found completely incomprehensible except for the fact that it had something to do with one of my wisdom teeth. "Can you give that to me in English, Doc?" I asked.

"Your tooth has gangrene," he replied.

Uh-oh. *That* I understood. Well, what next?

We talked some more and he gave me a rundown on the options: root canal or tooth extraction. He favored the latter, and after he explained why I had to agree having the tooth yanked sounded like the right thing to do. Normally I'm not too keen on losing body parts, but this case seemed to be the exception. After we agreed on that, he told me the next thing to decide was whether to have him do it or to use an oral surgeon. He gave me a long rundown on local oral surgeons, but I was puzzled. Finally I asked him what was so special that I'd want an oral surgeon do to this. Hadn't he ever pulled a tooth before? Dr. Kline looked a little indignant. "Only a couple thousand," he said. Then why was he telling me about all these oral surgeons? "Some people are more comfortable having it done by one of them," he replied. "Well," I said, "I don't see the need. You do it."

So it was that I was back the next day, which happened to be my birthday. I'd never had a tooth pulled before, but I had friends who had and I was prepared for the worst. It turned out the worst was out of town that day. Dr. Kline was incredibly gentle and there was nothing at all painful about it. The only thing that even remotely resembled pain were a couple of tiny little pinpricks as he administered the local anesthetic. Pretty soon I had my jaw clamped down on some gauze for the bleeding and I was looking at what had been my tooth. "I'm writing you a prescription for hydrocodone," he said.

Uh-uh. Hold it. I knew what hydrocodone was. A couple years before I had, reluctantly, gone to see a doctor about a cyst that had grown in the middle of my back. It had been there for a few years by then, but since it hadn't hurt and I don't go around with my shirt off, I'd ignored it. Unfortunately, it had eventually become infected and something had to be done about it. I had more or less picked a doctor at random and had him do some minor surgery to get rid of it. He had also wanted to prescribe hydrocodone, but when he told me it was a narcotic I had balked. "Are you sure I need this?" I'd asked him. "This doesn't hurt all that much. Wouldn't just taking some Advil do?" He had been pretty skeptical but he couldn't talk me into taking the narcotic. Instead, since it was a Friday, he gave me one of his business cards with his home phone number written on the back. "If the pain gets to be too much over the weekend, give me a call at home," he said, "and I'll give you a prescription." Well, my estimation of him shot up a lot at that. Giving me his home phone number and telling me to call him at home if I needed him did more to inspire my confidence than anything else he could have done. But, like I thought, there wasn't anything more than some minor irritation and discomfort over the weekend. When I went back a few days later to have the gauze pad taken out and for him to do whatever to finish off the treatment, I told him, "The Advil worked just fine. No problems." He looked at me a little wide-eyed. "You're tough," he told me. Tough? Horse apples. It hadn't hurt that much at all. I'd played football with injuries that hurt more than this.

So now when Dr. Kline was prescribing the same narcotic, I wasn't convinced. "Are you sure I'll need this?" I asked, a bit of a challenge in my tone of voice. "Yes," he said. He shoved the prescription into my hand. End of discussion.

I put it in my pocket but I wasn't convinced. I walked out of his office, got into my car, and started for home, which was on the other side of town. I made it as far as past the downtown – less than a mile – before the local anesthetic started wearing off. Just as soon as that started, I suddenly didn't have any doubts at all any more. I made an emergency stop at a pharmacy on the way home and picked up my prescription.

The next day was Friday, September 7th. One thing I'll say about hydrocodone: it could knock an elephant flat on its behind. I tried to put in my regular day at the office, but well before noon I had to admit to myself that I wasn't doing anyone any good by being there. I was just too dopey to think straight and too sleepy to concentrate on anything. I threw in the towel, went home, and just crashed in the living room in front of the TV. Saturday went pretty much the same way, but by Sunday I was able to wean myself off the drug. When I had to have a second wisdom tooth yanked a couple years later, I didn't argue with Dr. Kline anymore. He knew what he was doing. □

The following week, as I was backing my car out of the driveway to go to work, I heard over the radio that one of the towers at the World Trade Center had just collapsed. It was Tuesday, September 11th.

All the way from my house to the Institute I kept listening intently to that news broadcast, but I was not able to make out from the reports exactly what had happened in New York other than that one of the Twin Towers had collapsed. As soon as I got to the Institute I asked Karen at the front desk what had happened. "Was it another bomb?" I asked, thinking about the previous attack on the World Trade Center.

"No," she told me. Then she told me about the jet planes and their suicide crashes into both towers. And about the third attack on the Pentagon. I felt my blood run cold, but not from fear. It was that almost forgotten feeling of icy rage. I had heard or read somewhere that fifty thousand people worked at the World Trade Center. How many had been killed? I thought about my graduate student, Major Mike Vlk, who worked at the Pentagon. Was he okay? I thought about Dave Thompson, who had taken over as dean of the college of engineering just two years back in the fall of '99. He was supposed to be in a meeting at the Pentagon that morning. Was he all right? How many people had been killed there? As the enormity of what had happened sank in, I clamped down tight on my feelings so I could think clearly. One thing was certain beyond any possible doubt. America had been attacked and we were at war.

Touraj was standing in the hallway too, grim faced and solemn. We talked briefly and then he asked, "What do you think will happen now?"

"We find out who did this," I said flatly. "Then we kill them all."

Touraj turned a little pale at this. He'd never heard me speak with such cold-blooded menace in my voice. But the cowards responsible for this had murdered who knew how many innocent Americans that morning and I meant every word of what I said. I wanted them all dead. Every last one of them.

The University observed a brief period of silence for the victims that morning at ten o'clock, and then we got on with classes and other business as usual. This was what had to be done. We were a country at war now, but we did not yet know who the enemy was. I fully expected we would soon know, and I fully expected that soon we would learn how our government would mobilize America's corps of university people to take part in the war effort. Until then, it was our duty to set the example for our students and to show the world the resolve of the people of the United States of America. No one talked about this. No one had to. It was a time for America to stand as one people and look our enemy in the face with all the courage and resolve and ferocity of our nation.

Periodically that day I would check the latest news updates using the Internet, and after work in the days following I followed the news broadcasts closely, waiting with the rest of the country to learn what course events were taking. The morning of 9/11 I had feared the casualties in New York would be much higher. They were awful enough as they were, but they could have been ten times worse and I was relieved to learn they were not. Dave Thompson was safe and unhurt. He had still been at his hotel when the plane struck the Pentagon. I had not yet heard any word on Mike Vlk, but the plane had struck a part of the Pentagon not staffed by his branch. I would later find out he hadn't been there at all. Only the week before his Pentagon assignment had ended and he had transferred to a base elsewhere in the country.

I listened with skepticism as a Bush administration spokesman floated the idea of Iraq and Hussein as likely suspects in the attack. Iraq? They were a contained enemy, their borders sealed off, our foot on Hussein's neck. This sounded like nothing more than wishful thinking, an excuse to strike at Hussein for his assassination attempt on the President's father. Whoever the enemy was, I was sure it could not have been Iraq. The Iraq suggestion was floated once, briefly, then disappeared again.

I listened, first with irritation and then with growing anger, as one cowardly news announcer after another said over and over again the country was quaking in fear over the attack. They made it sound like we were all cowering and weeping in dread. Yes, of course there would be some who would be afraid. There always are. But I saw no signs of terror and dread around me. I saw shock, yes, and anger even more so. But fear? Terror? Dread? Our nation does not react to attacks with fear. America gets mad. Didn't these spineless lily livers know even that much about us? The whole crowd of them disgusted me. Were they trying to create the national fear they were inventing? Where was their sense of duty? Whose

side were they on?

I listened, pride mingled with sadness, to the stories of the heroes in New York, in Washington, and on the plane that had gone down in Pennsylvania. I wondered if, had I been there in their places, I would have had the physical courage to do what they had done, to make the sacrifices they had made. This is something no one can know until standing face to face with danger. I hoped I would have done as they did. Surely here were the heroes whose example touched us all in the deep places of our hearts.

And I watched and listened, filled with a terrible resolve, as the identity of the enemy was finally unveiled. Al Qaeda. Now the enemy had a name. Now he had a face. And now we knew where he was skulking. President Bush told us and the world that any country, any government, that gave shelter and aid to these fatherless pigs would be treated equally as our enemy, and I grimly approved. I doubted if the Taliban fundamentalists tyrannizing Afghanistan would hand them over to us. But if they didn't, they could share the fate of the bin Laden and his malevolent brood. If the Taliban chose to stand by them, they could die with them and that was okay with me.

But not everything about Bush's policy was okay. He told us he was going to make it his personal mission to war on all terrorist organizations everywhere. I heard these words and at first could not believe I had heard him correctly. We had a specific enemy to crush. What was this about *his* personal mission? What was this about de-focusing our strength and squandering it across the globe in some general crusade against faceless, murderous thugs everywhere, even those who did not stand with our enemy?

That's not how to win a war. It's how to lose one. It is not the duty of our Commander in Chief to have a *personal* mission. The President does not get to declare who our enemies are. The President is not granted the power under the Constitution to hold his own private *jihad.* That is why the power to declare war is placed in the hands of the Congress.

But the Congress *again* refused to do its duty. The Congress *again* failed to issue the declaration of war they were bound by oath to declare. It did not matter Al Qaeda was not a country. They were still an identifiable enemy. I thought then, and I think now, their lack of action was shameful and cowardly. They handed the powers of a Roman dictator to George W. Bush and pretended they had not failed in their duty to all of us.

The war was starting off badly.

Concurrent with these events came the anthrax murders. It was not clear whether this was a part of the Al Qaeda attack against America or if this was something else altogether. Still, only a fool would assume it was not part of the attack, that it was some strange coincidence. It appeared to be a threat.

And this one, at least, was something my colleagues and I *could* do something about. Ron and I sat down together and talked about if our SOL method could be turned to task of detecting the presence of anthrax. It didn't take us long to decide it could. Our team would need to do some work to give it this capability, and it would mean some of our experiments would have to be done using anthrax – which posed risks to us and our students that had not existed in the Grand Challenge. But we were certain we could do this and could do it under the kind of rigorous safety precautions required.

Our government was not interested. I never understood why. We were politely, but definitely, turned down. The project never got off the ground.

As the weeks passed, it gradually became clear that – unbelievable as it was – the Bush administration had no intention of mobilizing the resources of America for the war effort. They certainly had no intention to mobilize America's research universities or its professors. This, too, defied all logic and all comprehension. Were we at war or weren't we? Did we face an enemy to be taken seriously or didn't we? To me the answers to these questions were so obvious a blind man could see it. What was Bush doing? I thought about how he had acted on election night and I hoped to God he wasn't in over his head on this.

Any doubts I had on that score were soon settled in Afghanistan. Land-locked Afghanistan looked like

it would be incredibly hard to reach. When our diplomatic efforts brought Pakistan in as our ally, I applauded the success of the administration in accomplishing this. When we found an erstwhile ally in the Northern Alliance, the enemies of the Taliban, I applauded this even more. Pakistan gave us the route to pour men and equipment into Afghanistan, and the territory of the Northern Alliance gave us the marshaling area we needed to bring to bear overwhelming force. Once these two diplomatic victories were in hand, the days of Al Qaeda and the Taliban should have been numbered.

But the overwhelming force wasn't applied. Yes, our armed forces were enough to crush the Taliban militarily, and we did. But instead of bringing to bear our own forces to wipe out our enemy, it looked more and more like the job was being *outsourced* to Afghan warlords and proxy forces whose allegiance to *us* was neither firm nor reliable. Bush and Rumsfeld failed to deploy our own armed might to finish the job. Our leaders took down the Taliban government, yes. But they allowed both the Al Qaeda and the Taliban leadership to escape. They failed to win the war when it was at its most winnable juncture. I blamed Bush and Rumsfeld for that. The responsibility for leading us in war was in the hands of incompetents, just as it had been in Vietnam. We should have won this war in 2002 and they blew it.

Mike Vlk was one of those deployed to Afghanistan. All the normal schedules and rules about course-work were set aside for our men and women serving our country. Many, like Mike, chose to finish out the classes they were taking that semester when and how they could, and whatever we needed to do to support them in this, that is what we did. Just after Christmas I received a letter from Mike dated December 22nd. It read, in part:

> Dr. Wells,
>
> Cold and crappy here, but hopefully doing some good. Flew a mission into Kandahar this afternoon to drop off some equipment and pick up some "customers."
>
> Unfortunately we can't say where we are. But 10 years ago during the cold war I never thought I'd be here. Mail is a bit slow and Email is not available and spare time is sparse. But when I get my last tapes and final [exam], I'll get them back as quick as possible. Have a happy holiday season.
>
> Hope to talk to you soon!
>
> Mike

In late January I received a package from Mike dated January 14th. In it was his final exam for my course and another letter:

> Dr. Wells,
>
> Don't know if this is a first or not, but this exam has several combat missions under its belt.
>
> Our missions into and around Afghanistan have been hauling cargo and troops. We've been flying every day – sometimes two or three missions. So I took the book, exam and some notes on every flight along with a spiral notebook. If we had some time waiting on the ground, or once we were at altitude out of range of the threat, I'd work on the exam.
>
> It's been all over the AOR – Kandahar, Masir-E-Sharif, Bagram, Kabul. It was on the mission where we had to emergency take-off out of Kandahar when the airfield came under fire. I had it when we carried the body of Sgt. Chapman out of Bagram. I had it when we did a twenty-two ton humanitarian airdrop on six drop zones.
>
> Anyway I thought it was pretty cool – Unfortunately, I don't think it helped my grade any!
>
> I won't be able to take a spring '02 class, but hopefully will be able to in the fall.
>
> Take care!
>
> Mike

It *was* a first. And Mike did just fine on it. On his exam I pasted a small silver star decal. □

Despite the assertion that '9/11 changed everything' repeated again and again by the talking heads of what had once been the news programs, it actually changed very little on the home front. Certainly our nation had not been mobilized. One week to the day after the Al Qaeda war began Jang, Kwan, and I were down in Boise at HP for, of all things, a 'science fair.'

I mentioned before that the face of HP under the Fiorina regime was visibly changing. The science fair seemed to me to be another reflection of this. It was essentially public relations on the part of the technology section intended to bring what in the corporate world is called 'visibility' to the R&D work being carried out in Ken's lab. It consisted of an all-day poster exhibition where every project, including those of the university researchers, was on display for HP's employees to come, see, and talk about with the folks who were doing this research. One year later it was being called the 'HP Technology Expo,' which I thought was a more grown up name for it than 'science fair.' In part, one of the objectives of the 'fair' was to stimulate discussions between the rank and file of HP's printer R&D operations and the researchers that would hopefully lead to ideas for future project work. In fact not a whole lot of this went on in any really productive way or led to any important new ventures.

The science fair meant a lot of extra work for me because it was being held during the academic year when classes were in session. Rather than canceling my classes – which would have been very unfair to my students up in Moscow – I took advantage of the fact that my classes were being run through EO and I could therefore pre-tape my lectures before leaving for Boise. That way the students still received their lectures and, for my undergraduate course at least, I could have one of my graduate students or another of my colleagues sit in on the taped lecture and answer students' questions afterwards. It generally wasn't possible to arrange for this kind of substitute for my graduate course, however. The problem there was that the graduate material is at the expert level and the simple fact was that I was the only expert around in this area.

Most technical conferences, even the most prestigious, are in large part social gatherings. Out of the hundreds of papers presented at any given conference, there is usually only a small handful that prove to be important or useful for any one attendee. The majority of papers presented are usually forgotten within a few days of the end of the conference. There are exceptions to this, of course, and there are a few cases where landmark discoveries are first unveiled at a conference. But landmark discoveries are fairly rare and most papers are at best incremental additions to knowledge. There was, however, one big difference between a normal conference and HP's tech expo. Conference papers are refereed in the peer review process and count as part of a researcher's portfolio of scientific accomplishments. The HP expo was not peer reviewed and therefore did not count for such things as promotions, salary raises, and so on. What it did count for was maintaining friendly relations with those who made the decisions about the continuation of my funding. In university terminology this is called 'development' – which is short for 'developing sources of external funding.'

But there was, at least, a social element of the 'science fair' that I liked. It had been eight years since I'd left HP and five years since we'd been run out of town. The 'science fair' was a setting where I got to see a great many of my old HP comrades again and do a little catching up on what had been going on in our lives since the last time we'd seen each other. One thing I heard a lot of were complaints about how HP was changing as a company, and these complaints increased in harshness every year while Ms. Fiorina was at HP's helm.

I could tell Ken was a little nervous during the 'science fair,' especially when HP's higher-ups strolled through the auditorium where the exhibit was being held. This was one of the things I took as a clue that his technology lab was coming under fire at targeting time, which just happened to be around the time of the exhibition. Indirectly this led to one of the more amusing events – amusing for me if not for Ken – that took place at that first exhibition.

One of HP's management folkways had long been that a manager is supposed to pretend he didn't know very much technical stuff. The idea behind this grew out of HP's doctrine that a manager is

supposed to tell his folks what the job at hand is supposed to accomplish but is not supposed to tell his people how to do their jobs. If a manager offers technical opinions or suggestions, it was feared, his people would take that as 'the boss wants it *this* way' and that would be tantamount to the manager telling his folks how to do things rather than what to do. Somebody forgot to tell Bill Hewlett this rule, but it was a rule for everybody else. Because most HP managers were pretty good engineers before becoming managers, the sudden disappearance of a guy's actual technical knowledge was very noticeable to the rest of the engineering staff. We used to joke that upon being promoted the company required the new manager to undergo a lobotomy and that was why he suddenly didn't know anything anymore.

For most of the day I had Jang and Kwan manning our exhibition booth, explaining what we were doing and answering people's questions. I would stand nearby, talking with various people and occasionally pitching the benefits of the HP-MRCI research partnership. At lunch time, though, I let them both take off to get something to eat and I manned our booth while they were away. It was just at this time when Greg Spohn, my old boss and Ken's current boss, strolled into the exhibit area.

Greg has kind of a dry sense of humor. We had been friends for twenty-two years at that point, and one of the things we had always done was kid each other. It was a game we both enjoyed immensely. So, as soon as he saw me standing at our booth, he came over, Ken trailing behind him a bit nervously, and fired the opening shot in our kidding game. "Oh, great," he moaned. "I come down here to learn something and I only find the guy who can't tell me anything." He was referring, tongue in cheek, to 'the manager's lobotomy.' Behind him, Ken's mouth dropped open a little.

I grinned and struck a dignified pose. "I can tell you everything about this," I replied serenely.

"Oh, sure," he said. We went back and forth a couple of rounds, the general ideas being his claim that I didn't know anything and my rejoinder that I knew everything. Ken was hovering in the background, kind of bouncing up and down a little from jitters. He couldn't tell from our tones that we were kidding each other. Finally, pointing at our exhibit, Greg said in a challenging tone, "Okay, then, smart guy, what's that?"

"That's a poster," I replied proudly, looking and acting like I thought I'd just answered his question.

Ken turned pale. Greg just laughed out loud. □

Managers out in the private sector have a tendency to think that anything that isn't run the same way a company is run isn't being run correctly. Perhaps this is because they don't know how to do anything else but in any case it is a peculiar species of ethnocentric thinking. My own observation, made over the eighteen years when I was out in private sector industry, is that companies usually aren't run all that well, so this corporate cultural bias on how to run things the right way is kind of arrogant. The main reason running a company the way they do works is because their competitors aren't any better at running a company than they are. In *Up the Organization* Robert Townsend made a couple of observations I've always thought were pretty good cases of whistle blowing when it comes to managerial group-think:

> Big successful institutions aren't successful *because* of the way they operate, but in spite of it. They didn't get to the top doing things the way they're doing them now.
>
> The National Industrial Conference Board is a sophisticated center of research on yesterday. . . NICB publishes all sorts of data about corporate practice. I've found it a valuable source for ideas – of what *not* to do. When the vast majority of big companies are in agreement on some practice or policy, you can be fairly certain that it's out of date. Ask yourself: "What's the opposite of this conventional wisdom?" And then work back to what makes sense.

Manufacturing and high tech companies also have a tendency to look at education in the same way as they look at assembly lines. They pretty much think the process of educating young people is more or less a process of opening up the students' presumably empty skulls and pouring in some volume of knowledge like the machines in a brewery fill beer bottles. The way you can tell is by looking at how ABET, the organization that accredits engineering education in the United States, evaluates engineering programs.

The ABET 'guidelines' (which aren't actually guidelines so much as modified process control documents borrowed from industry with a few minor changes in wording) are loaded up with manufacturing and managerial terminology such out 'outcomes assessment' and 'metrics' and 'deliverables.'

In fact – if one wants to use silly business analogies at all – the process of education much more closely resembles farming than it does manufacturing. A farmer doesn't 'grow corn.' The corn grows by itself. What the farmer does is provide the conditions under which the corn can best do this. Analogously, a teacher doesn't 'learn his students some math.' All that a teacher can do is provide the conditions under which the students *can* learn the subject matter. That's the difference between 'learning my students some math' and 'teaching my students some math.' Education isn't some kind of manufacturing process and schools aren't 'knowledge factories.' Perhaps to folks accustomed to thinking of 'human resources' as a sometimes irksome species of widgets it's hard to tell the difference. The main problem with being a teacher is that *everyone* thinks he's a teacher. The fact is that most people don't have any more idea of how to teach than they do of how to cure cancer. That's why teaching is a profession and management is not.

During the 2000-2002 school years one of the things we were doing that chewed up a great deal of time and effort was preparing for what was called 'ABET 2000.' A few years earlier, the ABET organization suffered an invasion by former industry people, the most influential of whom came out of that great overhead organization known in most companies by the name 'Quality Assurance.' Through the late 1980s and on into the 1990s, a lot of QA departments – and especially the one at DMD – occupied themselves with introducing such things as 'continuous process improvement' processes, 'control charts,' and other such sundry rituals and totem poles into the manufacturing environment. The overriding theme had been 'documentation' – a term that meant keeping records of what was done so someone else could look at what you'd done and 'suggest ways of making further improvements.' In DMD's case, the main end result of this was to give morale a punch in the stomach because no matter how well people had done their jobs, there was always a way to criticize what they'd done. An awful lot of people, strangely enough, took this as second guessing, nitpicking, and endless harping and, consequently, felt that no one appreciated what they did. Interestingly enough, one of the biggest drivers of this new way of assuring quality came out of the European Union, where the whole business was codified under the name ISO 9000. ISO 9000 had teeth in the U.S. because Europe refused to allow the importation of any products that didn't follow ISO 9000 in their manufacturing process. One of the interesting things I'd heard about on my trip to Sweden were the complaints the Swedes were making about the EU's product regulations, under which Swedish strawberries couldn't be called 'strawberries' because they were too small.

The first time I read the new 'ABET 2000' requirements document, I didn't have any trouble at all recognizing and understanding it. It was ISO 9000 reworded. Under the old ABET what the ABET inspectors inspected was the content of an engineering program plus they did a little probing to see if the faculty really taught that content and maintained standards. Under ABET 2000 this was replaced by 'outcomes assessment methodology' and other such similar ISO 9000 documentation trivia. Interestingly enough, the most direct tool for documenting 'outcomes' – the students' grades – was specifically excluded from being an assessment. Why? Good question. Instead it called for documenting a process for 'continuous process assessment and improvement' with more accompanying documents documenting that this process was actually being followed. My guess is the new crop of industry QA retreads now governing ABET thought that because industry had had to be bullwhipped into paying attention to what it was doing, college professors must even more obviously be in need of a like discipline. Clearly we weren't running a very tight factory. I thought it was interesting, and dumb, that ABET 2000 specifically said 'content' was no longer a criterion for accreditation. Accreditation now depended merely on documenting 'learning outcomes' regardless of what it was the students were actually learning. So long as the curriculum bore some plausible resemblance to electrical engineering, we could teach our students anything, including Abacus 101, and it would pass as an accredited electrical engineering education. The new ABET is a triumph of form over function designed by unqualified amateurs ignorant of education.

Well, the pronouncements of ABET can't be ignored. Loss of accreditation is just too big a disaster for any program to survive. So, during 2001 we were all kept pretty business inventing a QA documentation process for our 'outcomes' – all the while continuing as well to do what we'd always done as teaching professionals, namely making sure we were properly educating young electrical and computer engineers. In the end we were able to comply with the form of ABET's new QA requirements while still managing to take care of the matter of real quality education. The result was we could look like a factory to the QA inspectors from ABET while still attending to the 'agriculture' of education. □

Dr. Jean'ne Shreeve, captain of the EPSCoR program.

The day after Martin Luther King day, January 22nd, 2002, Jean'ne's six 'Fuzzies' sat down for our first meeting of the neurofuzzy project. This was a meeting I would chair every two weeks for the next three years. At this meeting in Moscow were myself, Jim Frenzel, Terry Soule, and James Foster. Dan Wilamowski in Boise and Vitit Kantabutra in Pocatello attended via a live TV link.

Funding for the project wouldn't actually start for another ten days, but the purpose of this first meeting was organizational so the team would be ready to roll the second the money was ours to start spending. Jean'ne had given us an exacting checklist of things each member of the team was expected to accomplish during the course of the project, along with a timeline for when she expected these to be accomplished. As I said before, one of the many things I like about Jean'ne is I never had to guess what she expected. Professors as a general rule don't like being told what to do, but Jean'ne had the answer to that easily anticipated factor ready at hand. Anyone who didn't deliver on her checklist would be summarily dropped from the program. A major agenda item for that meeting was our tactical discussion on how we would as a team deliver on these requirements.

The neurofuzzy project would turn out to be one of the most successful and productive projects I ever led at the UI from the perspective of research accomplishments. Over the next three years it would financially support and provide research experience for a total of twenty-six graduate students, thirty-five undergraduates, and two postdoctoral fellows. We would publish sixteen journal papers, thirty-one conference papers, and three book chapters. Four U.S. patents would result, along with a fifth patent still pending. Six professors, including myself, were funded by this program. Our research work would lead to later research proposals that would bring in a total of more than four million dollars, and one of the team members, James Foster, would help co-author yet another major proposal that brought in sixteen million dollars of funding from the National Institutes of Health. Not a bad return for the 1.4 million dollar EPSCoR investment. A lot of private sector companies would find that hard to match.

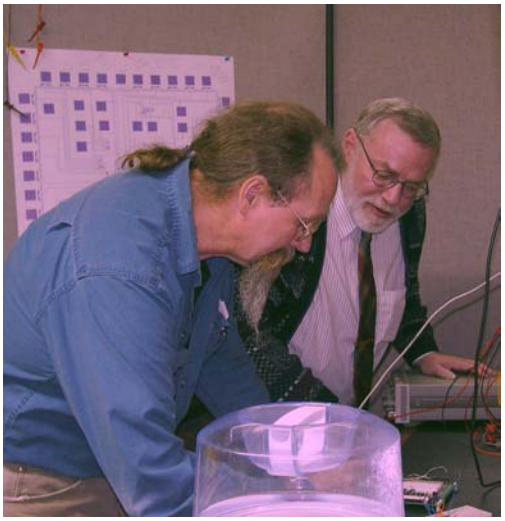
As a 'focus area' our team focused on a specialized branch of neural networks known as 'pulse coded' neural networks or PCNNs. These kinds of neural networks are particularly well suited to be implemented in microchip integrated circuit technology and were a relatively new area of neural network theory at that time. PCNN processors were known to have certain important advantages in image processing. The Army missile command had a particular interest in them for this reason. Why is probably fairly obvious from the first Gulf war, although whether or not PCNNs are currently in use or under development by the Army is something the Army won't be telling any of us any time soon. But despite their empirically demonstrated advantages, very little about how to design them or the extent of what they could do was known at that time because the mathematical theory of how they work is very complicated, much more so than is the case for traditional neural network systems. To figure out how to design them we turned to biology and, in particular, to neuroscience for guidance. You see, the brain and the rest of the nervous system is made up largely of pulsing neurons – a living example of PCNNs.

Terry Soule. Terry was a young assistant professor of computer science during the neurofuzzy project.

The team worked within the context of six primary objectives for the project. Broadly speaking, the objectives pertained to basic theory development, neurofuzzy computer organization, design methods, electronics, algorithms, and prototype chip development. Within this framework each of the six members pursued their own research directions. One of the principal problems we faced was coming up with design methods in the teeth of the enormously difficult mathematics that describes PCNN networks. This was where Terry Soule's evolutionary computing methods really showed their worth.

Terry and I ended up forming a kind of partnership – a little team-within-the-team – to address this problem. I supplied the system level organizational design – what we came to call the 'anatomy' of the networks – and the design of the basic electronic building blocks that went into it. Terry demonstrated that the EC algorithms he and his students were developing could overcome the mathematical difficulties and 'put the numbers' into the design. He accomplished this by discovering and developing new EC algorithms that ran on a very powerful kind of supercomputer known as a BEOWULF Cluster.

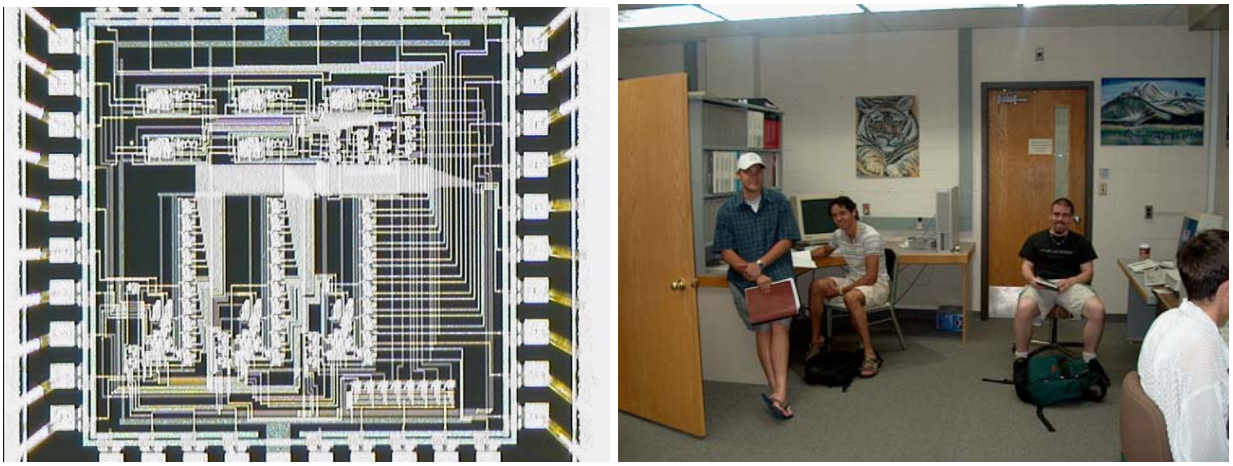
A BEOWULF is actually an array of relatively simple computers – the kind you might own yourself – modified to work together as one massive machine. A conventional computer does things one step at a time. This is called 'serial' computing. A BEOWULF performs many calculations simultaneously. This is called 'parallel' computing because the computers in the array work on different pieces of the computing problem and then cooperate to combine the results of these many individual computations. In computer jargon this is called a 'Multiple-instructions Multiple-data' or MIMD computer. The original BEOWULF concept was developed through NSF-funded research, and our first BEOWULF at the UI had been built by students in the computer science department with the support of NSF funding and a key donation of computer memory chips by Micron Technology. The first BEOWULF had sixty-four computers in its array and during the course of the neurofuzzy project two more BEOWULF machines were built, one of which had one hundred twenty-eight computers in its array. These machines provide an amazing amount of computational horsepower, and Terry's algorithms exploited this to the hilt.



Bruce Barnes and me testing one of our neural network chips in the electronics laboratory of the MRCI.

Terry's discovery solved one of the main design problems we faced but the numbers he supplied still had to be converted into electronic form. I wasn't out of a job yet. With my RA from the old SOL project, Bruce Barnes, we invented some new electronic circuits for implementing PCNNs. The circuits mimicked to a degree how biological neurons behave and so I called them 'biomimic artificial neurons' or BANs. One issue that had long been a problem for building neural networks was that direct implementation of the mathematical equations that described the network's function were also very expensive to build. It was one of our principal research objectives to find alternate ways of implementing functions like this that could avoid the expense by exploiting physical

properties inherent in transistors themselves. This was precisely what a BAN circuit did, and it resulted in a design that was much less costly than the direct approach and much more general than previous attempts to solve the cost problem had been. The BAN invention brought us two patents.



Left: Photograph taken under a microscope of one of our BAN neural networks. Right: Ben Sharon, Maurice Williams, and Bill Walker. Ben had been an undergraduate RI in the electrophotography program and became one of the graduate student RAs in the neurofuzzy project. Maurice and Bill were two of the many undergraduate research interns who worked on the project.

Because the circuits we were inventing were completely new, turning our circuit designs into actual working hardware required what is known as a 'full custom VLSI design.' What this means is the patterns of silicon and metal fabricated into a VLSI chip had to be designed from the transistor level on up rather than being able to re-use circuit layouts that had been previously developed. The photograph above-left illustrates what these patterns look like after a microchip is fabricated. While the circuit design itself for this project surpassed what undergraduate students could yet do, the physical layout design was another matter. I had an energetic corps of eager young undergrads working in my lab on this part of the design as well as on lab testing our prototypes and working on other closely related technical aspects of it. Their contributions were every bit as vital to our success as those of the professors and graduate students, and hiring them to work on the project greatly increased our overall research productivity. I think a lot of my young undergrads ended up amazing themselves with what they were able to accomplish. For most of them it was their first real work as engineers and their first real experience seeing how the theory they had learned in their classes was reduced to real engineering practice.

We also invented another new class of circuits to use in PCNNs, which I named 'forgetful logic.' It turns out that many key biological neural network functions critically depend on when different pulses occur in time relative to one another and on the rate at which these pulses are generated. Implementing these functions with conventional computer logic is pretty expensive. Forgetful logic circuits are designed so that these dependencies are built right into the circuit itself at the transistor level. In engineering jargon forgetful logic circuits are what is called a 'mixed signal' technology because in part they implement the 'digital' functions of normal computer chips and in part they implement what are called 'analog' functions such as those associated with circuits that implement mathematical operations like integration. By using forgetful logic we were able to greatly simplify the electronics needed to build PCNNs. Finding new approaches like the BAN or the forgetful logic circuit family is a central part of research in the art and science of electrical and computer engineering.

Most electrical engineering, computer engineering, and computer science students have little or no coursework in biology or neuroscience. Because what we were doing was so heavily based on biological neural networks, this was a hole in the backgrounds of the members of the neurofuzzy team. To remedy this, I wrote a series of tutorial papers to help my teammates learn what they had to know about neuro-

science. All in all there were eventually twelve of these tutorials written during the neurofuzzy project. I created a special web site for these 'tech briefs' and posted them there. One of the things NSF wants its researchers to do is to make project data, reports, and other scientific and educational material available to the public at large without waiting for the oftentimes slow peer review and journal publication process. In my field it is not uncommon for two or even more years to elapse between the time a manuscript is first submitted for publication and the time that paper actually appears in a journal. This is much too slow for the pace of modern science, and with the Internet now available to almost everyone, NSF likes to encourage researchers to make the best use of it. Today those neurofuzzy 'tech briefs' – as well as others I have written since then – are accessed hundreds of times each month by people from all over the world.

I think that in not too many years the Internet will produce fundamental changes in the scientific peer review and journal publication processes. There are signs of this happening already. The most important criticism of the Internet as a vehicle for disseminating scientific information is that the vast bulk of all such information posted on the web is not peer reviewed. This means that no one else has checked the author's work and confirmed the mathematics is correct, the experiments are reproducible, and the findings are verifiable. Ideally it should be the case that when you read a science paper downloaded from cyberspace, you should be able to trust that what you are reading is in fact true and commands agreement from other experts in the field. If the peer review process were perfect, the criticism that Internet publications aren't peer reviewed would be unanswerable.

Unfortunately, the peer review process is far from perfect, some of its referees aren't really all that expert in what they're reviewing, and the traditional publication process takes far too long and suffers from a great deal of censorship – often unintentional, sometimes not. The system we have today grew out of a need for a better, more efficient way to disseminate scientific information than in the early days of modern science when one scientist communicated his results to others by writing personal letters to them. Standard journals and the peer review process represented the best technologically viable answer to this issue available in the eighteenth century. But it might not be – in fact, it almost certainly isn't – the best technological solution today. After three hundred years of tradition, it's probably time for a change. The trick will be in figuring out how to prevent crackpots, charlatans, and bad scientists from clogging the information pipeline with bogus findings that just aren't true. And there is no doubt at all that the Internet today is riddled with papers and articles of this kind. On the other hand, today's journals aren't immune from this. It happens much, much less often than on the Internet, but it does happen. I know firsthand of a number of refereed, published papers from reputable journals that report things that just aren't true. How do I know they're not true? I went into my lab to verify the findings and found out the findings didn't hold up. I don't think this process of verification is used today as much as it ought to be; over time the journals have made us all a bit lazy. But 'trust me' is not an argument anyone can use in science. So perhaps someday in the not-too-distant future the Internet will force more of us to do *better* science. Perhaps the traditional journals will become the places where only the really, really significant papers, thoroughly examined, wrung out and verified to the highest degree, will be published and the trivial many will be relegated to cyberspace alone. Or maybe the journals will just fade away. Time will tell. □

Mom and me in 1953.

In late July of 2002 I flew back to Iowa for what would turn out to be my last summer vacation there. I stayed with Sherri and Ronnie out at their farm and Mom came out too so we could spend as much time together as possible. Mom was in pretty bad shape by then and had been going downhill pretty rapidly in the past few months. Since Dad had died I'd chatted with Mom over the phone every Sunday morning, and I already was aware of her deteriorating physical condition from these phone calls. I think my visit did do her some good. Sherri and Melody, who saw her all the time, told me she perked up quite a lot when I came out, and we had a very, very good visit. Even so, Mom

was a near invalid by then and her mind wandered off quite a lot. It tore me up inside to see it.

It's hard to watch the people you love grow old, sick, and enfeebled, to watch them robbed of their independence and eventually of their dignity. For me there has been nothing harder to do in my life than to watch Mom approaching the end of hers. When I think of her today, I don't think of the frail elderly woman of 2002. I think of and remember the strong, vibrant, loving mother of my boyhood and my youth. I think of my most important teacher, my caregiver, my protector in childhood, the one person who would always kiss the hurt and make it better. I think of the one person I knew would always remember my birthday and always made sure I got a Christmas present no matter how far away I might be. I think of the one person I know loved me more than any other person in the world ever would or ever could.

That visit was the last time I saw Mom alive. She died at the end of September, just a little over one month past her eighty-fifth birthday. Sherri and Melody were with her at the end and she went peacefully. We buried her the first week of October next to Dad in the little country cemetery and nothing in my life took more strength than did getting through those few heartbreaking days. I still miss her. Every single day. Just to write these words, years later, I have to stop every few moments to dry my eyes. I love you, Mom, and I miss you very, very much. □

The war and especially the question of Iraq were very much on the minds of my sister and brother-in-law during that last Iowa summer of mine. Sherri had been very frightened and alarmed by the Al Qaeda attack. She was pretty much operating in survivalist mode by then and had been hounding me off and on because I wasn't storing emergency food caches and so on against what she was convinced would be forthcoming strikes at power plants and whatever else. Of course, she had also been convinced that the 'millennium bug' was going to take down all the computers in the country come January 1st of 2000. She believes in being prepared for the worst, especially since she had no confidence at all that the government was really competent to deal with the threat. One time, after learning I still hadn't started stocking food, she challenged me to say what I was going to do when a terrorist attack started causing food shortages and the grocery store shelves became empty. I replied I'd shoot my next door neighbor and eat his dog. That earned me an exasperated "Honestly, Richard." Sherri is prone to see conspiracies everywhere. On her worries about me out in Idaho, I replied, "Look, no terrorist is going to steal a plane so he can kamikaze a corn silo." There actually aren't any corn silos in Idaho but I figured an Iowan would get the point of this metaphor.

Ronnie wasn't as overly nervous about the war as Sherri, but I could tell he did take the war seriously. The way I could tell was because he and I had an actual conversation about Iraq.

You see, Ronnie likes to argue just for the sake of debating. He's a pretty sharp guy and doesn't tend to jump to conclusions about things. But he does like to talk about them, especially political subjects. He usually doesn't actually take one side or the other on any political topic. He just likes the fun of debating. "What do you think about such-and-such?" is one of his typical openings. Then, whatever you reply, he takes the opposite side of the question. If he argues you into changing your point of view and you come over to the side he was arguing for, he immediately changes sides and starts arguing for the position he just talked you out of. It drives Sherri crazy because she takes most things very, very seriously.

But our conversation about Iraq didn't go this way. "Do you think we should invade Iraq?" he asked me. At first I thought this was just going to be another round of 'the debating game' but it wasn't. He didn't take a position one way or the other. He wasn't sure what we should do about Iraq and he was trying to make up his mind. He really was asking my opinion. That didn't mean my opinion would necessarily carry any weight with him on the matter. But he was trying to figure things out and one thing Ronnie does do is listen to both sides before making up his own mind.

My mind was already made up on this question. "No," I said. "Iraq doesn't have anything to do with the war. We have a war to win and that war is in Afghanistan and Pakistan. You don't win a war by starting another one someplace else against somebody who's no threat to us. If we go into Iraq, we'll

never get out there and it'll hurt the real war effort."

When the first President Bush had stopped the Gulf War rather than continuing on into Iraq to get rid of Saddam Hussein, I'd been initially upset by his decision. But since then I'd had a chance to learn a thing or two about the history of Iraq and had a chance to think about the broader political questions. It didn't take long to figure out President Bush had made the right decision and a wise decision. Nothing had changed since then to change how right he had been. I didn't buy into the 'weapons of mass destruction' propaganda line the second Bush was pushing. Iraq had no delivery vehicles. Its borders were sealed off tight. We'd already seen how vulnerable their army was to America's far superior military forces. And the risk any country takes in developing nuclear weapons isn't hard to state: If you use them first, you invite a nuclear-armed opponent to turn your whole country into glazed glass. There's only one use for nuclear weapons and it isn't to win a war; it's to annihilate an enemy totally. Any country that isn't capable of totally annihilating a nuclear-armed enemy on the first strike is stupid beyond all reason to develop nuclear weapons at all. No, Iraq was a contained threat. Our foot was on Hussein's neck.

And Bush had already bungled one war. We went to Afghanistan to get bin Laden and the other murderers of our citizens on 9/11. And by November 13th we had them cornered in a place called Tora Bora. Or, rather, we should have. But did Bush or his commanders in the field commit the forces required to root out and kill them? No. They *outsourced* this to a motley force of Afghan tribal militias supported only by U.S. air forces and twenty U.S. commandos. The enemy walked out of there and into Pakistan unmolested after leaving a sacrificial rearguard to cover their retreat. I had no confidence in Bush.

Back in January of '02, in his State of the Union address, Bush had declared a 'global War on Terror.' And nobody – not Congress, not the press, nobody – had challenged the illegality of a President of the United States usurping the Constitutional power of Congress to declare war. Instead the Republican Congress and its Caspar Milquetoast Democrats had sat there and applauded as this one man seized for himself the power to pervert his role as Commander in Chief into the role of military dictator.

The thin facade of legality Congress hid behind is the War Powers Act of 1973. This act states:

SEC. 2 (a)

> It is the purpose of this joint resolution to fulfill the intent of the framers of the Constitution of the United States and insure that the collective judgment of both the Congress and the President will apply to the introduction of United States Armed Forces into hostilities, or into situations where imminent involvement in hostilities is clearly indicated by the circumstances, and to the continued use of such forces in hostilities or in such situations.

There follows some language alluding to the provision that Congress has the power to "make all laws necessary and proper for carrying into execution" the powers of all branches of the U.S. government. When it was passed in 1973, the publicized intention of the Act could hardly have been more appropriate inasmuch as it was supposed to curb the power of a President to wage unauthorized war. But where the Act failed to 'fulfill the intent of the framers' came in section 5 (b):

> Within sixty calendar days after a report is submitted or is required to be submitted pursuant to section 4(a)(1), whichever is earlier, the President shall terminate any use of United States Armed Forces with respect to which such report was submitted (or required to be submitted), unless the Congress (1) has declared war *or has enacted a specific authorization for such use of United States Armed Forces . . .*

It is this clause I have italicized here that violates the Constitution. This is the clause Congress used to duck its responsibility for declaring our nation to be at war. They had already done so once when Congress had passed the Authorization for Use of United States Armed Forces in the days after 9/11. That resolution had stated in section 2, the key section,

> IN GENERAL – That the President is authorized to use all necessary and appropriate force against those nations, organizations, or persons he determines planned, authorized, committed,

> or aided the terrorist attacks that occurred on September 11, 2001, or harbored such organizations or persons, in order to prevent any future acts of international terrorism against the United States by such nations, organizations, or persons.

Under this wording, if Bush decides Des Moines harbors terrorists the language of the resolution permits him to attack Des Moines and Congress can claim, "Hey, *we* didn't do it!" It was cowardly.

Is this 'fulfilling the intent of the framers'? Did the framers intend for 'authorizations' to take the place of a declaration of war? I don't think so. In *The Federalist* (Number 41) James Madison had written

> Is the power of declaring war necessary? No man will answer this question in the negative. It would be superfluous, therefore, to enter into a proof of affirmation. The existing Confederation establishes this power in the most ample form.

The 'Confederation' he refers to is the Articles of Confederation. Aside from and in addition to the blunt statement of necessity he made, the statement of this 'most ample form' in the Confederation read

> No State shall engage in any war without the consent of the United States in Congress assembled, unless such State be actually invaded by enemies . . . and the dangers so imminent as to not admit of a delay till the United States in Congress assembled can be consulted; nor shall any State grant commissions to any ships or vessels of war, nor letters of marque or reprisal, except it be after a declaration of war by the United States in Congress assembled, and then only against the kingdom or state, and the subjects thereof, against which war has been so declared, and under such regulations as shall be established by the United States in Congress assembled . . .

This doesn't seem too ambiguous. It calls for the declaration and it calls for the enemy to be named. Nothing about it says it's okay for Congress to just tell a President, "sic 'em, boy!"

Afterward there followed the so-called 'Bush Doctrine' asserting his right *and his intention* to launch 'preemptive' wars against any nation he, Bush, declared to be a threat and an enemy in his 'global War on Terror.' Bush had succeeded in doing what Nixon had tried and failed to do. He had thrown the Constitution into the waste basket and grabbed the powers of a king. 2002 was a year when a cold, black wind swept across America. He had become a greater threat to America than Al Qaeda ever could be. I regarded him and his henchmen as traitors to republican government. And he had gotten away with it. □

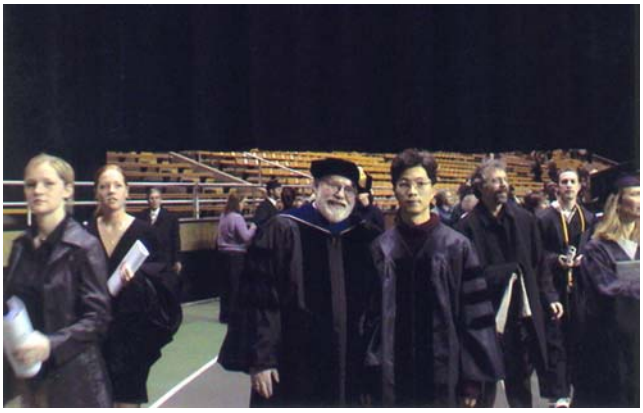
Jang Yi (standing) and Henis Mitro discussing an electrophotography experiment in my lab.

Electrophotography work under the HP contract also continued to grow during 2002. I still had only the two graduate students, Jang and Kwan, in my lab but the core of undergraduate Research Interns (RIs) had grown in number as the contract money had risen and I sought to give Jang and Kwan more leverage in carrying out their work. We began to see more and more signs of Bush's new Department of Homeland Security as we carried out our work. This didn't come from Bush mobilizing the academic resources of America; he had not and never did do that in any serious way. But now during our trips down to HP for review meetings and the September 'Tech Expo' I was having to submit the names of my students in advance to HP so HP could get permission from Homeland Security to allow my people to enter the HP site in Boise. How and why it came about that the government could require this from a non-defense-related company nobody ever explained to me. One of

my young students, Henis Mitro, was an international student from Albania, which was one of the countries on Bush's list of enemy countries. I had to get permission, via HP, from Homeland Security to take him along when we went down to Boise. The notion this young man, who wasn't even twenty years old, was somehow a potential threat to America was too ludicrous for words. Among ourselves we started jokingly calling him 'the spy' after a character on 'The Simpsons' TV cartoon show.

Down at HP there were further signs of internal problems developing for Ken's group. I learned that my old pal, Greg Spohn, had left HP. I'm under the impression he had opted to take one of the voluntary severance packages HP had started offering in order to cut its workforce, although I'm not sure whether or not that is what he did. I did know that he was taking care of his kids rather than taking another job elsewhere. I guess he could afford to do that because his wife, Nor Rae, continued to work at HP and, in fact, was a higher placed manager than he had been by then. I've known Nor Rae almost as long as I've known Greg. She first came to HP as an intern in the summer just before we took the HP 7908 into production and actually worked 'dotted line' for me under our matrix management setup during the transition team activities for the 7908 and 7911/12 products. Later on she went over to the laserjet printer side of the business, rising to general manager, then vice president and general manager of HP's Color LaserJet Business, and in April of 2007 became a senior vice president at HP. In October of 2006 she was inducted into the Women in Technology International Hall of Fame as one of the world's 'five most pioneering women.' With bringing home the bacon secure in Nor Rae's hands, Greg could afford to take on a 'Mr. Mom' role. Still, this change took me completely by surprise. Tom Camis, the engineer in Ken's group who had been most responsible for starting my research partnership with HP, also took one of their voluntary severance packages, and his departure was a big blow for Ken's group and for my lab as well. Tom had been our best ambassador to HP's rank and file engineers. He would later return as a paid external contractor, a tactic HP had started using more and more as it cut its own workforce.

After Greg's and Tom's departures, Ken told me I'd need to start finding 'customers' within HP for my lab's research activities. The general idea was for me to go around to meet and talk to more folks outside of Ken's group and find out what my lab could do for them. This isn't easy to do from three hundred miles away, and it was completely impractical for me to relocate to the HP site during the summers to engage in this sort of thing. Tony Anderson and I had landed a three hundred thousand dollar NSF grant to set up a small MEMS fabrication lab that past July, and Yang-Ki Hong's group had landed another seven hundred thousand dollar contract with the Office of Naval Research in August to continue the barium ferrite program. Then there was the neurofuzzy project. Although my HP contract had risen to two hundred thousand dollars per year by then, HP was now a very significant but still one of the smaller parts of my overall research program. I simply couldn't afford to devote my summers exclusively to HP.



With Dr. Jang Yi at winter commencement in 2002.

One thing Ken and I did readily agree on was Jang. Jang was graduating that semester and he hadn't laid in any particular plans for what he was going to do afterward. I wanted him to stay on as a postdoctoral fellow and Ken likewise was in favor of this. Jang's research had made him one of the world's top experts in the physics and modeling of electrophotography processes and by now his expertise in this surpassed my own. Since Jang didn't yet know what he wanted to do, he accepted this offer and joined the research staff of the MRC Institute. I counted on him to handle most of the day-to-day operations of the electro-photography lab since I was so busy with so many things. And, in truth, I was having some physical problems at this time. I didn't know it yet, but I'd done something to my back and the result was I was

very stiff, had chronic aches and pains, and I was having some problems just getting around. One clue had come in early September while I was walking up the stairs to my office at the Institute. I heard and felt a strange crackling noise that had run all the way down my spine. My body sounded like a bowl of Rice Krispies and, as the medical folks like to say, I 'experienced some discomfort.' I didn't know what had happened but at the time I chalked it up to not getting enough exercise. So, all things taken together, I was glad Jang was going to stick around and help me out. □

On the wider university stage things were about to get quite a bit tougher and in a very unexpected way. For the preceding few years, Idaho's Republican legislature had been systematically underfunding higher education each year despite the fact that Idaho itself was going through pretty good economic times. They had an interesting way of doing this while still being able to claim they were increasing higher ed funding each year. What would happen was the Legislature would pass their appropriations and then, awhile later that same year, our 'education Governor,' Governor Kempthorne, would announce hold backs – meaning the university wasn't allowed to spend all of the budget that had been passed. The next Legislative session, the Legislature would pass another budget that exceeded the previous year's amount *after* the holdback – thus 'raising' higher ed funding. Then the Governor would do another holdback. So it was that we got budget 'increases' each year and less or at best the same money to spend. All the while, the market manipulations by Enron and other energy companies had sent utility costs soaring and the cost of doing business for the UI had continued to climb. The SBOE responded to this by offering voluntary severance packages and early retirement packages to reduce the number of faculty. Faculty members who took advantage of this could not be replaced because of the budget situation. Eventually the ECE department lost around twenty-five percent of its members through this attrition process at a time when our enrollments were at record high levels. Naturally, faculty salaries were frozen as well, which was one of the things providing incentive for people to take the severance packages. Things were getting 'interesting' in the sense of the old Chinese curse, *'May you live in interesting times.'*

What no one expected was that on top of this a major financial scandal would burst into the open midway through the fall semester. But one did. It was called the Idaho Place scandal.

Idaho Place was one of President Hoover's high priority projects. It was planned to be a complex of three large buildings in Boise located near the BSU campus for research, support for southwest Idaho industry, and the UI's graduate outreach programs in southwest Idaho. It would allow the existing UI operation to move out of the rented quarters in the Morrison Knudsen building complex and greatly improve our laboratory facilities in Boise.

Money for the project was supposed to be raised by the University of Idaho Foundation and that's where the problem started. Our VP of finance was also the finance guy for the UI Foundation and to expedite the progress of the Idaho Place project he made a loan to the Foundation from some of the UI's funds, figuring the Foundation would repay this loan later (which it did). There were just two little problems. One, he hadn't cleared this with the SBOE beforehand. Two, it was against the law.

It always seemed to me that the scandal broke in slow motion over the last six months of 2002 and only really picked up speed in 2003 after that citadel of truth, *The Idaho Statesman*, reported it for all it was worth. That was when the foxes were set loose in the hen house and in no time at all we had a first-rate scandal on our hands and high placed politicians were running for cover. I don't believe any of the principals involved in this on the UI and Foundation side of things profited personally from this deal. But the VP of finance was forced to resign and later in 2003 President Hoover, assuming responsibility for what had happened on his watch, also resigned. The SBOE replaced him with an interim President, a retired businessman and UI alum named Gary Michael. Dr. Michael had never served a day working as a professor or university administrator, but the SBOE brought him in to deal with the huge budget problems now facing the UI as a consequence of the Idaho Place scandal. In this case, they felt, the UI needed a top executive and business man at the helm rather than an academic person. Dr. Michael served as interim President without pay and from a pure sense of civic duty from June 2003 until August in 2004.

The most immediate result of the scandal came in the form of huge budget cuts across all the colleges of the University. For awhile it was quite a mad scramble figuring out ways to make ends meet. One group that paid a heavy price was the group of assistant professors, who were not yet tenured. Quite a few of them were let go, including the one lone assistant professor in the ECE department. We became a department with no young junior faculty members.

Our Republican legislators seemed to think all we would have to do was take some of that big pot of externally funded research money the UI had been bringing in and reallocate it to cover teaching and the other routine educational functions and facility costs of the University. The fact that doing so would violate a whole host of federal laws didn't impress them very much. Perhaps they thought there was a legal way to embezzle from the federal agencies and we just hadn't looked hard enough to find it yet. In any case, we got zero help from the Republican Legislature or the SBOE after the scandal broke.

One thing neither the SBOE nor the Legislature nor the upper administration of the University had any problem with was raising student tuition. As it happens, tuition is illegal in Idaho under the State Constitution but the Legislature had long ago decided it was okay to charge 'fees.' Student 'fees' are tuition in everything but name, but that's the usual sort of lawyer dodge our legislature is pretty good at when they don't want to pay for something. 'Fees' started shooting up as if intent on catching up with the Ivy League, and this was a big hardship for our students and for their families. It made pulling in research dollars more important than ever because this is the money that funds jobs for students. They saw to it most students would graduate with crushing loan debts, forcing them to become serfs to bankers.

It was during this period numerous Republicans began talking about how higher education was a 'private good' and not a 'public good.' However much private good a person reaps from education – and it is considerable – it is none the less true that the public good is *vitally* served by it. Alexander Hamilton wrote, *the vigor of government is essential to the security of liberty; that, in the contemplation of a sound and well-informed judgment, their interest can never be separated; and that a dangerous ambition more often lurks behind the specious mask of zeal for the rights of the people than under the forbidding appearance of zeal for the firmness and efficiency of government. History will teach us that the former has been found a much more certain road to the introduction of despotism than the latter, and that of those men who have overturned the liberties of republics, the greatest number have begun their careers by paying an obsequious court to the people; commencing demagogues and ending tyrants.* Our republican form of government and our personal liberty cannot survive without an educated public capable of understanding the complex issues of government. But now the conservatives had a slogan to use in their war against education. Ignorance and inflamed passions are always the friends of tyrants. □

On October 16th Bush signed into law the Authorization for Use of Military Force Against Iraq Resolution of 2002, which handed over to him Congress' power to declare war against Iraq. The resolution contained twenty-three 'whereas' clauses, most of which were mere allegations made by Bush and later found to be lies. The key 'authorization' was section 3(a),

> The President is authorized to use the Armed Forces of the United States as he determines to be necessary and appropriate in order to –
>
> (1) defend the national security of the United States against the continuing threat posed by Iraq; and
>
> (2) enforce all relevant United Nations Security Council resolutions regarding Iraq.

The resolution went on to leave it to Bush to decide when 'diplomatic or other peaceful means alone' were inadequate to 'protect the national security of the United States against the continuing threat posed by Iraq,' a threat that never really existed.

In the House, two hundred fifteen Republicans voted in favor of the resolution, six against it. Eighty-one Democrats voted for it, one hundred twenty-six against it. The House's lone Independent, Vermont's Representative Sanders, voted against it. In the Senate, forty-eight Republicans voted for it, only one

against it. Twenty-nine Democrats voted for it, twenty-one against it. The lone Independent Senator, Senator Jeffords from Vermont, voted against it. Five amendments to the resolution had been proposed, and all five had been defeated. The Spratt amendment called for the U.N. Security Council to authorize any use of force against Iraq, and if it did not for Bush to come back to Congress for a second vote before he acted unilaterally. This was defeated 155-270. The Lee amendment urged the President to work through the United Nations to resolve things peacefully. It was defeated 72-355. The Byrd amendment stated that no additional constitutional authority was being ceded to Bush outside of that necessary to deal with 'the threat posed by Iraq.' It was defeated 14-86. The Levin amendment urged the U.N. Security Council to adopt a resolution demanding Iraq 'grant immediate and unconditional access to U.N. weapons inspectors.' It was defeated 24-75. The Durbin amendment tried to restrict the use of the force authorization to cover only an immediate threat from Iraq rather than a continuing threat. It was defeated 30-70. Having already bungled the real war against Al Qaeda, Bush was now free to bungle another. □

Early in the last week of October '02 I stopped at the county courthouse to file my first absentee ballot. When election day arrived the following week, I would be in southern Spain for the 2002 annual conference of the Industrial Electronics Society of the IEEE, which was being held in the historic old city of Seville (called Sevilla in Spain). I didn't expect my vote to do much in Idaho. Governor Kempthorne was a popular governor despite the fact the Republican Legislature more or less pushed him around, or maybe because he allowed himself to be pushed around. A commission appointed by the Legislature to 'independently' determine the election redistricting after the 2000 census had done nothing to undo the gerrymandering the Republicans had put in place after the 1990 census. Idaho was destined to remain a one-party state and everyone pretty much knew that. However, I did hope the Democrats would fare better nationally by obtaining a majority in the Senate and cutting the Republican majority in the House. Bush had, after all, failed to win the Al Qaeda war in Afghanistan. Before 9/11 few Americans had ever heard of the Taliban and fewer still had cared about them.

It was a busy week. Tuesday evening I flew down to Boise for the HP research meeting, getting back to Moscow Wednesday night. Friday morning I pre-taped my lectures for the following week and that night flew to Seattle in order to catch the flight to Spain on Saturday morning. We were taking a pretty big crew to the conference. Most of the professors on the neurofuzzy team along with some of the graduate students were going. The neurofuzzy team was presenting seven papers at the conference. Kwan also came along because we had two more papers on neural networks he was presenting. One of these papers won a 'best paper' award at the conference. In addition, I had been asked to co-chair one of the special sessions on neurofuzzy soft computing.

At that time the new security arrangement at the airports was still at the stage where they would pluck people out of the line for a full electronic frisk before getting on the plane. Supposedly those plucked out for a more thorough search were determined randomly by computer when you presented yourself at the check in counter. I had my doubts about how random this process was because I was frisked at every single airport. Every single time. Both ways, going and coming. It got to be fairly annoying pretty quickly, especially since methods like this are completely ineffective insofar as providing 'security' is concerned. It's a sampling process, which means the odds of actually catching a terrorist this way are pretty bad. The whole process was all for show so the Bush administration could look like it was doing something to protect the public. But as a counterterrorism measure it was worthless. I'm pretty sure they were actually using some kind of profiling criterion to figure out who was going to be searched; otherwise it's hard to explain why an Idaho college professor from Iowa would be so popular with the friskers. But if *I* fit some profile, it's hard to see how that profile could be geared up to catch any real terrorist. Maybe they figured a professor was likely to belong to that dread organization Al-Gebra; luckily, I carried no Weapons of Math Instruction with me.

The conference itself went very well but for me the best part of the trip was Seville itself. Seville is a large city – someone told me its population was around seven hundred thousand people – steeped in history. It had been captured in 45 BC by Julius Caesar, and the Roman emperors Hadrian, Trajan, and

Theodosius had been born in the nearby town of Italica (modern day Santiponce). The ruins of an old Roman aqueduct still stand in parts of the city. Although it was November, the weather in Seville was perfect, like summer days back home.

Jim Frenzel in the electronics lab at the Institute.

On days when not much of interest to us was going on at the conference Kwan, Jim Frenzel, Terry Soule, and I would set out from the Meliá Lebreros Hotel, where the conference was being held, and go on walking tours of the city. None of us had thought to bring a Spanish-English dictionary along – the language at the conference was English – and my old high school Spanish had gotten very rusty over the years. For the first few days we were getting some pretty strange looks from waiters when we asked for the check; it turned out that instead of asking for the check we were asking them to bring us the invoice. The Spaniards were a pretty laid back bunch who were never in any particular hurry. One afternoon we'd stopped off at a sidewalk cafe for lunch and after lounging about for awhile decided it was time to resume our tour. The trick was to get the attention of one of the waiters so we could pay our bill and be on our way. Kwan tried to wave one of them to come over to our table, and I guess he was a little too vigorous about it. The waiter jumped into the street, gave a sharp whistle, raised one hand high over his head, and yelled out in English, "Taxi!" Kwan's face turned red and the rest of us laughed until our sides split. It was hilarious and even the waiters gathered round and joined in.

Our little tours of Seville weren't exactly organized safaris. The hotel had tourist maps available and we'd more or less set out in the general direction of where the map indicated there were interesting things to see. We'd go until my body stiffened up to the point where I couldn't walk anymore, take a break until I could go some more, then we'd be off again. On days when I overdid it too much we'd take a taxi back to the hotel after we'd covered the area of the city we'd set out to see. Cab fare in Seville was cheap. A taxi cost only six euros and at the time the euro traded even up, one euro for one dollar.

I enjoyed seeing the regular, non-tourist parts of the city almost as much as the tourist attractions and I enjoyed trying to chat, as best I could in my broken and very limited Spanish, with the locals. There were several old houses owned by families who belonged to the Spanish nobility that were open to tours. I use the word 'old' in the calendar sense here; these houses were very well maintained and, truth be told, were in better shape and were better built than many of the much younger houses back in Moscow. Invariably they would feature an interior courtyard open to the sky, around which the rest of the house was built. The ones I saw were two story houses. I was told this architecture helped keep the air circulating inside the house and kept the house cool in the heat of the Spanish summer. Typically the courtyard would feature a fountain, a garden, or a tiled open space with a ring of marble statues placed around the periphery. The individual rooms in the house were smaller than is typical in a modern American house. Still, a person could be very comfortable living in one of these houses.

But for those hard to please, there was always the Real Alcázar, the Royal Palace that belonged to the King of Spain. This, too, was open to tourists and it was a gigantic place. We spent probably about two hours wandering around inside it and still didn't see everything. The palace contained within its outer wall numerous gardens and there were small little coffee shops and restaurants sprinkled about here and

there on the palace grounds. It had its own museum as well as many, many works of art adorning it pretty much everywhere. No complaints about the size of the rooms here; they were big enough to satisfy the most claustrophobic person. The Real Alcázar isn't the main palace in Spain. That one's in Madrid and the Real Alcázar was kind of the vacation get-away palace for His Majesty. I guess it's true what they say; it's good to be the king. The Real Alcázar made J.R. Simplot's house in Boise look like a log cabin.

Not far from the palace was a very nice little park that featured a huge statue of Christopher Columbus. Seville was the major jumping off point for Spanish expeditions to the New World and the city has a gigantic hall of records where documentation of Spain's bounty from its American expeditions is still kept, or so I was told. I saw the hall from the outside but it's still an operating government office building and we didn't go inside. Christopher Columbus is a local hero to the people of Seville.

Then there was Seville's gothic cathedral. That was one serious church. I'm told it is the third largest church in the Christian world, after the basilica in Vatican City and St. Paul's in London. Construction of the cathedral started in 1401 and today it contains five naves, twenty chapels, plus a Royal Chapel. It also holds numerous works of art by, among others, Murillo, Zurbaran, Valdes Leal, and Goya. Kwan and I took the opportunity there to do some serious climbing – all the way up a series of stairs that started to seem endless long before we got to the top and could look out over the city.

Not on the usual list of tourist attractions, but still of interest to us, was Seville's university. It was set back behind high stone walls in an attractive part of the city not too far from one of the many very nice little parks. We strolled inside and basically just wandered around for awhile. We didn't come across too many professors there – like elsewhere in Europe, the professors tend to kind of set themselves away in what I tend to think of as cloisters – but there were plenty of students. Young people are the same the world round. I saw serious ones, silly ones, gregarious ones, all in the full flush of youth and vigor in the High Summer of their lives. Just being around them was fun.

Back home the elections had come and gone, and from Seville it was hard to find out any details about the outcome. From what I could find out, though, things hadn't gone too well. The Senate was back firmly in Republican hands; that the Republicans kept their majority in the House was no surprise. I guess the Democrats' effort to look more like Republicans than Democrats hadn't paid off. Why the party leaders thought it would is something I never did figure out. Instead I was reminded of George Wallace's famous campaign line, "There's not a dime's worth of difference between the Democrats and the Republicans." I guess that was true in 2002 except for one thing. With full Republican control of both houses of Congress, Bush could now do anything he wanted and there was no opposition to rein in our bungling pseudo-Caesar.

I couldn't learn anything at all about how things had gone in Idaho, so I had to wait until we got home to find out how badly Republican things had gone there. On the local front in Moscow, one of the things that had happened was a stealth fundamentalist had managed to get elected to the school board. By stealth fundamentalist I mean a person who presents himself during the campaign as a supporter of public education and then, after being elected, proceeds to propose and support moves to hurt the public schools and supports having private religious schools, usually fundamentalist, paid for by taxpayer dollars. A less polite term for these folks is 'liar.' Kind of like those Democrats who were pretending to be Republicans. There was a lot of that going around those days. □

During the 2002-03 school year I found myself receiving a lot of invitations to give talks in various seminars and to attend an increasing number of meetings on various topics. One of these meetings was on Homeland Security Issues, although nothing of any consequence came out of that meeting so far as I know. Word had gotten around about my mental physics work, too, and I started getting invitations to deliver philosophical talks at different seminars, including a philosophy colloquium at Washington State. As I mentioned before, I think philosophy can and should be treated as a science – the first science, in fact – and I found my audiences enthusiastically receptive to the topics on which I was speaking whether my talk included anything about electronic brains or not.

In mid-December of ’02 the SBOE had approved our Notice of Intent to start our graduate program in neuroscience, and final approval of the program itself came during their January 20-21, 2003, meeting. Consequently, spring semester of ’03 found me doing the first offering of a new graduate course entitled ‘Biological Signal Processing.’ This course would become one of our three ‘core’ courses required of all graduate students in the neuroscience program, and it would also be cross-listed as a graduate course in electrical engineering, much like the course I had taken at Stanford many years before. It teaches students how to do computational models of biological and psychological phenomena with an emphasis on those phenomena of interest to neuroscience. The course is an introduction to computational neuroscience intended to serve a student audience drawn from biology, psychology, mathematics, and engineering. I am presently working on a new textbook for this course to replace the existing ones that I find to be not entirely appropriate for introducing this science to the broad audience my course intends to serve. When it is ready and has been adequately classroom tested, I intend to publish it for free over the Internet in the same manner as I published *The Critical Philosophy and the Phenomenon of Mind* in 2006.

On Wednesday, February 26th, Jang, Kwan, and I traveled down to Boise for the first of that year’s university research checkpoint meetings at HP. The plan was to follow our usual routine and meet in the parking lot in front of the lab for the drive to the Lewiston airport. Kwan showed up for our rendezvous that morning a bit excited and concerned. On his way over he’d run into a fairly big squad of police officers and FBI agents who were swarming around one of the married students’ housing complexes out at the edge of campus. He didn’t know what was going on, and we wondered about it all the way to the motel in Boise where we were staying during the HP conference.

We found out what it was about just as soon as we got there. The newspapers and radios throughout the Boise area were trumpeting the news that the FBI had arrested a terrorist on the UI campus. His name was Sami Omar Al-Hussayen and he was an international student from Saudi Arabia. Since the three of us were from the UI, the locals in Boise had quite a lot to say to us about what had happened. I thought I could detect just a hint of rebuke from them that the UI would have terrorists on its campus.

I knew Sami slightly, which is to say I’d seen him around campus every once and awhile. He was a Ph.D. student in computer science working for a professor whose office was next door to mine in the Institute. She was the director of our Center for Secure and Dependable Systems – CSDS for short – which was and is our research center that looks into security and protection issues for computer systems. CSDS was funded mainly by the National Security Agency and primarily investigates methods by which hackers break into computer systems and/or plant computer viruses, ‘worms,’ or carry out other such illegal actions. The feds charged Sami with seven counts of visa fraud and four counts of lying to officials – all of which stemmed from work he allegedly did as a webmaster for some web sites located in Michigan. To add spice to the whole affair, he was also charged in connection with a goat smuggling conspiracy (Huh?) but this charge was later dropped. You might notice that none of these charges would seem to have anything in particular to do with terrorism; those charges actually came about a year later when he was charged with two counts of conspiracy to provide material support to terrorists and one count of providing material support to Hamas (through donation links on the Web site he allegedly maintained). But although he had not yet been charged with any terrorism activities, the feds announced – and the news reported – that they had caught a terrorist. The next day out at HP, I didn’t run into one single person who hadn’t heard all about it and not a single person who wasn’t dead sure he was guilty. Sherri was absolutely convinced Sami was a terrorist. She still is.

It turned out there was just one little problem. He was innocent.

At his trial, in April of 2004, a jury acquitted him of all three terrorism charges and three of the eight total immigration charges. The jury deadlocked on the remaining five immigration charges. The terrorist charges against Sami came out of the misleadingly named USA Patriot Act, which had been rushed into law October 26th of 2001. In March of 2003 a judge ruled that he should be set free without bail and remain under house arrest until his trial. Sami was married and he had three sons up in Moscow.

Immediately after this ruling, immigration officials detained him on their charges and held him in their custody until he came to trial. I thought there was something more than a little Gestapo-like in that tactic. At a closed door immigration hearing in mid-2003, the INS ruled he was deportable. After his acquittal he remained incarcerated by the INS until he agreed not to appeal the deportation order in exchange for the prosecutors agreeing not to re-try him on the five deadlocked immigration charges. His wife and sons voluntarily returned to Saudi Arabia to meet him rather than wait to be deported themselves. Today he is an instructor at a technical university, in Riyadh I believe, and his wife teaches kindergarten. I think the feds deliberately railroaded an innocent young man; they certainly put an end to his graduate studies.

The terrorism charges against him came from the Patriot Act provision that authorizes the government to prosecute those who 'provide expert advice or assistance' to terrorist groups. This provision of the act was ruled to be in violation of the First and Fifth amendments in January 2004. The Republican Congress later amended the Act to fix up the vague definitions in the original Act so that they could restore the 'expert advice or assistance' clause. Not being a lawyer, I couldn't tell you exactly what would constitute 'providing expert advice or assistance' to terrorist groups. For all I know, publishing a scientific paper might do the trick if a terrorist read it and put something in it to use in some kind of terrorist act.

It sort of makes you think if you're a professor. □

On St. Patrick's Day I received a phone call from the NSF program officer in charge of the Research Experience for Undergraduates (REU) program. The previous September I had submitted a proposal to NSF for an REU site for computational neuroscience and technology research. The idea for this site had grown out of a melding of our new graduate program in neuroscience and the neurofuzzy research project we were carrying out under NSF EPSCoR funding. There are a great number of opportunities for findings in neuroscience to influence the engineering field of artificial neural networks and, likewise, for findings coming out of engineering research in neural networks to provide insights into brain science. In the language of modern management, this is called 'synergy.' The word basically means 'the whole is greater than merely the sum of the parts.' Synergy is something you see fairly often in athletics: A team without superstar players comes together and dominates the league that season to take the championship. Over the years I had often seen the same thing happen time and time again in R&D teams at HP and in research teams I had been part of at the university.

Synergy is the result of good team leadership and is always something to be highly desired and prized when it can achieved. Achieving synergy is the main reason why the best research results come from a good *team* of researchers rather than from individuals working off by themselves. With synergy in research you only need smart, dedicated people and do not have to rely on having a genius around. In my opinion, achieving synergy is the main job any leader has. All the rest of it – budgeting, scheduling, etc., etc. – is just a tiny piece of what a manager does and not nearly the most important part of the job. The minimum thing a leader or manager must do is prevent 'anti-synergy' – having the team disintegrate to the point where the whole is *less* than the sum of the capabilities of its members. But *good* leaders *create* synergy. It isn't easy to do, but it's always worth doing.

I had seen a golden opportunity to create some synergy between the engineering world of neurofuzzy research and the scientific world of neuroscience proper here at the UI, and the REU proposal was born of this opportunity. I had been working with folks from both sides of the picture to form a new research consortium within the MRC Institute, which we were calling the Laboratories for Computational Neuroscience and Technology Research (LCNTR). LCNTR was to be the organizational unit for the proposed REU site. The idea had been warmly received at NSF. Our REU site was – and I believe still is – the only one in the country where this melding of neuroscience and engineering into one team was a central focus. Today there are a number of REU sites for neuroscience, and there are a number of REU sites for the engineering and mathematical aspects of neural networks, but we were and are the only site where these are combined into one research organization.

Dr. Booker from NSF called me that day to talk about a problem that had cropped up when my REU

proposal had moved up the management ladder at NSF. It was the same old problem NSF usually faces: money. Our proposal had received a 'fund if possible' recommendation from NSF's panel of reviewers, but the 'if possible' part was proving to be tricky. The reason wasn't hard to figure out. The combination of Bush's massive tax cuts, passed in 2001, with the Al Qaeda war meant that money for non-war-related federal spending was tight. Dr. Booker called to propose an idea to me. She wouldn't be able to fund our REU site starting in 2003, but if I was willing to wait until 2004 she'd be able to put the funding for it through then. The Division Director at NSF had agreed to this plan. Would I be willing to agree to it? Well, that wasn't a tough decision: Agree to wait one year and know we'd get the funding or not agree to wait and know we wouldn't get the funding. It took me about two seconds to decide on that one. I appreciated Dr. Booker's willingness to innovate in solving the budget problems at NSF, and I wasn't about to whine about life's realities rather than get on with dealing with them. I agreed we could wait one year before starting the REU site. Jean'ne didn't like my decision too much on this one, but it was the right call and the next year we had ourselves an REU site. □

Bush's war on Iraq started three days later. Like it or not – and I didn't like it one little bit – America was now in a second shooting war and there was only one thing we could do about it: Win it so we could get back to fighting Al Qaeda, the real enemy. With the rest of the country, I was glued to the TV each night to catch the day's war news as our forces – ours and Great Britain's – advanced toward Baghdad. Compared to Afghanistan, this time we had clearly brought enough force to bear to crush the armed forces of the enemy. I couldn't help but think that if we'd brought this kind of force against Al Qaeda in Afghanistan the real war would be over already. The Iraq campaign has gone into the military textbooks as an example of a well-executed battle plan, and rightly so. From a purely military perspective, our young men and women fought magnificently. As our forces approached Baghdad, I waited with no little apprehension, along with the rest of the country, for that moment when Hussein would unleash the chemical weapons against us that Bush had told all of us Iraq possessed. I knew these wouldn't be able to stop us, no more than poison gas had been able to be a decisive weapon during World War I or Iraq's use of them had done anything to defeat Iran back in the 80s. But their introduction on the battlefield would almost certainly cause severe casualties.

Iraq's vaunted chemical weapons never made an appearance. I didn't think for a second this would be due to any restraint on Hussein's part. He was a butcher and we already knew from the first Gulf War that as commander of Iraq's armed forces he was nothing but a boob and a thug. No, if he didn't use them it meant he didn't have them. I wasn't surprised later on when no weapons of mass destruction nor even any facilities for producing them were found. It turned out to be just as I had said to Ronnie when we had talked about the question of Iraq. Iraq really had been contained and had never been a threat to America. This was an unnecessary war, an irrelevant war. All it accomplished in the end was to give Bush some personal revenge for Saddam Hussein's attempt to assassinate his father after the first Gulf War.

One other thing also became clear during the advance on Baghdad. We had brought to bear enough force to overpower Iraq's army, but not nearly enough to occupy and pacify a hostile country. This became clear when Iraqi 'militia forces' started their attacks in our rear areas. I had no doubt that some Iraqi civilians, the majority in fact, would welcome the fall of the dictator Hussein. I did not think this meant they would necessarily welcome *us*, an occupying power, on their home soil. Nor did I think a liberated Iraq would be a united Iraq. No one who has learned the least little bit about the history of Iraq and given it the least amount of thought should have expected that. Iraq was a united country for just one reason: all the military and secret police force their dictator had applied. Now, I felt to a certainty, we would be facing a costly and pernicious and lengthy counterinsurgency campaign in post-war Iraq. The doctrine of counterinsurgency had been much talked about in the mid-1960s because of Vietnam, and it was something we had studied a bit when I was a CAP cadet. There was also ample evidence from the history of post-colonialism after World War II when Great Britain lost piece after piece of their empire, and from the rout of the French in Indochina and their ejection from Algeria in Africa.

I had never believed for a single second Bush's pre-war claim that oil revenues from Iraq would pay

for the war and for the so-called 'nation building' he proposed to undertake. How could Iraqi oil resources pay for the war except by us either seizing them for ourselves or extorting the revenues from them at the barrel of a gun? What sort of 'infrastructure rebuilding' could anyone reasonably expect to result from the privileged companies to whom Bush had granted 'no bid' contracts and then given a free hand to feed at the pig trough of an Iraq in chaos? What kind of peaceful post-war Iraq could be expected after the Army had left massive caches of stockpiled weapons unguarded and Iraqi guerillas were left free to raid them and thereby arm themselves against us and against each other? The nineteenth century writer Antoine Boulay de la Meurthe had famously written, "It is worse than a crime, it is a blunder." That was the Iraq war. Bush had taken us into a counterinsurgency war that would drain our military resources for years to come and leave our real enemy, Al Qaeda, free to regroup and rebuild.

Our War Chief President had proven himself to be a blundering incompetent through and through. □

Ben Sharon at work in the my lab.

Spring semester and the summer of '03 were busy days for us. A total of seven graduate students whose committees I served on completed their theses or doctoral dissertations and graduated during this period, and I brought a new graduate student, Ben Sharon, aboard the neurofuzzy project. Ben had worked for me previously in the electrophotography lab as an undergraduate research intern and I had been impressed by his abilities as a young engineer and his practical approach to problem solving. When he decided to go to graduate school, I had just the research project for him: extending our basic biomimic artificial neuron circuit to implement a more powerful version of artificial neuron called the Eckhorn model. This model had been proposed earlier by a team of German neuroscientists as a model for neural signal processing in the visual cortex of the brain and had become an important part of pulse coded neural network theory in image processing applications. Up to that time no microchip circuit implementation of the Eckhorn neuron had been invented, and doing so was now Ben's job.

Jean'ne's EPSCoR program held annual program review meetings each September where the three focus area teams presented what they were doing to a distinguished panel of outside experts who comprised our Program Advisory Board. One thing the PAB members did was evaluate the different EPSCoR teams' performances and report this evaluation to Jean'ne. If they didn't like what they saw, Jean'ne had no hesitation about dropping non-performing professors from the Program. The second and more important role PAB members played was to advise the focus area leaders on things they thought would be of benefit to their particular team efforts. The neurofuzzy team was fortunate in having a very distinguished PAB subpanel led by Dr. Don Wunsch of the University of Missouri Rolla. Don was and is one of the world's foremost experts in artificial neural network research. He was at that time about to become the president of the IEEE's Neural Network Society (known these days as the Computational Intelligence Society) and would be named a Fellow of the IEEE in 2005.

One of the most important pieces of advice Don had given me at the September '02 PAB Review was that my team should establish a central application area that could be targeted by our work. Doing so would help to unify our individual efforts and, as it turned out, this was excellent advice and did a lot to increase the synergy of our individual efforts. After the review the team members sat down and we decided to target bipedal robots as an application area. Bipedal robots were not new at that time. For

example, the Japanese had come out with one called 'Asimo' – presumably named after Isaac Asimov, a science fiction writer whose robot stories had fascinated me when I was a boy. But robots like Asimo are really pretty clunky jobs whose ability to move around falls far short of human ability. What we decided to do was aim our work toward the eventual goal of bipedal robots capable of human-like locomotion. Such a robot would, for example, have been capable of going into the caves of Tora Bora after the enemy. This was something Asimo and others like it cannot do. Naturally, our approach would be 'biomimic'; our research would aim at uniting the biology of human locomotion with robotics engineering.

This, too, was not unique to what we were doing. Researchers at MIT and a few other places were then working on biologically-inspired robot 'fish' and 'insects' and were just then in the process of achieving some very impressive results. However, for numerous technical reasons the problem of natural bipedal movement is quite a bit more difficult than the problem of locomotion in fish or insects, and here we felt our methods and findings had a very good chance of overcoming these technical problems. On top of this, my own research into the mental physics of the human mind had by then produced a very relevant finding which stated that the development of intelligence and cognition is very tightly linked to the development of motor skills in infants and young children. Much earlier research work carried out primarily by the famous Swiss psychologist Jean Piaget and his co-workers had turned up experimental findings that this was so in child development. What my work added to this known fact was a more detailed theory that showed this linkage between motor skills and the development of cognition and intelligence was *fundamental* at the deepest levels of mental physics. As it happened, about the same time I had been coming to this conclusion the work of some noted biological neuroscientists – principally S. Murray Sherman and R.W. Guillery – was uncovering important findings in the neuroanatomy of the thalamus (a part of the brain through which all peripheral signals pass from the body to the higher brain centers) that also seemed to point toward this same result.

Piaget's work hasn't been very popular in the American psychological community – due in no small measure to opposition originating at Harvard – and the biologists, who are a very cautious breed, regarded and still regard the implications of the thalamus findings to be speculative. My own findings, which came out of very fundamental theoretical considerations that did not depend on the specifics of biological organization, had already convinced me of the truth of this underlying relationship. In fact, if Sherman and Guillery hadn't already made their findings, I would have published a prediction that something like what they had found would turn up if the anatomists looked for it. At the time I wasn't aware of their work but when I later looked for evidence of this sort of brain organization in the published literature of neuroscience I was delighted to find out what they had done and accomplished. It seems a marvelous confirmation of a key part of my theory. But I'm getting ahead of the story a bit.

The neurofuzzy team decided to start out with developing PCNN models of the human spinal cord and muscular system. The spinal sensorimotor system is basic to how our bodies are able to control our muscles and movements and we thought a focus on this aspect was the most logical starting point. One of the things that occupied a lot of my time during the summer of '03 was writing a series of detailed tutorial 'tech briefs' for my teammates on the biology of the spinal cord and muscular system. These tech briefs provided important background knowledge the other professors and graduate students would need for our newly defined application focus. I published these tutorials on our Web site, where they turned out to be surprisingly popular; they are among the most often downloaded materials from our Web site. In any particular month, from a hundred to as many as nine hundred copies of these various tech briefs are accessed from all over the world.

I also developed a detailed mathematical model of the kinetics of muscle action that Terry and his group used to further their work on evolutionary computing methods for neural network design. This model turned out to be an important contribution to our overall team efforts and, likewise, became a popular download from our Web site. One reason Asimo and other robots like it are so clunky is because they are built using fairly standard mechanical implementations that lack the flexibility provided by the compliant tissues that make up our muscles. Muscles stretch and contract and do so in a very nonlinear

way, and this significantly complicates the problem of controlling them. But this was precisely the sort of biological control system problem we were and are interested in solving.

Jang in his new office in the Institute. Jang doesn't like to smile when his picture is taken so for this one I stood behind the photographer and told him jokes until I finally got him to laugh.

We were continuing to make very good progress in our electrophotography research as well. Jang and I were at this time engaged in coming up with a number of important findings by applying the model we had developed for HP, and these results ended up in a mini-flood of published journal and conference papers with Jang as first author. I also asked Jang to develop a computer model of the mathematics I had worked out for the spinal-muscular system, and he put one together for us in an amazingly short time. I already knew he was an exceptionally talented researcher, but even I was amazed at how good he was turning out to be in his new role within the Institute. Touraj, too, was deeply impressed and he and I began planning how to get a Research Assistant Professor slot approved by the University for Jang after his postdoctoral fellow appointment. Guys like Jang don't come along very often, and we both knew a good man when we saw one. Getting this approved was going to be tricky because of the University's financial crisis brought on by the Idaho Place scandal, but we were confident we could eventually come up with a way to get this done. Jang was just that good.

HP was also making good use of the computer aided design software package we had delivered to them. HP buys its print engines from Canon in Japan, and during this period they were using the model to influence how Canon would design its next generation of print engines for HP. The eventual result was lower cost print engines and, therefore, lower cost LaserJet printers. □

In September of '03 I unexpectedly picked up a walk-on Ph.D. student and a new project. "Walk-on" is the term I use for graduate students who ask to work in my lab without the support of a research assistantship. These students usually have some kind of research project of their own in mind and what they want from me is generally coaching, advice, and training in how to conduct research. If what they want to do is something I think I can help them with, I generally agree to take them on under the theory that if walk-on players work out for the football coach there's no reason they wouldn't work out for me.

This case was a little different. Al was an older-than-average graduate student, married, and already had teenage boys and a daughter. He had been working for Dr. Deb Frincke, who at that time was the director of one of the Institute's two centers, the Center for Secure and Dependable Systems (CSDS). Deb had in fact been the major professor for Sami before his arrest. She came and asked me if I would take on Al as my student because his research involved cryptography, an area in which she had no expertise. This happened to be an area I knew a bit about from my work in information theory and also from some playing around with it I'd done when I was boy. I agreed I'd talk to Al and if I thought I could help, I would.

A couple days later he came to see me in my office. I listened as he described an encryption system he'd been working on. It was a complicated gizmo with all sorts of stuff being done to encrypt the original message (called the 'plain text' in the language of cryptography). "It's unbreakable," he bragged.

I looked at him for the good part of a minute and then replied, "You don't know that." He looked surprised and then started to explain it all again. I raised my hand and stopped him. "There's two kinds of security in encryption," I told him. "One is called 'perfect secrecy' and the other is called 'computational security.' Do you have a proof this system enjoys perfect secrecy?" He shook his head. "Do you have a

calculation estimating its computational security?" He shook his head again. "Then you don't know if this system is secure or not," I said. I went on to tell him a little story from the history of encryption systems. During World War II the Germans had a system for encrypting their military transmissions. When the African campaign was at its height, British bombers were sinking most of the supply ships bound for Africa with supplies for Rommel's Afrika Korps. One of Rommel's staff officers raised the question of whether the British might have broken the German code and if that might be how they were managing to sink most of the Afrika Korps' supplies. Field Marshal Rommel dismissed the idea out of hand. Breaking the German code, he said, was "a mathematical impossibility." But, in fact, the code had been broken and that was in fact the reason for the British success in sinking the supply ships. Many years later when documentaries were being done about the exploits of the British code breakers, a former German officer was indignant at the suggestion these guys had really been so successful. "If that is true," he demanded, "why didn't they win the war sooner?" The answer, of course, is *they did.*

It was pretty clear to me that Al had a lot to learn about encryption systems and their security, and it just happened that I had an idea for a new way to investigate this question. One of the mathematical methods I had been working with for about a decade by then is a little known area of systems theory that goes by the name 'set membership theory.' I had already used SMT to solve a number of otherwise fairly nasty problems, and it occurred to me that this theory might be just the thing to analyze how easy or hard it might be to break codes. You see, perfect secrecy is extremely difficult to achieve. There is only one kind of cipher system known to enjoy perfect secrecy. It is called the 'one time pad' and there is a formal mathematical proof that this system cannot be broken. The reason people don't use it is because it runs into a number of important practical issues that make it not very easy or convenient to use. The U.S. Armed Forces do sometimes use a version of it, or so I've been told. Pretty much nobody else does.

All other kinds of encryption systems – including the one in your computer – do not have perfect secrecy (which means they can be broken). The trick to making an encryption system secure is to build it so that the time required to break the code using the best known computer-aided techniques is so long that it might as well take forever so far as any snooper is concerned. However, computational security can only be evaluated in the light of the known methods for approaching a code breaking problem. If somebody comes up with a better code breaking algorithm, a system that was once believed to be secure might turn out to not be very secure at all. Computational security is achieved by making the calculations involved very complicated and time consuming. But no one had ever – again, so far as I know – tried to use SMT methods on this problem. SMT can be described as a method to 'roll your own math' – in other words, to concoct new mathematical structures in which what was a hard problem becomes a fairly easy one. I'd used it on three earlier occasions to solve problems that had defied clean solution by means of everyday mathematical methods. Why not, I suggested, try it on this problem?

Al had never heard of SMT before. Not too many people have. But he was willing to learn and I was willing to teach it to him. So, just like that, we had a new project going. Just a bit playfully, considering the topic, we came to call this one "Al's project." □

Our second annual EPSCoR PAB review was held in late September. By then we were twenty months into the neurofuzzy project and the team had a lot of exciting things to showcase for the members of the Program Advisory Board. Terry's first graduate student on the project had graduated the previous August and a bright, earnest, and somewhat nervous young man named Stan Gotshall had just joined Terry's lab to pick up the work. I like Stan a lot, not the least reason being the way he dived right into learning about the biology of the spinal cord and muscle system. Stan's job was to develop Evolutionary Computing techniques to design the neural network for our artificial 'spinal cord.' The team had produced a nice little stack of published research papers since the last review; papers, of course, are the currency of exchange for research and ultimately are what a research team's success is evaluated on. We had already filed for one patent on the BAN technology and a second patent disclosure was then in the works. Jean'ne actually beamed when she introduced her 'Fuzzies' at the review that year.

The one weak spot that year was Vitit, the professor from Idaho State. Vitit had turned out to be what I call a 'high maintenance' team member. It isn't unusual for a professor to be more than a little independent minded. The fact is, it's more usual than unusual. In Vitit's case, this independent mindedness took two forms. The first was a little rebellion against that list of requirements Jean'ne had issued to every EPSCoR participant at the start of the program. His basic attitude seemed to be that no 'administrator' – meaning Jean'ne – could tell *him* what to do. The second was a similar attitude taken toward his focus area leader – meaning me. I had originally brought Vitit aboard because his field of expertise was computer arithmetic, and the idea of bringing him aboard was to work on the problem of what the mathematical architecture of a neurocomputer needed to look like. What I hadn't counted on was that he would become enamored with elementary neural network theory (with which he hadn't been too familiar when the project started). He had gotten enthralled by one particular aspect of artificial neural network learning behavior and had drifted off into playing around with it. I'm sure he learned a lot doing this but there was just one problem. What he was learning wasn't new. Everybody who worked in the field already knew about it and so he was merely rediscovering some very, very old stuff. Neither Dan nor I were able to coax him back into participating as a team player.

The PAB members weren't too impressed either. After the formal presentations and other business of the review were over, the focus area leaders each took part in what were called the 'exit interviews.' These were meetings where specific PAB members provided feedback to us for where we should steer the projects during the next twelve months. Don Wunsch and Hao Ying, my two PAB advisors, gently suggested it was time I 'reallocated' the project's funding to more heavily promote those areas of the neurofuzzy project where the most productive results were being produced. I was planning to propose this to Jean'ne already, but Don's and Hao's feedback pretty much made this change a slam dunk. Jean'ne was a little less gentle about it when I met with her shortly after the review. I think she more than half expected me to defend Vitit's contributions to the project, but the unfortunate thing was he wasn't doing anything I felt like defending. We didn't need or want what he was doing and I did need and want what he wasn't doing. I knew Jean'ne already intended to drop him from the program but I spared her the need to argue with me about it because that was my intention as well. We went into the third and last year of the program without him, and I re-funneled the money to provide more support for Terry's efforts and to add more undergraduate research interns to the microchip design efforts. Vitit was now free to be as independent as he wished; he would just have to be independent using somebody else's money. □

I was still having chronic back problems when I turned fifty that September, and I still didn't know that the problems I was having *were* back problems. Mainly this was because from my neck down to my toes I felt stiff and had aches pretty much everywhere pretty much all the time. My back wasn't exactly sore but, like the rest of me, it did feel as stiff as an old board. The calendar said I was fifty, but I didn't feel one single day older than seventy-five.

By then I'd pretty much gotten used to feeling like an old man all the time. Most likely this might have been because by then I'd forgotten what feeling good felt like. For all I knew, it might have been normal to feel like this at the half-century mark. But in mid-October things took a change for the worse. It began one morning while I was sitting at my computer in my study working on a technical paper. All of a sudden and for no apparent reason, a burning sensation began in my right leg. It began as a strange kind of twinge and in a few seconds it felt like my leg was on fire. This didn't last for more than a few minutes but at the time it sure seemed like a lot longer. The hornet stings I'd received when I was a little boy were worse than this burning leg episode, but nothing else I'd ever felt had ever come close to this.

I had only the one episode that day, but in the days that followed the problem rapidly got worse. It was all completely unpredictable. Some days I would have no episodes at all, others I might have as many as four, mostly in the morning and spaced out at unpredictable intervals. One even hit while I was giving a lecture in one of my classes. During that one I really had to focus all my willpower to keep the pain off my face and out of my voice so I could deliver the rest of the lecture without alarming my students. I'm pretty sure none of them noticed.

It was pretty obvious something was very wrong, so that afternoon, after I'd finished my lecture and finished pre-taping the next lecture (I would be down in Boise that day for the HP autumn 'tech expo'), I paid a visit to my local doctor. He was the same guy I'd gone to for having that cyst removed from my back a couple of years before. He listened carefully while I told him what had been going on. I'd started keeping a log of when these episodes had occurred just in case there might have been some kind of pattern to them. But it turned out there was no particular pattern, and after he examined my leg he was as stumped about it as I was. He admitted this to me quite frankly, which I appreciated very much. I hate it when a doctor is clueless and still acts like he knows exactly what the problem is. He said the symptoms sounded like some sort of 'convulsion' but he'd never seen one like this before. Well, that made two of us. If it *was* a convulsion, he went on to say, there was a new anti-convulsant medicine that might help. He was very clear there were no guarantees, but he'd let me have some pills to try if I wanted to try it. Because having my leg catch on fire hurt like the dickens, I was game. He handed me a box labeled 'physician samples' to take home. The drug was called 'neurontin.' The box of samples was free.

When I got home that evening I found a very big piece of paper covered on both sides with very tiny print neatly folded up inside the box next to the pills. It was a summary of the complete description of the drug including the results of animal tests and a clinical trial that had been run on it. It turned out that this drug had been developed as an anticonvulsant for epileptic seizures. That gave me a lot of pause right there; whatever my leg problem was, I knew it wasn't due to epilepsy. I read the entire thing with mounting fascination. What was written on it would be gibberish to most people, but by that time I'd been studying neuroscience for years and consorting with biologists for the past two years, so I was able to follow what the thing was saying. Two things in particular really caught my attention. The first was a little section in which it was written, 'In standard preclinical *in vivo* lifetime carcinogenicity studies, an unexpectedly high incidence of pancreatic acinar adenocarcinomas was identified in male, but not female, rats. The clinical significance of this finding is unknown.'

In English: Some rats that had been given this drug developed pancreatic cancer and they didn't know if the same thing would happen to people.

The second thing that caught my eye read, 'During the course of premarketing of Neurontin, 8 sudden and unexpected deaths were recorded among a cohort of 2203 patients. . . Some of these could be seizure related deaths in which the seizure was not observed, e.g. at night.'

'Could be,' eh? Okay, I think I'll pass on taking this medicine.

The next day Jang, Kwan, and I flew down to Boise for the tech expo. All things considered, I thought it was better to put up with getting frisked again at the airport than to chance having my leg catch on fire while I was driving that winding goat trail we here in Idaho call U.S. Highway 95. The expo went off quite well, but I had two painful episodes during the first day of it and four the next day.

That weekend I spent quite a bit of time thinking about what might be wrong with me. Up until then I had thought of this as a 'leg problem,' but was that really what was going on? Except for the feeling that my leg was on fire, there were no other signs of anything at all being wrong with my leg. No discolorations, no swelling, no nothing. Maybe the problem was elsewhere. For the first time, I started to consider the possibility that this was really some kind of back problem. It made sense. Every single nerve in the human body passes in one way or another through the spinal cord on the way to the brain. I had a pretty fair picture of this spinal cord organization from the tutorial papers I had been writing for the neurofuzzy team members. All peripheral nerves enter the spinal cord via what is called the 'dorsal root ganglia,' a collection of neurons contained in a little sack-like arrangement just behind the adjacent vertebras. If something was pinching down on one or more of the dorsal root ganglia, the brain wouldn't be able to tell the difference between that and something in the peripheral nerve endings of the leg.

The next week I made an appointment to see a chiropractor in Moscow. If it was really a back problem instead of a leg problem, maybe a chiropractor could help. If not, well at least there wasn't a cancer risk.

My guy turned out to be a young, but not too young, fellow named Dr. Larry Hammond. His office was within walking distance of mine. I was by then making a practice of walking everywhere I could because I'd had a couple of episodes while driving my car, and they were each so painful I'd had to make an emergency stop and get out of the car to put the fire out. As I walked there I was mentally preparing myself to accept the normal chiropractic beating I'd taken back when I was thirteen. But I was in for a very pleasant surprise. Chiropractic had changed a lot in the almost forty years since I'd had my last adjustment. Larry listened very carefully as I described my symptoms. Then, just to be on the safe side, he took an x-ray of my back before he did anything else. Then the treatment began.

It was nothing like my earlier experience. In fact, it was almost as pleasant as getting a massage from my friend Ruth down in Boise. My favorite part of it was this blanket-like gizmo he put over my back that gently stimulated my back muscles. The idea behind this, he explained, was to tire those muscles out so they wouldn't fight the adjustment. After he finished, we made an appointment for me to return on Friday for a second adjustment. He warned me that he didn't think we had the problem licked yet.

I felt a bit better the rest of that day and for the day after. I had a couple fairly minor twinges that next morning at home but neither actually grew enough to be painful. Just a sensation of warmth in my leg. On Friday afternoon before the second appointment I had two bad ones. One happened while I was pre-taping a lecture, the other while I had a graduate student in my office. The second one was bad enough that I couldn't hide it and the student, Balaji Margabandu from India, did become alarmed. I had to spend some time calming him down. After he left, I had another meeting with the guy who ran the Idaho Research Foundation, which was handling our patents, and then it was time to walk over to see Larry.

I told Larry what had happened since our last treatment and he gave me another one, pretty much like the first. He wanted me to come back in on Monday, but I couldn't do that because I was spending the entire next week in Roanoke, Virginia at the IECON annual conference. I was presenting two papers there. Larry wasn't the least bit happy about that and he told me flat out that I shouldn't go. But that just wasn't an option. We made an appointment for me to come back the very first thing on the Monday morning after I got back from Virginia.

As it turned out, I didn't have any episodes while I was at the conference. There were a couple of very minor twinges that weren't painful, but nothing else. One of my papers won a 'best paper' award at the conference and I got to spend a lot of time talking with people who were very interested in what we were doing. One of these people was Dr. Paul Werbos, who was the NSF program officer handling engineering neural network funding and is a very famous guy in the world of neural networks. When I got back to Moscow I was pleased to tell Larry how well things had gone in Roanoke, but he still clucked at me a little bit for being so foolish as to take the chance. He gave me a third treatment and we scheduled another visit for Friday. All that week no bad episodes occurred, nor did any occur over that next weekend. Things were looking up, so we decided to skip the next week and have me come back on Monday, November 24th, which was the start of spring break.

Larry had instructed me to call him right away if I had any more episodes between then and the next appointment, and I was happy to promise him I would. But the week passed without incident and I was in pretty good spirits as I stretched out on my stomach on Larry's treatment table. He was less impressed. I guess his fingers must have been seeing something I wasn't. In any case, this time he gently started exploring higher up on my back than before. His fingers must have found something, because he gave me a push on the spine up between my shoulder blades. Previously, everything had been down in the lower back where the nerves associated with the upper right leg enter and leave the spine. There was a very loud *SNAP!* and both my feet shot into the air on their own so far and so fast that I almost kicked myself in the behind. If Larry had been standing one foot further back, I'd have knocked him to the floor. Larry stood there for a moment looking perplexed, then said to me, "What was *that* all about?"

"Hey, Doc," I replied cheerfully, "*you* did it, not me."

And he had done it. That was the adjustment that cured the problem. There was an unexpected fringe benefit, too. All that stiffness and all those feelings like my body was slowly turning into petrified wood vanished and I felt better than I had in a very, very long time. I might not have felt like I was twenty-five again, but I no longer felt like I was seventy-five either. It felt *good* to feel good again.

Talk about the laying on of the hands. All I can say is, *"Wow!"* □

Every now and then a strange year comes along and calendar year 2004 was one of those at the UI. The strangeness that particular year came in the form of a lot of personnel turnover. Joe Feeley, who had again become my department chair after David Egolf's term expired, had announced in the fall semester that he was retiring at the end of the 2003-04 school year. The announcement took all of us by surprise. As it happened, Joe had developed a heart condition and the stress of administering one of the largest departments in the university during a major budget crisis – brought on by the Idaho Place affair – wasn't doing him any good.

Joe's announcement touched off an internal political catfight within the department. For awhile it wasn't clear whether or not we'd be allowed to replace him because of the university's budget crisis; the main way the UI had been dealing with its budget problem had been through attrition. However, by the start of spring semester our college dean, Dave Thompson, had secured permission to replace Joe through a national search for a new ECE department chair. The catfight within the department was between part of the faculty who wanted the next chair to come from our own ranks and others who wanted to recruit a new chair from outside the university. At the heart of the controversy was how our department would deal with the budget problem.

Many professors at the UI took the position that the right thing to do in answer to the budget issue was to protect what they saw as the university's core mission – undergraduate education. All the various departments in the university were short-handed from the attrition process that had been going on, and the 'core mission' faction saw the situation as one where undergraduate education competed against research and graduate education. Everyone agreed that a land grant university like the UI was supposed to do both, but if both couldn't be done well then the quality of the undergraduate programs had to take priority over research and graduate education. Within the ECE department, our 'local chair' faction was inclined to take this position and they supported one of our own, an associate professor and excellent teacher named Joe Law. Joe was very forthright in saying that he would deal with the budget crisis by making sure that undergraduates would come first.

I found myself aligned with the other faction. My view was and is that research and graduate education are also core missions. It wasn't a matter of undergraduate vs. graduate education. We had to find a way to do both and to do both with uncompromising quality. Research enters in to this picture because research is how the university brings in non-state dollars that go to support graduate and undergraduate students alike. With university 'fees' climbing eight to ten percent each year, I believed that being able to provide meaningful jobs for students on various research projects was more important than ever. I also believed that if an organization responds to a crisis by cutting into its core mission right at the first step, that organization takes the first step on the path to failure. I was also certain that if we did not bring in an external candidate to fill the chair position, we'd lose yet another faculty position to the budget crisis and that was something I was certain would hurt everything we did in the department.

One of the things I had been working very hard at since moving to Moscow had been to increase the size of our graduate program. For many, many years the UI had been known much more as a teaching college than as a research university. Under Bob Hoover that had all changed and by January of 2004 the UI as a whole and our department in particular had established a large and robust graduate education and research program. The UI's research funding was now in the vicinity of one hundred million dollars per year university-wide. It hadn't been easy to build this program and I thought it was ludicrous to respond to a budget shortfall by doing things that reduced our income even more. So while I liked and respected Joe Law, I did not want to see him become chair of the department.

As spring semester got underway, the dean called for a search committee to be formed to look for our next department chair. As luck would have it, I found myself appointed to be one of the members of this committee. Following standard university procedures, a chair search committee is chaired by one of the other department chairs in the college, and for this committee we chose the chair of the civil engineering department, a guy named Sunil Sharma. We also had a representative from the UI's Human Resources department on the committee, as required by both university policy and the law, as well as a student representative, as required by both college policy and our own departmental By-Laws. The rest of the committee was made up of department faculty members, with both our internal factions being more or less evenly represented. Joe Law was not on the committee because he was formally applying for the chair position. Thus, in addition to everything else I was doing, I now found myself with the added responsibility and duty of helping to look for a new department chair. It was an assignment I couldn't turn down because participating in the faculty governance of the university is part of the social contract that comes with being a professor.

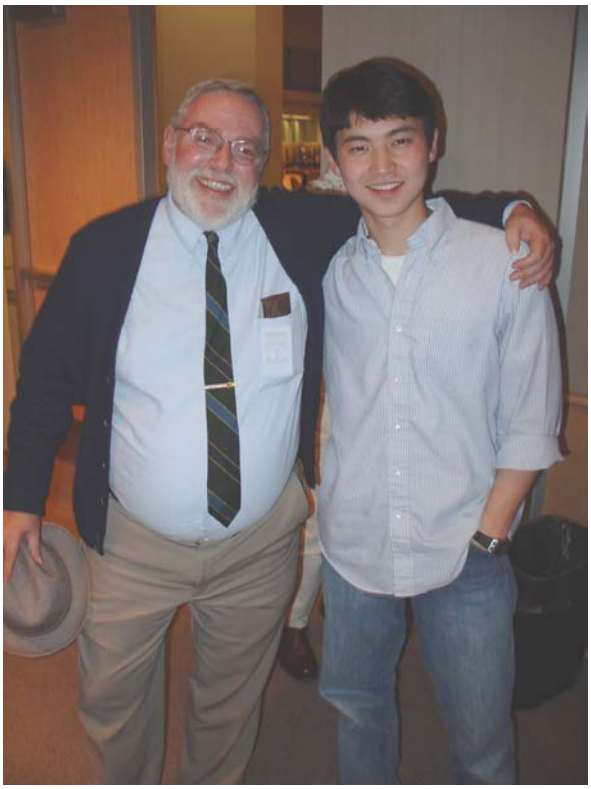
Even before this activity really got underway, another personnel crisis suddenly and unexpectedly erupted within my own laboratory. Jang Yi was resigning. That was a major loss for the Institute and a thunderbolt from the blue for me.

Jang is a big city boy with more than a little wanderlust in his heart. He was born in Seoul, Korea, and lived in San Jose after his family immigrated to the U.S. I had been trying to appease his wanderlust by sending him to our conferences and on professional visits to other institutions involved in HP's university research program. He likes to travel, I don't, and on the whole it seemed like a good arrangement. But by January of 2004 Jang had been living in Moscow for seven years and Moscow is a very small town. That can be a little tough on a young bachelor approaching the late summer of life. People of my parents generation used to speak of 'the seven year itch' – a tendency a lot of people have to make sudden big changes in their lives that at least anecdotally seems to come around on about seven year intervals, give or take. This might be more than mere folklore. In her 1976 book, *Passages,* anthropologist Gail Sheehy wrote of a series of somewhat characteristic changes in attitudes, goals, and directions that she found in a study of a large group of Americans, both men and women, at different times in their lives. According to Sheehy, these 'passages' occur at roughly ten year intervals from about age eighteen onward. I haven't especially noticed this particular pattern in my own life, but in Jang's case there were definite similarities to many of the things Sheehy wrote about.

Whatever the psychology of it might be, Jang had been re-evaluating his life and his goals. To my utter amazement, he had decided he wanted to get a law degree. Personally, I thought this didn't make sense, especially for a researcher of Jang's caliber, but it was what he wanted to do and there was no talking him out of it. Even trying to talk him out of it only irritated him. So it was that in late January he left us to move to the east coast (Boston). He succeeded in getting into the Hofstra law school on Long Island and he recently graduated with his J.D. He swung back through Moscow a few weeks ago on his way to San Francisco and we got together for a few drinks at The Quiet Bar, a little establishment in the University Inn where we used to go for a couple of drinks on Fridays after work when he lived here.

Jang had been running the day to day operations in my electrophotography lab for me, and this now fell back to me again. At the time we had two graduate students, Kwan and a young woman named Phik Wei Low, working in this lab along with a small corps of undergraduates. As a top notch researcher, Jang could not be replaced but the loss from his departure could be offset by hiring a couple more graduate students and parceling up the work. By now the electrophotography model was finished and the computer aided design tool released to HP. But we still had work to do on the neural network project and HP had asked for a couple more studies to be carried out. Phik Wei was working on one of these, a project to study toner consumption that was intended to better understand how fast a printer uses up its supply of toner in various typical printing applications. Another new project was looking into how temperature and humidity affected print quality. Jang's departure left this one uncovered. A third project involved how to take the results from Kwan's neural network and develop a cost-efficient way to implement what it did in

a LaserJet printer. The job of the neural network was to *design* the laser modulation template patterns the printer used in making, for instance, a 600 dots per inch print engine print at 1200 dots per inch. Once this is accomplished, there is no need to actually put a neural network into a printer. HP already had a standard computer chip design for implementing the modulation function, and the objective of this new project was to automatically convert the templates the neural network had come up with into HP's standard logic circuit implementation.



With Shingis Madakhmetov at a freshman Honors Program function. Shingis joined my lab as a research intern in January of 2004 while he was in his second semester of school.

Luckily for me, I was able to find four very sharp students able to step in and fill the hole in my lab, two graduate students and two undergraduate students. One of these was an Indian student named Balaji Margabandu, the same student who had been in my office the day I had that fiery leg episode. I had discovered him entirely by chance in one of my classes. Balaji was a tall, quiet graduate student whose facial expression always made him look like he was brooding about something. He never asked questions in class and in his day to day habits and mannerisms he seemed completely unremarkable, the kind of guy it is easy to overlook. The only reason I had taken real note of him was because my class required a research term project. When I read Balaji's term project report, I was in for a profound surprise. This unremarkable student had turned in one of the best research reports I'd ever seen come out of a term project. Entirely by accident, I'd discovered a diamond in the rough.

I hired Balaji to take on the temperature and humidity study, and I very quickly discovered he could handle that project and much more besides. A lot of unexpected things always pop up in the course of running a research lab – research tends to be like that – and I found out that I could put Balaji on these things and he'd handle them with calm efficiency and thorough-going excellence. I began referring to him as 'my go-to guy' because when a tough job came up I could go to him and he'd get the job done.

I teamed Balaji up with a brash and lovable young freshman named Shingis Madakhmetov. Shingis was, as they used to say, 'fresh as paint.' He was from Kazakhstan, one of the countries that had belonged to the old Soviet Union, and had come to America as a foreign exchange student while he was still in high school. He was a naturally bold and daring young man, only nineteen years old, who brimmed over with the kind of self-confidence coupled with youthful naivety – and, yes, with the sort of teenage arrogance – that old geezers like me often find amusing in a youngster when it is channeled into good and productive behaviors. Professors oftentimes find themselves feeling a bit paternal about students like this. That was the way I felt about Shingis from the day he first marched into my office from out of the blue and as much as told me to my face that hiring him would be the smartest thing I would ever do. Shingis thought there was no mountain too high for him climb.

Shingis had been a little boy when the Soviet Union fell and his country broke away. I was amused to learn he had been disappointed by the collapse. But not for any political reason, mind you. No, he had been a member of the Pioneers, the Soviet equivalent of the Cub Scouts. After communism collapsed this organization was disbanded in Kazakhstan before he was old enough to become a troop leader like his older brother was. He'd thought it hadn't been fair that he'd been cheated of his chance to become a

leader in the ‘scouts’ just because the Russians were nincompoops. It kind of reminded me a little of when the CAP in Maquoketa had disintegrated back in the sixties, so while I was amused I was also kind of sympathetic. It would seem that politics affects little kids no matter where in the world they live.

Like all Moslem students, Shingis had something of a balancing act to do when it came to classes. You see, most lecture classes at all U.S. universities meet on a Monday-Wednesday-Friday schedule. However, Friday is to Islam what Sunday is for most Christian faiths. Thus, while the normal university routine is set up to accommodate people of the Christian and Jewish faiths, it does not accommodate people of the Islamic faith. This is something I think we should do something to address because it puts Moslem students at a disadvantage, but so far there isn’t any sign on the horizon that the university system is going to change its ways in this regard. In my lab I don’t require my Moslem students to work on Friday and in my classes I try to accommodate them as best I can when they have to miss Friday lecture. For most of my regular classes, I ask for the class to be scheduled for Tuesdays and Thursdays.

The second graduate student I hired was Franco Fabile. Franco came from Boise and was newly arrived at the University of Idaho, having received his Bachelor’s degree from Gonzaga University if I remember correctly. He had applied for the RA position I had posted on the department’s bulletin board and had done the best of all the applicants in the technical interviews I conducted to fill the position. I also liked his ‘can do’ attitude and his practical-minded approach to engineering. His assignment was to work alongside Kwan on the problem of automating the conversion of the laser modulation templates produced by the neural network into the computer circuit implementation used by HP.

Lastly, I hired an undergraduate student named Prassana Upadhyaya, whose last name I never did figure out how to pronounce correctly. Prassana was an international student from Nepal and for him college at the UI was kind of a family affair. His older brother and his younger sister were both students here as well. I teamed Prassana up with Kwan and his job was to carry out the many laboratory experiments we were doing to test the quality of Kwan’s neural network results. He replaced Ning Choy, who was graduating at the end of the semester and planned to go to work for Boeing in Seattle. Along with Kwan, Phik Wei, and Henis, the holes in my lab were now filled and we could carry on without Jang. □

In late February Kwan, Balaji, and I flew down to Boise for the semiannual university research review meeting. The meeting itself was routine but by now this trip was lasting two full days, with the second day more or less going to ‘meeting with customers’ as Ken put it. The ‘customers’ were, of course, people from outside Ken’s group who we hoped to be able to serve by helping them with some research they needed. All in all, this trip left me with a very uneasy feeling about the direction my partnership with HP seemed to be taking. First, although he hid it well I could sense Ken was growing increasingly nervous about the future of his R&D section. I’d been a manager at HP long enough to spot the signs. Some key people had been pulled from his group to go work on ‘urgent’ product development projects. There was an increasing emphasis on periodic written ‘status reports’ documenting the ‘deliverables’ coming out of the research HP was funding. I knew what that meant. Ken was facing opposition at targeting time from a committee that had been formed to review his spending plans. When I was at HP targets weren’t reviewed by any committee; they were approved or not approved through the normal management chain. I took this as yet another sign of growing centralization of management by Ms. Fiorina and her staff down in Palo Alto. Or perhaps ‘growing centralized micromanagement’ would be a better term.

This new business of ‘go out and find new customers’ didn’t sit well with me either. It was a slam bang, hit or miss way to plan a research program. Research is almost by definition a forward-looking investment and this sort of Persian bazaar approach to identifying research needs was something one might do for product development, not for high tech research. I had absolutely no intention of letting my research lab get sucked into product development. That isn’t research and research is my business.

I also noticed that more and more of my old friends didn’t seem to be around any more. A couple of my pals in what I jokingly call my ‘spy network’ inside HP told me something that astounded me. There

had been a new policy implemented under which, when an R&D project came to an end, it was up to the people who had worked on that project to find new assignments to work on. If they didn't then they were 'excess' people and could lose their jobs no matter how good they were as employees. I had, and still have, a hard time believing such an incredibly stupid management policy was really being used, but whether it really was or it wasn't, HP employees believed it was. The HP Way – the soul of the company since its founding – was dead and buried once and for all. I was glad I no longer owned any shares of HP stock.

One manager down there told me confidentially that Ms. Fiorina had decreed HP was going to become a 'consumer electronics company.' I shuddered when I heard that. No company on the face of the earth was less suited or less qualified to be a consumer electronics company. It was the one marketplace HP had consistently failed to do well in decade after decade. They were a company that had lost their way and I was certain Ms. Fiorina was leading them all to disaster. I regarded her as a complete incompetent and a spectacular failure as a CEO. Under her the old HP where I had spent eighteen years had ceased to exist. This new entity was a doppelganger bearing no resemblance to the company that had been my life throughout the years of my youth. I thought it was the most massive case of identity theft in history.

After I got back to Moscow, I quietly began to re-plan my spending on the electrophotography budget. I no longer had any confidence it would be renewed when November rolled around, and I had four graduate students working under this contract that I needed to see through to graduation. I slashed spending on normal operating expenses and material and equipment purchases. I wanted every penny I could save in case I was going to need it for student salaries after November. □

During spring semester a lot of time was going into the search for the new chair. We had quite a few applicants for the position, including a good number of IEEE Fellows. Unfortunately, the best people we brought to Moscow for interviews took one look at the budget crisis they'd have to deal with and didn't want any part of it. My colleague Joe Law did make the short list of candidates by the skin of his teeth. The committee split right down the middle during the roll call vote and it turned out the deciding vote came down to me. As I said earlier, I did not support Joe becoming chair and I did not approve of what I thought his policies would be as chair. Nonetheless, with the department split the way it was I felt it would be unfair and unethical for me to take him out of the process instead of letting the full faculty debate and decide on the matter. I chose not to take advantage of the power that came into my hands by accident and voted to include him on the short list. Our dean was upset by this decision.

In the end, Joe did not become our chair and we ended up hiring an IEEE Fellow named Demetrios Kazakos. That turned out to lead to an interesting situation the following year. Interesting, that is, in the sense of that old Chinese curse. The political controversy dividing our faculty was by no means over. □

The Neuroscience & Neurofuzzy combined REU Participants and Mentors of the summer of 2004.

Our Neuroscience Research Experience for Undergraduates (REU) Site began its first summer program in 2004. In this program we bring an average of ten undergraduate students to campus for eight weeks each summer and the students carry out real neuroscience research under the guidance of a mentor from the UI neuroscience faculty. The REU participants are given the title of Research Intern, receive a salary for their work, we pay for their living expenses in Moscow and provide a travel reimbursement to help cover their costs in coming to Moscow from wherever in the U.S. they come in from. For the students it's a summer job but not a very usual summer job. Almost all the students come from small little colleges across America where the opportunity for undergraduates to find out what research is all about is very limited. All the students are American citizens or permanent residents, and they are among the very best and most intellectually gifted young people our country has to offer. Competition for getting an REU position in our program is very keen and if there is one thing I wish could be better it is only this: I wish our funding would let me hire all the fine, fine youngsters who apply each year.

The program session got underway the afternoon of Sunday, June 13, with a barbeque to welcome the kids, as I call them, to campus. That first session I had a large contingent of our local UI undergraduates working for the neurofuzzy program for the summer as well and I decided we'd combine the two groups on the theory 'the more, the merrier.' Research is one of the most fun professions there is and one of the things I made an objective for our REU program was that the students would have a social infrastructure so their hours outside of work could be as fun and supportive for each of them as the work itself. It can be very lonely for a young person to journey hundreds or thousands of miles from home and family to work in a strange new place doing something he or she has never done before under the supervision of people he or she has never met before. Some of our participants are as young as eighteen and just through their freshman year of college, and I organized our program to see to it that our kids would quickly feel right at home in Moscow. Before all else, our neuroscience REU program is all about the talented youngsters who participate in it and who will become America's next generation of scientists and doctors. Research really is also about teamwork, and my colleagues and I work hard to cultivate a social dynamic among the kids that teaches and encourages the spirit of teamwork and community.

The neuroscience REU program has come to be one of the most fun and personally rewarding things I do – so much so that I do it for free each summer. I have help, of course, from my colleagues in the UI neuroscience program. That first summer the team of mentors for our kids included Jim Frenzel, Terry Soule and Terry's graduate students, Stan Gotshall and Matt Settles, from the neurofuzzy team as well as Dr. Deborah Stenkamp, the Director of our neuroscience graduate program and a professor in our biological sciences department, and Dr. Mark DeSantis, one of our senior faculty members in neuroscience, the biological sciences department, and our medical education program. In the photo above, Terry, Stan, and Matt are at the far left in the picture and Jim and Deb are at the far right. All the other folks in the picture, except me of course, are participants from that first summer session.

Every single student in the program – right down to the very youngest – is assigned a real research project to work on. We don't have any make-work or phony projects; none of the kids end up being a glorified test tube washer. Every single project is about real research questions for which the answers are not yet known. Helping to find those answers is what the kids do. I organize the program so that many of the kids, especially the youngest ones, work in a two-person team and have a peer partner to work with in addition to their mentors. The students provide mutual support to one another and develop a real sense of comradeship. Nearly all the kids arrive scared green because this is their first experience with doing real research, and most of them are by no means sure they'll be able to succeed in this strange new job. Having a peer to lean on every once in awhile goes a long way toward building self confidence. All these human considerations in our program help to produce excellent research results in the very short amount of time available each summer, and these results are the attainments of the students themselves. They don't merely 'contribute to making' important findings; they *make* important findings. I couldn't be more proud of the dozens of young scientists who have come through our program since 2004 if they were my own kids. Nothing delights me more than watching all of them grow from uncertain, nervous youngsters

to confident and capable new scientists over the course of eight short weeks. These young men and women represent the very best of America. I have no doubt that one day some of their names will be known by people all over the world and some day there will be many people who owe their lives to my kids. I expect no less of them.

In addition to their research work, all our student participants take part in a workshop on ethics in science and engineering. My pal Michael O'Rourke designed this workshop for the program and he and I led it for the first three years. I think ethics education is one of the most important parts of a young person's development because every single person will eventually face ethical situations in life and it is important to be prepared to face these situations when they come. I know I owe a tremendous debt both to my parents and to the moral leadership education I received from the CAP when I was a boy. Ethics isn't about religion and it isn't about memorizing some list of do's and don'ts without understanding why the things on this list are do's and don'ts. It is about developing what Kant called *a good will:* the courage to do what is right for no other reason than because it *is* the right thing to do, the self control to *not* do what is wrong for no other reason than because doing it *is* wrong, the wisdom to understand the difference, and the self discipline to face life's challenges with moral resolve. *That* is what a good will is.

We also hold weekly luncheons and dinners featuring guest speakers who are exemplary role models for young scientists to emulate. Our speakers' topics range across the spectrum from how he or she got into research in the first place, how to select a graduate school and a major professor, how to plan for a career in science, how to work in interdisciplinary teams, and, of course, some of the exciting discoveries and accomplishments these speakers have achieved in their careers. For example, one of our regular speakers, Dr. Martin Pall of Washington State, has developed a new theory that may turn out to be the answer to the root cause of many debilitating diseases, possibly including post traumatic stress disorder. If Marty's theory turns out to be correct, I wouldn't be the least bit surprised to see him receive the Nobel Prize in medicine some day. If he does, our young scientists will be able to say, "I knew him when." □

At the end of July I took the entire electrophotography crew down to Boise for the second of the annual review meetings at HP. In the past these reviews had consisted of oral presentations made by the various research teams but the format was different this time. Instead of the usual oral presentations and question & answer sessions, Ken set this up as a poster presentation rather like those found at most other conferences. My team presented five different posters covering the various aspects of the work we were doing for HP.

The presentations were well received by those HP folks who came to it, but I couldn't help but notice that the attendance wasn't particularly large for this kind of a conference. I thought Ken looked worried about that. I stayed down there the next day for the usual round of discussions with potential 'customers' for research work, and by the time I departed for Moscow in the early afternoon I had a stronger sense than ever that the long and successful partnership between my lab and HP was coming to a close.

As it turned out, my instincts were correct. And what brought it about was something I had nothing to do with at all. At the same time as our graduate program in neuroscience had been established, the SBOE also approved the startup of another graduate program in Bioinformatics and Computational Biology. The amount of data collected in biological research is rather mind boggling, and a very important practical problem in this field is how to organize, search, and view the incredible amount of data that has been collected. Bioinformatics is the specialty field that researches new and better ways of doing this.

As you might guess, this is a task that makes heavy use of supercomputer resources and the BCB program had recently funded the construction of a third BEOWULF supercomputer. As required by state law, they sent out a request for quotes to the different manufacturers of personal computers, including HP. As it happened, HP chose not to respond to the RFQ and Dell Computer – one of HP's major competitors – came back with the low bid. Again, the UI is required by law to award contracts to the low bidder in the RFQ process and so our third BEOWULF was built using Dell computers. Somehow or other, word that the UI had bought a large number of computers from Dell seeped back to HP.

I found out later from one of my "spies" that this fact was brought up at the targeting approval meeting held a short time later down in Boise. Apparently the story got a little garbled or else the folks sitting on this committee were somehow under the impression that *I* controlled the purchases of computers by the University of Idaho or that I was the person who made this particular purchase. In point of fact I didn't even know at that time BCB was in the process of building a third BEOWULF. The bottom line, though, was that when my contract came up someone pointed out the fact that Dell computers had been purchased. Someone else sitting at the table responded, "Well, the heck with him then," and they voted down continuing to fund my program. The irony was that out of my various projects the MRC Institute had actually purchased a far greater dollar amount of HP computing equipment than any other entity at the UI over the past few years. They retaliated against their best UI customer for a purchase HP hadn't even elected to bid for. It's probably not a story they're very proud of, and I will say up front that I didn't learn these details from Ken. The identity of my particular 'Deep Throat' in this matter is and will always remain for the two of us alone to know.

So it was that my ten year partnership with HP finally came to an end. I found out about the decision just before classes began for the fall semester of the 2004-05 school year. I was, naturally, disappointed by the news and even more disappointed by HP's childish conduct that led to it. However, I had been anticipating the probability of bad news this time around from all the things I had been observing at HP for quite awhile and I had prepared my contingency plans just in case. I met with the members of my electrophotography lab on Tuesday morning, August 24th, and announced the bad news. I also assured my graduate students that I had the funding to see them through the time each of them had remaining for completing their graduate studies. Our activities now and for the next twelve months turned to finishing up the projects and getting their results written up in their theses or dissertations.

Kwan graduated in December of 2004 with his Ph.D. As circumstances had it, that was the commencement when Bruce Barnes – who had started out on the NASA Grand Challenge and finished up on the neuro-fuzzy project – also graduated. The UI has a rather nice tradition at commencement when a student graduates with a Ph.D. There is a hooding ceremony in which the student's major professor ceremonially adds the Ph.D. hood to the student's academic regalia, thus symbolizing the student's inauguration as a Doctor of Philosophy. At that December commencement I had two 'hoodings' to perform, which is a somewhat uncommon event that made it necessary for me to walk off one side of the stage with Bruce and then hustle back around to the other side to join up with Kwan so I could hood him. Fortunately, "B" and "V" have a good bit of spacing between them in the alphabet. Kwan returned home to Thailand and today he is a professor at his university back there. Bruce landed the teaching job he wanted at Eastern Washington University.

Balaji defended his thesis – which turned out to be based on additional follow-up research from that neural network term project of his I had so impressed with – in July of 2005 and graduated at the end of that summer session. I tried to talk him into staying on for his Ph.D., but he was tired of school and anxious to get out into the world to start making money. I hated to see him go. He was my 'go to' guy. Phik Wei defended her thesis in August of 2005 and went to work for Micron after graduation. Franco defended his thesis in December 2005, having successfully solved the problem of 'translation' from Kwan's neural network outcomes to the logic circuit implementation of modulation templates. He took a job with the Naval Weapons Lab at China Lake after graduation. I hear he works on neural networks for them but, of course, he can't tell me anything about what he is doing. It's classified. I was able to place the undergraduates on other projects, so in the end I was able to shield my kids from the effect of losing the electrophotography contract. □

Each time I visit Boise I always arrange to see Vern, my brother in all but blood, while I'm down there. In the summer of '04, the upcoming elections were much on our minds, and I think Vern was a little surprised to learn how vigorously I, like he, was supporting Senator Kerry for president. Over the years it had almost become a standing joke between us that we supported opposite candidates. I don't think the two of us had ever voted for the same guy prior to Bill Clinton. On my part, I couldn't see how

America could possibly vote to return Bush to the White House for a second term. By then we knew to a certainty that Iraq had never had weapons of mass destruction, that Al Qaeda had never been in Iraq prior to our invasion. By now the disgraceful scandal of the torture of prisoners in Abu Ghraib had broken. By now we knew that Bush had been briefed as early as August 6th, 2001, that bin Laden planned to attack America using hijacked airliners and that Bush had ignored the threat completely. Nearly three years after the attack on America, bin Laden was still free, Afghanistan was out of the news completely, and Al Qaeda was rebuilding while Bush did nothing about it. By now Iraq had descended into chaos as a direct consequence of Bush's bungling of the post-war situation there and America had taken one thousand casualties in Bush's private war. I couldn't conceive of his getting a second term.

But I also couldn't conceive of the effectiveness of the Republican smear machine nor the incredible, pussy-footed bungling of the leaders of the Democratic Party and the inept campaign they would run. By the time election day finally arrived, it was clear to me that the Party needed fresh new leadership. The ad men and hacks running the Party in 2004 failed us all. As everyone knows, Bush took fifty-one percent of the popular vote this time and two hundred seventy-four electoral votes against Kerry's two hundred fifty-two.

Congress, too, remained firmly in Republican hands, and so long as that was so I knew nothing at all would be done to rein in the bungling little Napoleon and his henchmen who were leading us to defeat and disgrace. The Democrats seemed hapless and impotent, and we had no leaders, only rulers.

Our country remained under the heel of the Party of Nixon. I hadn't been this pessimistic about the honor and future of my country since the days of Watergate. □

In the late summer of 2004 I had filed an invention disclosure for the biomimic artificial neuron circuit with the Idaho Research Foundation, the state-owned 'private' company that handles the UI's intellectual properties, and after the patent was submitted the IRF decided to publicize the event. The UI's public relations folks issued a press release that they must have sent to practically everyone on earth. We even got a call from a guy in Iran about it. If you didn't get your copy of it, sorry.

That press release generated a lot of phone calls from various reporters and because it said in my employment contract that I had to talk to them, I did. Reporters aren't my favorite people to talk to, but a professor has to do what a professor has to do. *The Idaho Statesman* ran a front page story on it under the headline "Neural network mimics human thought process." The first thing I'd like to say about this is: *I* didn't write that headline and in actual fact it isn't true. What this technology does is merely enable and support building neural networks that I hope to someday truthfully be able to say do this. The actual story they printed was reasonably accurate, but the headline was pure hype. I found it embarrassing. I greatly disapprove of 'newspaper science'; a great deal of it is misleading and very exaggerated. I hope this doesn't shock you too much, but you can't always believe what you read in the paper, especially when it has to do with new discoveries. If we really did what the newspapers often say we did, a lot more of us would have been to Sweden by now to pick up our Nobel Prizes.

A copy of the press release also somehow made its way to the Paul Harvey people. I'm guessing you've probably heard the Paul Harvey radio show; it's been on the air now forever. As luck would have it, the press release and the release of the movie *I, Robot* happened at more or less the same time. The movie is a science fiction movie very loosely based on an Isaac Asimov story, and it is about robots trying to take over the world. Paul Harvey's son, who has taken over the show for his dad, was reviewing the movie and at the end he said something like, "Think this can't happen?" Then he read off the UI's press release, my name included, with the same exaggerated hype as *The Statesman's* headline. His punch line was, "This is a *good* thing?"

I didn't happen to hear the broadcast, but about a hundred people told me about it the next day. I don't think of myself as a mad scientist, and all I could do was shake my head about it. It isn't every day a guy gets denounced on the Paul Harvey Show as a menace to humankind. □

Feng Xie working on our computer model of the micromagnetics of barium ferrite material.

With the end of the electrophotography program and with the neurofuzzy project drawing to a close at the end of January of 2005, it started to look like I was going to have more time available. In February of 2004 the leadership of the microwave ferrite project begun under Yang-Ki had moved to one of my colleagues in the electrical and computer engineering department, Dr. Jeff Young. Jeff's area is microwave engineering with his particular specialty being antenna design. The first two years of this project had been devoted to fairly basic barium ferrite materials research; the focus was now shifting to applications of this material for microwave communication systems. Jeff and his team, which included myself, Yang-Ki, and two professors from the physics department, had been awarded a one-and-a-quarter million dollar contract from the Office of Naval Research to move the research into the engineering phase, and the program had been re-named the Advanced Microwave Ferrite Research or AMFeR program.

I was still very much a bit player in this program; my piece of the funding was just over ten percent of the total. The main technological challenge facing us was still centered on the barium ferrite (BaFe) itself and here the challenge was to produce thick BaFe films that still possessed the desirable properties needed to meet the engineering goals of the research. You see, the properties of magnetic material are very dependent on how big the chunk of material is. It's called 'size dependency' and magnetic materials display it much more than any other type of material I know anything about. Chemicals like iron, nickel, and cobalt are what is known as 'ferromagnetic material.' BaFe is similar (it contains iron), but at the atomic level it's just different enough to get its own name ('ferrite') to distinguish it from things like iron. When BaFe is made in very thin films it possesses a property known as 'self biasing' which is one of the most important properties necessary for building the microwave devices we were after. Unfortunately, when BaFe is grown in thick films, it loses this self biasing property and the fundamental questions the team faced were 'why?' and 'how do we get this property back?' The reason this was important was because in order to use BaFe for a practical engineering application in communication systems the film *had* to be thick. A thin film just couldn't do the job.

If you talk to a typical physicist or materials scientist, quite likely he will tell you we know everything about the physics of magnetic materials. The reason you'll be told this is "because everything in the world is fundamentally explained by quantum mechanics and since we understand quantum mechanics (physics at the level of the atom), naturally we understand everything there is to know about magnetism and magnetic materials."

The problem is this just isn't true. It might be true if real materials came in the form of ideal, perfect solids known as 'single crystal material.' But in fact most real engineering materials come in a form known as 'polycrystalline.' The word means 'many crystals.' Just as soon as we're dealing with poly-crystals, the physics equations become so complicated that it's hard to even write them down in any meaningful expression and impossible to solve them starting with the basic laws as they would apply to a polycrystalline solid. The area of physics we're talking about here is called the theory of quantum magnetics. It's a very pretty theory and it's quite useless. It isn't even fundamental. The reason for this is that ferromagnetism (and also the magnetism of ferrites) is basically an effect that arises as a consequence of Einstein's relativity theory. This means that to really understand it requires an advanced level of quantum theory known as 'quantum electrodynamics' or QED theory. Richard Feynman, the famous Nobel Prize winner in physics, won his Nobel Prize for helping to develop QED theory. But applying QED to magnetic materials is an awesome task and nobody, not even Feynman, has ever done it. I've

tried to do this myself a couple of times over the years and I got absolutely nowhere with it.

To my way of thinking, if you can't solve the equations that make up your theory then you can't claim you understand the phenomenon your theory is supposed to describe. (Well, you can *claim* anything but just saying it doesn't make it true). Saying "we understand all about the physics of magnetic materials" is a bit like saying "God counts the tears of women." It's more a matter of faith than science. What we really do is guess at a set of mathematical equations, using some general principles from quantum mechanics to guide our guesses, that we hope will provide an adequate large-scale model of the magnetic behaviors we're interested in and which *can* be solved numerically using a computer. We stick various fudge factors into these equations and hope we can adjust these fudge factors to make the model match the reality. Of course, when we write scientific papers we give these fudge factors more intelligent sounding names than 'fudge factor' but in the end that's what they really are. It's called a 'semi-classical' model and the science – such as it is – in doing this for magnetic materials is called 'micromagnetics.'

I was the micromagnetics guy on the AMFeR team and in doing this work I was assisted by a sharp young Chinese graduate student named Feng Xie. Feng had been on the project from its inception and had already earned his Master's degree by the end of July in 2004. He continued to work on his Ph.D. and the two of us constituted the 'materials theory' team within AMFeR. There are two ways a person can carry out micromagnetic modeling. The first is to just play around with the fudge factors until you force the model to match the data. This is just glorified curve fitting and it is useless. The second way is to very carefully look at what your model does and does not do and try to guess at the form of the physics this implies when the model does not match the laboratory data. If you do this right and you put your physics hypothesis into the model, then the model becomes capable of making further predictions of things that haven't been looked for in the lab yet. If you then look for them in the lab and find that things happen the way the model said they would, you've really got something. Feng and I were taking this latter approach.

I had successfully used micromagnetics during my doctoral research back in the early 1980s, but the AMFeR problem was a much harder problem. This was because we were trying to do thick films, which required a three-dimensional micromagnetic model. This kind of model requires the solution of a far greater number of simultaneous equations and it takes a very long time to run simulations. Nonetheless, by late 2004 we were discovering some new and very interesting things about barium ferrite. What we were seeing in comparing micromagnetic models against laboratory data had led me to make a rather daring new hypothesis about the nature of polycrystalline BaFe material. We called this the 'hypothesis of multiple magnetic phases' and it flew in the face of conventional micromagnetic theory. Believe you me, we didn't make this hypothesis lightly. Feng and I had tried everything we could think of to get a conventional model to match up against the data coming mainly out of Yang-Ki's lab but the stubborn fact remained that a conventional micromagnetic model gave wrong answers, which meant something very important was missing from the theory. The 'magnetic phases' hypothesis succeeded where all else failed, and I am as convinced as any conservative scientist ever has the right to be that our new hypothesis is correct. Unfortunately, our new theory defied conventional thinking in the micromagnetics community and our papers were turned down for publication one after another. There is a certain degree of censorship the modern day peer review process imposes and the anonymous referees just wouldn't believe what we were reporting. Rather than tilting toward the side of letting us tell other people about what we'd found, so they could test our theory in their own laboratories to either verify or refute it, the referees and editors chose to silence the heretics. It is always a huge mistake in science to become complacent and to begin to think that custom or traditional thinking in any way validate an old theory or render new ideas unsound just because they are new. This especially is so in a field like micromagnetics, although micromagnetics is by no means the only case. Dealing with these self-appointed Bishops of Paris got to be pretty frustrating after awhile.

We had just received our latest bit of frustrating news from the IEEE in mid-October of 2004 when other news out of Iowa made all that unimportant. Uncle Wayne, my second dad, had passed away just a month before his 93rd birthday. Suddenly the IEEE didn't matter to me anymore. □

The MRC Institute's Autonomous Underwater Vehicle. The AUV is a tiny 'intelligent' submarine that operates in coordinated 'schools' to sweep for mines.

Word about the end of my electrophotography research program got around and in mid November my pal Mike Anderson from the mechanical engineering department dropped by my office for a visit. Mike was one of the co-principal investigators then working on another project, funded by a seven hundred thousand dollar contract with the Office of Naval Research, called the 'autonomous underwater vehicle' or AUV project. This project was being run out of the Center for Intelligent Systems Research (CISR), which is a division of our MRC Institute (the Institute of which I am the associate director). Joe Feeley, who was now retired, had been one of the members of the AUV team and his part of it was to look into more advanced underwater communication methods by which AUVs could 'talk' to each other. Mike had come to ask me if I'd be willing to step in and take Joe's place on this project.

The AUV project was a very cool project, and because these little submarines were supposed to be 'intelligent' systems – in the loose sense in which that word is used in the engineering world – it was one I would have dearly loved to have been involved with it right from the beginning. Unfortunately, at that time I had my hands full with the electrophotography, neurofuzzy, and barium ferrite programs and just couldn't take on any more projects. Now, however, I had an 'opening' due to the end of the HP contract and could take part. It was too late for me to participate in the 'intelligence' aspect of the AUV, but I thought I could still help out with the communication system aspect of it, so I agreed to join the team.

To appreciate how cool an AUV is it is necessary to describe it and what it does. Each AUV is a bit under four feet in length and around four inches in diameter. It is unmanned, obviously, and self-guided, operating independently of direct human control (that's the 'autonomous' part of its name). It is designed to work in 'schools' of typically five AUVs. It has its own custom-designed 'language' for communicating with the other AUVs in its school. The AUV language was developed by my pal Michael O'Rourke and graduate student Kaylani Merrill, who was working concurrently on her Master of Arts in philosophy along with her Master of Science degree in neuroscience. AUVs work as a team with one of them acting as team leader and the others taking up their positions in the school formation according to the leader's orders. If something happens to the leader, another member of the school automatically takes over as the new leader.

The AUVs are intended to sweep for mines. Being hit by a mine is one of the biggest dangers faced by Navy vessels. The AUVs can be put into the water from a ship and can be left to operate entirely on their own for days at a time, methodically sweeping a designated sea area and looking for a safe passage through any mines they find in that area before any of our ships enter it. This is an application that has some personal significance for me. Dad's ship, the destroyer U.S.S. Waller, had been hit by a magnetic mine a couple of months after the Japanese surrender. I knew this because I had found and read the story he'd written about it when I was a boy. The Waller had been in a harbor in China at the time when this happened. Now, almost sixty years later, his son was involved in a project aimed at helping to prevent this from happening to other ships. I had a feeling Dad would have liked that very much.

When I joined the AUV project they were already using an underwater acoustic modem designed by folks at the Oceanographic Institute. It is a fairly simple communication system and uses a method similar to sonar to send signals from one AUV to another. This system was sufficient for accomplishing the main research aims of the project at that stage, but there were several things about this system I saw as severely limiting future capabilities for AUV applications. The data rate – the speed with which one AUV can 'talk' to another – was very slow and the sonar-like signals they used could be picked up at distances a

very long way from where the school was operating. It isn't too hard to think up other applications our Navy or our intelligence agencies might come up with for AUV technology – I can think of half a dozen of them without even trying very hard – and in my judgment a faster, quieter communication method would have some important advantages for these applications. As it turned out, Joe hadn't gotten very far in looking into more advanced communication system methods for the AUV and I would be working with a pretty clean slate.

The low data rate was Mike's main concern and was the reason he had asked me to join the project. AUVs have to be able to operate in shallow waters, and this turns out to be an environment where there is a severe amount of reverberation of sound waves. Sound waves echo from the sea bottom as well as from the surface of the water, with the result that this operating environment acts like kind of a big echo chamber. If you've ever tried to hold a conversation with someone in a place that has lots of echoes, you already know what this implies. You have to speak slowly, one speaker at a time, and typically you need to be standing pretty close to the other person to make yourself understood and to understand him. More or less the same thing was true for the AUVs. Mike and his graduate student, Isaac Kodavaty, were working on the mathematical model for the underwater acoustic communication channel; the system I would be working on had to work reliably in this environment.

Because my piece of the project concerned something that would be important a few years down the road – the main efforts of the project were, naturally, going into just getting an AUV invented in the first place – my piece of the budget was very small, just enough to hire one Research Assistant to help with the work. With several big funded projects going on concurrently in the Institute, really good graduate students who weren't already working for someone else were hard to find, but I did come up with one promising young guy, an international student named Jianqiang Zeng. He had come to the UI on a full scholarship from his home government in China, which was the main reason he was still available. His scholarship money was running out and he needed a job to continue his studies. I was a little wary at first of using someone from the PRC on this particular project, but I spoke to Dean Edwards, the principal investigator and boss of the AUV project as well as the director of CISR, and it turned out there were no security issues that would prevent us from using Mr. Zeng on this project. (None of us had been able to get our tongues wrapped around his first name sufficiently well to pronounce it correctly, so we all just called him 'Mr. Zeng').

It also worked out by chance that I had a 'walk on' RA I could use on this project. Her name was Leili Baghaei Rad and she was an international student from New Zealand attending the UI on a full ride scholarship from an organization back in her home country. Her husband would be starting to attend Stanford University so it was a bit strange that he would be down in California while she was going to school up in Idaho, but I figured if that arrangement worked for them, who was I to question it? Leili came to graduate school with a specific interest already in mind. She wanted to study and work on a specific type of communication method known as a 'MIMO' communication system, which is a method used in satellite and mobile radio communications to combat what is known as 'multipath fade.' It's a problem in communication systems you've probably experienced while driving your car and listening to the radio. If you've ever been driving around in town and noticed your radio reception fading in and out as you passed through particular areas of town, you've experienced multipath fade. A lot of work on MIMO has been done for wireless radio systems, but in 2005 the method hadn't been tried for underwater acoustic communication systems. Leili's research work made a nice complement to the method I hired Mr. Zeng to work on and she didn't need a paid assistantship. With Franco and Phik Wei still finishing up, office accommodations in my lab were a bit cozy, but we found a way to make it work.

One thing that was a bit unusual on this project was what I had to do to get my new RAs trained up in the technical area in which they were working. Normally this is accomplished largely through our normal graduate level classes the department offered. However, in 2005 we were still very much suffering from the problems brought on by the university's budget crisis. Only a few years before our department had a whole group of professors whose areas of expertise were in system theory. It had been one of our strength

areas and I usually taught our advanced courses in communication theory. By 2005 our systems group had been decimated by retirements, as had our electronics group, and to fill the gaps this had created I had been obliged to cover other more central courses, leaving the advanced courses in communication signal processing untaught. What this meant was that I had to spend considerably more time than usual tutoring Mr. Zeng and Leili on the technical theory they needed to work on the AUV project. Just a year earlier this would have been an impossibility given all my other project work, but the neurofuzzy program came to a successful end in January of 2005, and this freed up more time for me to do this. □

With the start of the 2004-05 school year Tim White came to Moscow to take over as President of the University. Gary Michael, who had served without pay as interim President for a year after Bob Hoover's resignation, hadn't been greatly loved by the faculty, although I doubt if anyone would have been. He'd been brought in at a tough time and he'd probably handled our immediate budget crisis about as well as anyone could have. I'd known and liked Bob Hoover – I still like him despite the Idaho Place fiasco – but I hadn't gotten to know Dr. Michael at all. The day to day sort of administrative things that affected me had been dealt with by the Provost, Dr. Brian Pitcher. Faculty morale going into the '04-05 school year was about as low as I've seen it and things in the College of Engineering were in a pretty unsettled state after our Dean, Dave Thompson, had been abruptly removed as Dean by Dr. Pitcher. Why this had happened had been the subject of any number of rumors and counter-rumors, but the most widely believed of these rumors was that Dean Thompson hadn't been successful enough at getting local industry support for the university in the form of large financial gifts and research contracts. I'm not so sure that rumor was true; economic times were fairly tough right then for both HP and Micron, Idaho's two largest high tech companies, and in those circumstances Sister Teresa couldn't have gotten them to pony up large amounts of money for the university. Whatever the reason, Dave's dismissal had shocked me. I liked Dave and had gotten along with him very well. Provost Pitcher didn't seem to be in any big hurry to find a new dean of engineering either, so we were fairly uncertain about what was going on.

It was in the teeth of this uncertainty and low morale that Dr. White took the reins. Tim is a big man, soft spoken, and always impeccably dressed – in contrast to Bob Hoover, who always looked just a little bit rumpled. Most importantly, Tim is a real leader. His first move upon becoming president was to launch what became known as the Plan for Renewal. And he hadn't come to town with this plan in his pocket either. Instead, he succeeded in rallying the university's faculty and staff to participate in coming up with this plan, and to do so within the framework of fiscal reality. Lao Tsu had written *when the best leader's job is done the people say 'we did it ourselves.'* That's the kind of leadership Tim brought to Moscow. With Tim, a kind of Fort Apache siege mentality that had beset the UI ended and a real turn-around began. We were finally on our way back from Idaho Place.

Then in February of 2005 another event took place a thousand miles away, down in Palo Alto, that didn't have any direct effect on us but which I greeted with a smile and a sense of satisfaction nonetheless when the news arrived. Carly Fiorina had been fired as Chairman and CEO of HP. *Better late than never,* I thought when I heard the news. In my imagination I thought I heard cheering coming up faintly on the wind from Boise. As soon as I heard about it, I dashed off an Email to Vern. His reply came back almost right away. As I had guessed, there was dancing in the aisles going on at HP in Boise. It was and is my opinion that Ms. Fiorina was the greatest disaster ever to befall my old company, and while I don't think anyone will ever succeed in bringing back the old HP – which was a very, very special company – or in restoring life to the HP Way, at least now maybe they could get on with their own Plan for Renewal. Time will tell. I was happy for my many friends who still worked at HP.

Still, not everything would go so well in my world that year. Demetrios Kazakos had come aboard as department chair at the start of the 2004-05 academic year. It was no surprise to anyone that he joined us eager to expand and grow the department's research activities; during the interview process he had told us this would be his main goal and that was something we expected from a chair who was an IEEE Fellow by stint of his own research contributions to his field (which did happen to be in the systems area). Personally, I liked Demetrios and the two of us got along quite well. Unfortunately, the same wasn't true

between Demetrios and a lot of other people. Demetrios was born in Greece and, like a lot of other Greeks I've known over the years, he had kind of a fiery and sometimes bellicose personality (something else not rare among IEEE Fellows). This probably isn't unusual on the east coast, as witness my experience with John from EMC Corporation my final year with HP, but it's not something that goes over too well in the Inland Northwest. Here the culture puts a very high premium on politeness and even the language is nuanced so that disagreements are discussed in such a gentle sounding way a New Yorker or Bostonian probably wouldn't realize two people were having a heated disagreement. A society not really all that many decades past an era when a serious argument was likely to result in a gunfight tends to become pretty studiously friendly and polite.

In terms of folkways, Idahoans often tend to regard Californians as insufferably rude, New Yorkers as barbarians, and even Iowans as lacking in the social graces. When you move here you either adjust or you make enemies. I'd gotten my first hint of this early in 1979 when I'd first moved to Boise and noticed a lot of cars bearing bumper stickers that read, 'Don't Californicate Idaho.' It sort of provided an extra incentive to get the California license plates off my car as quickly as possible. One of the reasons I and others became so furious during the Engineering in Boise smear campaign had been that most of the language being hurled at us was the kind of language used deliberately out here to make enemies. And it did. Our Idaho culture was something Demetrios wasn't prepared for and had trouble understanding.

On top of this, there was still the problem of the underlying split in our faculty over the chair issue. This issue hadn't healed. On one end there were those who had wanted one of our own to take over for Joe Feeley and who thought we needed to sacrifice other areas to preserve the undergraduate program. At the other end were those, including me, who thought it was best to bring in a new person and who thought both the graduate and undergraduate programs were equally important. Then there was a third group in the middle who agreed with some but not all of the positions taken by the other two factions. They were the 'swing' group that had come down on the side of bringing in Demetrios.

I think Demetrios never had much chance of winning the one group over – not, at least, without using a nearly superhuman amount of personal charm, which I don't think he possessed – but he had every chance of alienating folks in the middle group. And that turned out to be exactly what he did. By April of '05 he had committed several interpersonal gaffs that even I found incredible and disturbing. There were still some of us who wanted to give him a chance to mend his ways, but we were now definitely in the minority. Some of the faculty members were so offended that they wanted to get rid of him – as chair at least – right then. And there were a couple who took their complaints directly to the Provost. That was something that offended me greatly because I felt it amounted to dirty politics and an outright violation of the social contract within our department. To me, it was a case of Rusty all over again.

My personal anger over that was also colored by the fact that the guys who did this end-around to the Provost were fundamentalists (they call themselves evangelicals). I get along well enough with evangelicals as long as they behave themselves, act like the Christians they're supposed to be, and at least outwardly don't disrespect *my* religious faith to my face. As long as they are tolerant of my faith, I'm tolerant of theirs. But I don't particularly trust them. I've met too many over the years who seem to feel it's perfectly okay to screw the infidels – meaning me – and so I watch my back around them. When my nephew Aaron was still in college, one of the students in a class he was taking was a slightly older woman who didn't hide her extremist fundamentalist views. In one class session she had gotten on a self-righteous and absurd rant that 'Christians' are very badly 'persecuted' by 'non-Christians.' Aaron was in her mind one such 'persecutor' and she accused him of being 'hateful' towards Christians. When he pointed out that this was absurd because he was a Catholic, her response had been "Catholics aren't Christians." It isn't without reason that I don't trust fundamentalists whether they profess to be Christian, Jewish, or Islamic. In the Demetrios affair, I felt very strongly that 'screw the infidel' was playing a big part in the shameful and dishonorable tactic of trying to use the Provost to ram through a power play rather than respecting the rest of us enough to work things out in a democratic fashion. I felt *I* was being disrespected by this and it got my back up. A lot. The controversy was taking on a very personal flavor

and turning ugly. I was ready for as nasty a fight as any one cared to make it, and I was equally resolved to resign and leave the department after it was over if honor, mutual respect, and civility didn't return before then. Quite frankly, only my duty to my students was letting me control my anger over the Demetrios affair. I don't like fighting, but I won't back down from one and I won't surrender. Anybody who thinks I'd do otherwise doesn't know me at all.

In the end the faculty came to a sort of compromise, largely due to the efforts of the members of the middle faction, and Demetrios ended up being in kind of an 'on probation' status as chair. There was a reasonable corrective action process worked out, the purpose of which was to correct those mannerisms and actions of his that had led to this crisis in the first place, and a timeline was set to review the progress he made in cleaning up his act. I suspected nothing he did would ever win over some of my fellow faculty members, but if he could win back the respect of the middle folks and not do anything to entirely lose the respect of 'his' faction, I thought things would work out okay for him and for us. Time would tell. In the meantime, a fair and honorable compromise had been reached and was in place. A fragile truce it was, but it was an honorable truce nonetheless. □

Al, my graduate student working on encryption research, and his wife are both veterans of the U.S. Army and devout Mormons. During Christmas break of 2004-05, while Al and his wife were in Chicago at a Boy Scouts conference, Al's daughter stepped out of the shower in their home with nothing but a towel wrapped around her to find three strange men hunched over her computer. The men bolted out the front door of the house and sped away in a black SUV. Because the burglars got away, we don't know for sure who these particular guys were, but Al did find out who they were with. They were FBI agents. What they had been doing was attempting to plant a key logger – a form of spy software that logs all the key strokes you make on your computer so that everything you do is recorded – on the computers in Al's house.

As it happened, this whole story had begun in 2003 when Al was working in our Center for Secure and Dependable Systems. In that year he was lead author of a conference paper entitled "Railway Security Issues: A Survey of Developing Railway Technology." As per normal procedure, Al had first contacted the Federal Railway Administration before submitting his paper for publication to make sure the FRA didn't have a problem with anything that would be in this paper. The people at the FRA told him they didn't care about this paper and gave him the go-ahead to present it at the conference. Apparently they felt that no terrorist was going to mess with the railroad.

The paper itself isn't exactly stop-the-presses news. The railway system in the U.S. is controlled by a distributed network of computers that keep track of where trains are, control the traffic signals used for such things as preventing two trains from coming straight at each other on the same track at the same time, and do other necessary control and communication functions. Not too surprisingly, this system has begun to use the Internet to facilitate communications in the computer network. Also not too surprisingly, this means that the railway system is vulnerable to the same kinds of computer attacks that your own computer is vulnerable to if you have it hooked to the Internet. That is in essence what Al's paper said and he had suggested several standard precautions that should be adopted to protect the system. This is known as 'helping to combat cyber terrorism' and that's what we do in CSDS.

The paper was presented in August of '03 and appeared in print in the conference proceedings in early 2004. One month after that, someone slipped a virus into the CSX traffic computer that controls railway traffic signals in thirty-three states. The virus brought the traffic control system to a screeching halt and shut down rail traffic east of the Mississippi River for about a week. A guy in Montana who worked off and on as a security consultant for the FRA had read Al's paper and called the FRA to tell them about it (again). This time the FRA called the FBI. We found out about this story because the Montana guy's son works with Al in the Boy Scouts and he told Al about it afterwards.

Al returned home from Chicago two days after the burglary, and at eight o'clock the next morning the FBI called him. The agent wanted to know why Al hadn't submitted his paper through the FRA. Al told

him he had. My guess is that a sort of selective amnesia is afflicting the folks at the FRA. After all, who wants to own up to ignoring a warning that something like what had happened to the CSX computer could happen? In any case, the agent asked Al for a copy of his paper and Al gave him one.

We had a pair of undergraduate students who worked for Al on the encryption project. These students have continued to do some routine work for us after graduation from their homes up in Coeur d'Alene, Idaho. In the summer of 2006, they found key logger spyware planted in their computers, too. Al tells me he thinks there might have been three or four more break-ins at his house since the original one, but he can't verify this for sure. The most recent suspected one was in May of 2007.

I don't think it takes any great amount of genius to figure out what's going on. Having no suspects for the cyber attack on the railway system back in 2004, Bush's black bag men are investigating the guy who warned that this could happen. After the way Sami was railroaded previously, I have no reason to doubt they're trying to do the same thing again, this time to one of my students and, likely, the kids who worked for us. For all I know, they might be secretly investigating me as well. I haven't seen any evidence of this at my house or in my office so far, but I'm keeping an eye out for it.

What I do know is neither the FBI nor any other federal agency has ever called or come to talk with me to find out what our research is about. Let them come see us. Let them bring as many experts with them as they wish. We'll show them every single thing we're doing, every result we've found so far, every piece of research software we've written. My students and I have absolutely nothing to hide from them nor anything we wish to hide from them. We'll even tell them about what we *haven't* and don't intend to publish because of the potential for danger we feel it might pose to America. What I do know is that when the government responds to warnings with black op burglaries in the homes of the experts who warn them, it doesn't exactly make a person eager to warn the government of dangers.

I do know I hate the Bush administration's violation of the constitutional process – which is what the so-called 'Patriot Act' permits Bush and his Gestapo to do – and I do deeply resent the Bush administration choosing to wage a covert war against the very people in academia they should have called upon to help in the war against Al Qaeda from the very beginning. I do know I resent the Republican Congress sanctioning the establishment of a secret police in America and Bush's use of it to commit burglary against American citizens. Next to all this, Nixon was a rank amateur. Do you think the Patriot Act is a good thing? You wouldn't if you had my job. The FBI isn't trying to solve a crime here; they aren't trying to prevent a future act of cyber terrorism; they're trying to find an easy scapegoat to hide the FRA's bungling. It's just that simple and that's what's going on in America right now. And now you know why I'm not telling you Al's full name nor the names of my undergraduates at all. None of us are too keen about the idea of taking a little covert vacation, all expenses paid by Uncle Sam with free water boarding included, down in sunny Guantánamo Bay or scenic Syria. □

2005 Neuroscience REU students holding a birthday party for Participant Ricky Blatter.

Our 2005 session of the neuroscience REU got under way on June 6th. By this time the neurofuzzy project was over so we had a smaller but still terrific group of youngsters conducting research that summer. Topics ranged from three different neural network projects, a psychological study of the effect of heavy snowfall on a driver's ability to navigate his car, a few anatomical studies, and the synthesis of some new organic compounds that might some day prove useful in treating certain neurological diseases.

Like the year before, the youngsters in the 2005 session were all splendid young researchers and a number of findings came out of their work, several of

which were subsequently included in some major journal publications by their mentoring professors. To highlight just one of their many achievements in 2005, students in the program successfully synthesized six brand new molecules that no one had ever done before. These molecules may some day allow brain researchers to specifically target, identify, and distinguish among an important class of protein receptors in the brain, known as NMDA receptors, that play a central role in learning and memory.

Later, in November of 2005, ten of our REU participants attended the annual Sigma Xi National Student Research Competition, which that year was held in Seattle. This is the most prestigious research conference for undergraduates in America. A couple hundred student research posters are presented at it each year. Our kids presented six different research posters at the 2005 conference and brought home six gold ribbons for outstanding research work. One of our students also had her work accepted for presentation at the annual conference of the American Chemical Society that year.

I was very, very proud of my kids. Again.

Immediately following the end of the 2005 REU session I was off to Montreal to attend the 2005 International Joint Conference on Neural Networks. We were presenting two papers at this conference. One was by Stan Gotshall, Terry's Ph.D. student, on his work using evolutionary computing to design biologically realistic artificial neural networks that implement spinal cord functions. The other was a paper I was presenting on behalf of my team which introduced our forgetful logic circuits.

They speak French in Montreal, which is a language I do not know more than a couple of phrases in. I arrived after dark at the Montreal airport and it took me awhile to figure out where the bus to the hotel was. The bus driver was an interesting character who bore an eerie resemblance, both in appearance and mannerisms, to Charles de Gaulle. It turned out he did speak English, with a pretty thick accent, but at first he wasn't letting out any hint of that.

I'd never been to Montreal before. The bus stopped a few blocks from the hotel and I didn't relish the idea of bumbling around a strange city in the dark where I couldn't speak the language. I figured I could use all the guidance and help I could get. The trick was getting it in simple enough terms that I'd be able to follow the directions and find the hotel. One thing I've found works pretty well for this in foreign countries is to be dumb. I've got a pretty good dumb act and I decided to use it on the stern looking gentleman piloting the bus. By the time we finally reached downtown Montreal, I had him convinced I was the dumbest old geezer ever to visit his fair city. He ended up practically leading me by the hand to a place from where I could see the hotel. Good thing, as it turned out. The hotel was only the top couple of floors of a high-rise building; in the dark I'd never have been able to recognize that building as a hotel.

At the conference the next day I had the great pleasure of seeing my old teacher, Bernie Widrow, again. He didn't remember me, of course. It had been more than twenty-five years since I'd been his student and nearly two decades since the last time we'd spoken. I didn't look like the brash young man of my Stanford days any more either. Bernie had changed a bit, too. He was quite a bit older now, of course, had shed his trademark beard and put on a few pounds. But he was otherwise pretty much the same old Bernie I'd looked up to and admired when I was a student. Like most of the guys at the very top of the neural networks world, he had a kind of entourage that tagged along with him everywhere he went, and that was different from when I'd known him at Stanford.

I attended Stan's paper presentation and got quite a kick out of it. Stan is another of those folks who tends to be a bit on the nervous side, and it turned out that the audience listening to his talk included some of the biggest names in the field. Fortunately for Stan, he didn't know who these guys were or I doubt if he'd have been able to talk at all. At the end of his talk he got grilled a little bit by a short, skinny, sad-looking old guy. Stan did okay in his answers, although I could tell he was more than a little abashed by the harshness of his inquisitor's tone. I didn't tell him until afterward who that guy was. His name was Stephen Grossberg, and he's one of the very top big shots in the neural network field. If Stan had known who he was, he'd have melted into a little puddle right on the spot.

Montreal is a beautiful city, and on the third day of the conference there was a break in the action so far as papers I was interested in were concerned. Stan's sister had come with him to Montreal, and the three of us went on a walking tour of the old city. We visited a number of museums and exhibitions and generally had a pretty good time. My legs were sore by the time we got back to the hotel, but it was worth it.

My friend Don Wunsch, who had led our Program Advisory Board during the neurofuzzy project, was at the conference. Don was the current president of the neural network society, and at the awards banquet he was honored by being inducted as a Fellow of the IEEE. Paul Werbos, the neural networks guy at the National Science Foundation, was also made an IEEE Fellow at that banquet, which was an honor I thought long overdue. Don was delighted to see me there, and Paul remembered me also. I couldn't help joshing them a little bit about the honor that had just had bestowed upon them, so I greeted each of them with, "Hail, Fellow. Well met." They both grinned. It was a big night for both of them.

All in all, it was a pretty good conference and I was in a good mood on Friday when I flew back to Spokane from Montreal. Until, that is, my suitcase came up the conveyer. At first I didn't recognize it for all the gray tape wrapped around it. But it was mine all right. The tag on the handle said so. The tape had been added by the TSA people after they had broken into it. That tape was all that was holding it shut. It was an expensive suitcase, and now it was completely ruined. Inside was a note that said 'We're sorry we had to damage your luggage.' It went on to say they had the right to break into it and there was nothing I could do about it, including getting reimbursed for the damage. I was furious.

And I don't think they meant it. I don't think they were sorry at all. □

The beginning of the fall semester of the 2005-06 school year brought a few new faces into my lab and saw the departures of many old ones as a number of my graduate students completed their degree programs. One departure I didn't welcome was Mr. Zeng. Although he had support for his schooling in the form of a research assistantship, his wife hadn't been able to find one. Earlier that summer, she was offered one at the University of Texas and Mr. Zeng was likewise offered one as a kind of package deal. So it was that UT recruited him away from me. Funding for the AUV project had been renewed by ONR, to the tune of one million three hundred thousand dollars, and I had to hire a replacement for him. Luckily, there was a new face on campus. His name is Ron Crummett. Ron had received his Bachelor's degree in electrical engineering from Utah State and had started out in his Master's study in the program the SBOE had allowed Boise State to start. Ron had very quickly discovered that the BSU program was presenting him with no challenges. As he put it to me, "I wasn't learning anything new." As a consequence, he had transferred to our graduate program and moved up to Moscow. He is a bright, hard-working guy and his undergraduate training in Utah had prepared him well for graduate work. I hired him to replace Mr. Zeng on the AUV project.

Lan Nguyen with me in my office.

Another new face on campus was Lan Nguyen. Lan was an older student who had been working on his Ph.D. in much the same fashion as I had worked on mine over twenty years earlier. He had taken most of his coursework through our Engineering Outreach Program while living and working in southern California. We require all Ph.D. students to spend a minimum of one academic year in residence on campus where they work closely with their major professor – me in this case – in finishing up their doctoral research. Lan had come to campus to do just that.

Lan is an interesting guy on many levels. He works for a southern California company that does

defense related work, much of which is classified. His particular research project with me wasn't classified (doctoral research can't be because it's published in the form of a doctoral dissertation), and it had to do with the use of adaptive signal processing to remove certain types of signal distortion often found in satellite communications. It happened that no one had studied the problem of removing multiple simultaneous distortion effects all at the same time, and that's what Lan's research was about. It was an interesting problem because these distortion effects (known as Doppler shift, phase jitter, and amplitude jitter) interact in a non-linear way when you try to cancel them out, making a closed-form mathematical solution to the problem ill-posed. That, of course, is just the territory where an adaptive system shines and although the system Lan came up with isn't a neural network, it uses many of the same principles.

Lan had arrived in America as a boy with his family after the fall of Saigon. He and they were among the many boat people who fled Vietnam ahead of the communist takeover. Like most of these people, Lan's family worked hard to build a new life in America. For him earning a Ph.D. was something of a family tradition. He's a very sharp guy. He is also something of a worrier. I don't believe I've ever met another man who worries about things as much as Lan does. Whether that has anything to do with the experiences he went through as a child I can't say, but the good side of his worry-wart nature is that it makes him a careful and thorough researcher. About all I had to do was teach, coach, and occasionally dampen out the excesses when he'd get to worrying too much about things and point him back in the right direction. In this he and I have somewhat different personalities. It isn't that I don't worry about anything. I do. But I tend to focus on the positive – what can go right – while Lan tends to zero in on what can go wrong. In a way you could say I watch for the sunrise while Lan watches for the sunset. But despite this difference in our personalities, we made a pretty good team and Lan made extraordinarily rapid progress in his research work after coming to campus.

I also started doing a little coaching and technical advising that semester for one of our young assistant professors in the Chemical Engineering department, which sits just down the hall from the MRC Institute. My young colleague, Dr. Eric Aston, had a research contract to fabricate what are known as 'nanowires' – very, very tiny little wires intended for use in microscopic-scale engineering systems. He had a Master's student helping him in this, and because part of the project involved characterizing the electrical properties of his nanowires, he had asked me to sit in on his status meetings with his student and consult on such EE things as measurement techniques and other non-chemical aspects of the project. I was happy to do it for him, glad for the chance to learn a little more about 'nano technology,' and this activity only took up about an hour or so each week and so for me at least it was pretty painless.

There were a few committee assignments that came my way beginning in that semester as well. Demetrios had appointed me to chair our department's curriculum committee. That assignment automatically also made me a member of the curriculum committee for the College of Engineering, so I got two committee assignments for the price of one. In addition, I was asked to serve on the university committee that reviewed EPSCoR proposals for the branch of EPSCoR involved with research funded by the Department of Defense. This committee was chaired by Jean'ne Shreeve, who was still as feisty and hard-nosed as ever and still fun to work with. At least *I* think it's fun to work with her. Folks with timid, tender spirits sometimes don't think so. But I always like working with people I don't need a secret decoder ring to talk to. It saves a lot of time.

The AMFeR program under Jeff Young had also been renewed by ONR, this time to the tune of a little over a million dollars. My part of this program was starting to draw to a close. Feng would be graduating this academic year and there wasn't too much more micromagnetics work that needed doing for AMFeR. It was a fun project, but I was becoming eager to be done with it so I could put more time into my own electronic brains work, which was still unfunded.

The most unusual and, for me, the most fun thing that came up in the fall semester was my philosophy class. Earlier that year, during the summer, my pal Michael O'Rourke and Doug Lind, the chair of the philosophy department, had approached me to ask if I'd be willing to do a senior level special topics class

on the philosophy of Kant. Undergraduate students in philosophy get just enough exposure to Kant in their coursework to learn he is an important figure in Western philosophy. But Kant's work is also very, very deep weeds technical metaphysics and even most philosophy professors don't claim to understand it. At the UI we had guys who were well versed in Kant's moral philosophy – Doug is one of these – but no one who felt comfortable about trying to teach his metaphysics doctrine. However, there was a fair sized contingent of philosophy undergraduates who were begging the department to offer them something on Kant, rightly feeling that Kant's work was something that, as philosophy majors, they ought to know more about.

Michael knew that my work on mental physics drew heavily from Kant's technical metaphysics and he had heard me discuss particular aspects of this work from time to time. He was therefore aware that I had become something of a Kant scholar, hence the invitation to accept an appointment as an adjunct professor of philosophy and provide the course their students were begging to have offered. I thought this would be a lot of fun and certainly a big change of pace from my usual work. I cleared it with Demetrios and so as fall semester got underway I found myself teaching our junior level course in electronics on the one hand and the senior level Kant course on the other. In the latter class we went through Kant's most famous work, *Critique of Pure Reason,* from cover to cover. The students loved it, although it took them a little while to adjust to level of hard work I demanded from them. This was philosophy in its most technical and intricate form.

Finally, 2005-06 was the year I was due up for consideration for promotion to full professor. I wasn't any more well informed about whether my record qualified me for this promotion than I had been about my chances for tenure and promotion back in 1998-99. The big difference this time was that it didn't matter that much to me whether I got promoted or not. The first time my job had been on the line; this time the consequences of not making it weren't at all so severe. Either I'd make it, which would be a nice bit of ego inflation since full professor is the highest academic rank, or I wouldn't, in which case nothing would change for me. Full professor pays more than associate professor, but at this stage in my life that didn't matter much to me. I was already a millionaire. Consequently, I didn't worry about it. I just turned in the documentation demanded by the process and promptly forgot about it. I'd find out near the end of the school year how it all went.

To the small extent that I did think about it, I didn't see anything to be concerned about. My academic resume (called a 'curriculum vita' in academia) looked fairly decent. I had a nice list of publications on my record and now, with the adjunct appointment to the philosophy department, I could claim five academic appointments: associate professor of electrical & computer engineering; associate professor of neuroscience; adjunct professor of material science & engineering; adjunct professor of philosophy; and affiliate professor of physiology and biophysics at the University of Washington School of Medicine. I had consistently excellent teaching evaluations from my students, a nice list of courses I had developed over the years, a long, long list of graduate students I had mentored, and a few million dollars of external research funding I was credited with bringing in. The only other thing I needed to do was get some outside review letters from reputable people at other universities, which is something the UI takes into consideration for tenure and promotion. I turned in a couple of names to Demetrios – Don Wunsch and a professor at Purdue named Jan Allebach, who I knew from HP's university research program and who was likewise an IEEE Fellow – for him to use in soliciting my outsiders' review. He needed a couple more names for this list so I asked him to just pick some from among the many people he knew professionally and whose opinions he trusted. I figured that if this outsiders' review was to be useful and meaningful, it should involve the opinions of scholars who didn't know me personally. After all, what's the point of having only your pals involved in something like this? Demetrios picked a few more names and that was that. When the outside reviews finally came back they were favorable and near the end of the school year I got the word that I would become a full professor effective July 1, 2006. □

On Monday, August 29th, Hurricane Katrina slammed into the Gulf Coast and largely destroyed New Orleans in one of the greatest natural disasters ever to hit the United States. As the full extent of the

emergency started becoming clear, a large group of UI students set their books aside and headed for Louisiana to help with the rescue and relief efforts. President White sent a letter to all the UI's faculty members telling us about what our students were doing and informing us that the University would do all it could to support their efforts. This included excusing our student volunteers from class during the emergency and doing everything possible to support their volunteer efforts as well as helping them get their own academic studies back on track after the emergency was over and they returned to campus. I was filled with pride in our young people and with pride in my University for responding so quickly and unconditionally to help in this time of disaster. Katrina brought out in our young people what is best and finest, most virtuous and unselfish in America. In America we walk the streets with heroes every day.

If only the same could be said for Bush and his administration. Along with the rest of the country, I was appalled by the bungling incompetence with which FEMA failed to respond to the Katrina disaster. It is for emergencies precisely like this that FEMA exists at all, and we were all able to witness the stunning incapacity of our government to deal with this most basic of government functions. Katrina marked the beginning of a groundswell shift in how the American people saw our rulers in Washington. The state government of Louisiana didn't exactly distinguish itself either in this emergency. At least a part of that was due to the fact that most of the Louisiana National Guard wasn't home in Louisiana; they had been shipped off to fight Bush's private war in Iraq, which continued to go badly.

Some other things came into the full glare of the light of day before 2005 was over. Republican majority leader Tom Delay was indicted in Texas at the end of September for violation of Texas' election laws. Cheney's chief of staff, Lewis Libby, was indicted for felony perjury over the Bush administration's treasonous outing of one of our important undercover CIA operatives, whose husband had criticized the administration. Republican Representative Randy Cunningham resigned after pleading guilty to accepting more than two million dollars in bribes relating to defense contracts. Lastly, Bush himself admitted that he had ordered the National Security Agency to conduct eavesdropping on American citizens without obtaining legal warrants, and he defiantly stated he would continue to do so. This is outright defiance of the laws of this country and an arrogant trampling of the Constitution. If this doesn't fall into the category of 'high crimes and misdemeanors' I can't imagine what would. And neither the Republican Congress nor its gutless Democratic members did anything about it. We were under the heel of an incompetent dictator and criminally betrayed by Congress. There's no other way to say it. □

In Moscow after the disruptions caused by Hurricane Katrina, things settled back into a routine that I found to be outright relaxing after the hectic five years that had gone on before. Among other pleasures, I had no out of town trips I needed to make that year, which meant I wouldn't be getting frisked at airports all the time nor would I have to buy a new suitcase. I could focus on my teaching, my graduate students and projects, and on putting the finishing touches on the first draft of *The Critical Philosophy and the Phenomenon of Mind,* the soon-to-be E-book that would introduce mental physics to the wider world.

Jeff had appointed an Advisory Board for the AMFeR program to review our progress and, naturally, give advice. One of the members was an old, old friend of mine from HP, Dr. Ralph Simmons. Ralph is a physicist and by 2005 I had known him for pretty close to a quarter of a century. His specialty was the physics of quantum thermodynamics by training and that of magnetic materials by experience. In mid-September he came up to Moscow for the Advisory Board meeting and we had a fun little reunion. I really enjoyed chatting and joking with him again; it had been awhile since the last time we bumped into each other.

I had first gotten to know him back in the early 1980s when he had been the chief designer of HP's ill-fated magnetoresistive disk drive head. Ralph has a terrific if somewhat technical sense of humor I've always greatly enjoyed. One day I had dropped by his office and found him giggling over a little card the alumni association from his alma mater had sent him. On it his degree was listed as 'Ph.D. in Psychology' and that's what he was giggling about. He showed it to me and I got a pretty good laugh out of it, too. At that moment Ralph's boss had strolled over to see what was so funny. Ralph showed him the card, and as

he was looking at it with a kind of puzzlement on his face, I chimed in with, "See, Mike. That's the problem down here. You hired the wrong kind of head doctor!" Ralph laughed out loud, but Mike, his boss, didn't think it was too funny. He was one of those unfortunate people who are humor-challenged.

Ralph is also the guy from whom I first learned that interdisciplinary work involves, among other things, a good facility with language. You see, different technical specialties develop their own technical language, and different specialties often use the very same words to mean very different things. This was something I hadn't really appreciated until one day in 1983 or so when I trotted down to Ralph's work area to see him about a concern I had with the MR head design. I'd been carrying out an analysis of how the proposed head design would impact the read-write circuit design of a disk drive. The analysis method I was using is called 'Fourier analysis' and part of this analysis involves something called the 'phase transfer function.' The term refers to how signals are delayed in time as they pass through a system. In data communication and in disk drive work, there is an important property called a 'linear phase characteristic' and the proposed head design didn't have it. I figured that was going to make some problems for the electrical engineers, and so I wanted to talk to Ralph about it.

I strolled into his area and after an exchange of pleasantries I said, "Ralph, I need to talk to you about the non-linear phase characteristics of this head design."

Ralph gave me a puzzled look and then launched into a long, interesting, but not particularly pertinent discussion about the material properties of the MR head. He looked at me as if to ask, 'Does this answer your question?' It didn't.

"That's really interesting, Ralph," I said, "but getting back to these non-linear phase characteristics in the head design . . ." Ralph gave me another puzzled look and told me some more about material physics. We probably spent about ten minutes or so talking past each other until all of a sudden I realized that every time I used the EE's word "phase" Ralph was hearing "solid, liquid, and gas" – the 'phases' of physical materials. As soon as I realized what was going on I started to laugh, and when I explained it to Ralph he joined in just as heartily. The incident was an important lesson for me, and one I never forgot. It has served me well for many, many years now. Today I have a whole row in one of my bookshelves dedicated to technical dictionaries from a number of different fields including philosophy, physics, math, chemistry, biology, and psychology. The pages of these books have gotten a bit thumb-worn over the years. □

One sign that the UI was finally emerging from the budget crisis the Idaho Place affair had touched off was the university slowly started hiring people again. Ever since the Provost had removed Dave Thompson as dean of engineering, the search for a new dean had been in the deep freeze. Chuck Peterson, who had originally planned to retire at the end of the year Dave was removed, had agreed to stay on one more year as interim dean. Well, this *was* that extra year, Chuck wasn't going to stay for another, and so a new dean search was underway. One by one prospective candidates began arriving on campus for the interview process. I didn't think much of the early crop of would-be deans and apparently not too many others thought much better of them. The search went on.

I'd seen Chuck around campus here and there over the years, but I hadn't gotten to know him all that well before he became acting dean. Once in that position, though, normal business tended to bring me in contact with him more and more and I came to like him quite a bit. One of the things he liked to do, which impressed me, was read the thesis or dissertation works written by our upcoming new graduates who were completing their Master's or Doctoral programs. I was managing to do a pretty good job at keeping him busy with this all by myself since I had five graduate students who were finishing and would graduate at winter commencement in December. Additionally, three more graduate students whose committees I sat on were also finishing that semester.

One of my guys, Steve Cohen, was a medical doctor from Richboro, Pennsylvania who had become interested in electrical engineering as a result of things he regularly encountered in his medical practice.

He had no intention of giving up his practice, of course; he just wanted to know more about EE. Steve was one of the very, very few graduate students who took on a thesis Master's through Engineering Outreach. Most EO students opt for a 'professional' Master's, an option that does not require writing a thesis. Supervising thesis research work being done in Pennsylvania from all the way out in Idaho had its challenges, but Steve and I kept in close contact and his project worked out quite well. He was interested in a medical instrumentation application that involved removing excessive noise from electrogastrograms. From where he lived, he could get hold of experimental data taken from dogs to use in developing an adaptive system for removing other unrelated sounds normally picked up during this procedure. He'd gotten the idea for doing this when he took my graduate course in adaptive signal processing, and he managed to work his term project for that course into a full blown thesis project afterwards. It was a fine piece of work, which he successfully defended when he came to Moscow in early November for his final exam and thesis defense.

My philosophy class on Kant went well enough that Doug Lind asked me if I'd be willing to help teach the junior level history of philosophy course when spring semester began. This course was team taught, with different lectures being delivered by faculty members who specialized to a greater or lesser extent in the different historical figures being discussed. Doug asked me to take the lecture on Kant's metaphysics. Since this was an evening class that met only once a week, it didn't conflict with my other two courses that semester (our senior course in system theory and my graduate course in biological signal processing), so I was happy to do it. Just for fun I sat in on that course for the whole semester, both to learn more about other famous philosophers and to get to know the folks in the philosophy department better. Technically this course was an 'overload' for me, and Doug offered to pay me a little something extra for agreeing to do it. But I turned down this offer and told him to use the money as a donation to the philosophy department instead. It was too much fun to want to get paid for doing it.

The philosophy department was one of the departments on campus that had received approval to hire a new faculty member. Candidates for the position began showing up on campus soon after spring semester began, and I was asked to take part in the interviewing process. This particular faculty position was a philosophy of science position, and they asked me to take part because I was involved in both the neuro-science program as well as the college of engineering. Plus, of course, I was adjunct faculty in the department myself. It was a tiny favor to ask, and I was glad to do it.

One unexpected thing *did* turn up as the spring semester got underway. Deb Stenkamp had been the director of our neuroscience graduate program since its inception, and spring of 2006 would be the end of her three-year term as director. I was all for re-electing her for another term, but Deb was planning to take sabbatical leave the following year and, in addition, they were planning to adopt a baby. She therefore felt continuing as director would be too much to handle on top of these things, and so we'd need a new director for the next three years. The election was slated for January 19th at our first faculty meeting of the new semester.

I had barely begun thinking about who to support for the new director when I got a call from Deb. Someone had nominated me to succeed Deb in the post. Somebody else – it turned out to be Deb – had seconded the nomination, and Deb was calling to ask if I'd accept the nomination.

Director of the program is an administration job – albeit only a quarter-time job in our program – and the last thing in the world I wanted to do was spend time being an administrator. That wasn't why I came to the university. Not at all. But our program was still a very young one and it is part of the social contract in a university for faculty members to do their part in governing our academics. That put the whole thing very squarely in the category of Duty so I felt I couldn't refuse the nomination just because I didn't want to do any administrative work. Besides, there would surely be other nominees and I figured I could throw my support to one of them. After all, being nominated isn't the same thing as being elected.

No such luck. We gathered for the faculty meeting at two o'clock in the afternoon and Deb opened the floor for nominations. Mine was put in officially – it turned out to be Jim Frenzel who nominated me –

and it was formally seconded. Then there was an awkward silence. Then somebody moved to close the nominations. There I was, sitting there, the sole nominee. All of a sudden my chances of losing weren't looking too good. Deb asked me to leave the room – the usual formality – while the vote was taken. Then she brought me back in the room, grinned mischievously, and told me I now had a 'mandate.' Well, there wasn't much I could do at this point; accepting this post was a Duty. I was asked to make an acceptance speech, so I made about the shortest one on record. "I can't promise to be perfect," I told my colleagues. "All I can promise is to do my best." Speech concluded. They applauded anyway. Come July 1, I was going to become director of the neuroscience program for the next three years. □

With Dr. Lan Nguyen and Dr. Feng Xie after the spring 2006 commencement ceremony.

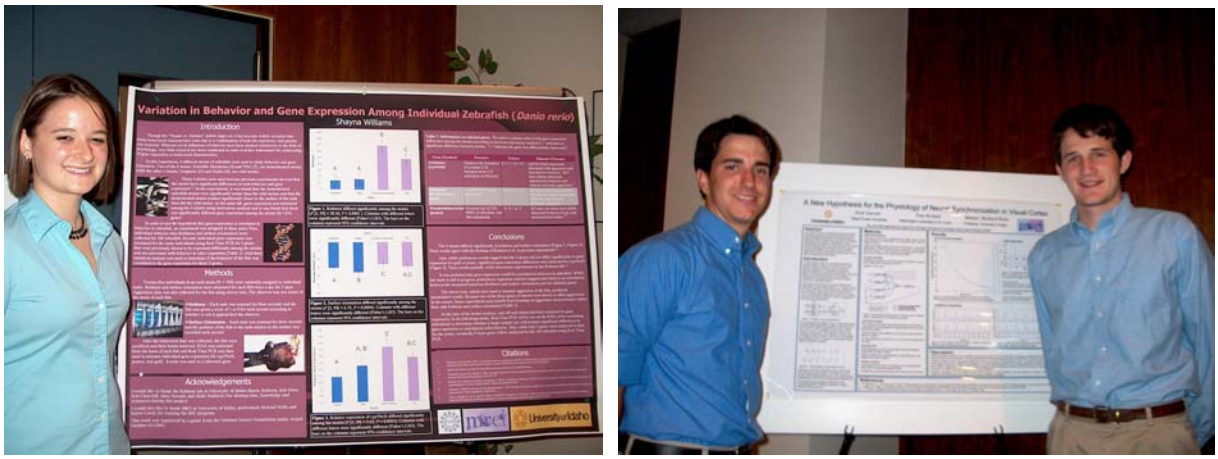
Most of the rest of the 2006 spring semester was entirely routine. Both Lan and Feng finished up their doctoral research, as expected, and graduated at the spring commencement. Lan went home to Mission Viejo, CA and Feng got a job in industry. With Feng's graduation my participation in the AMFeR program also came to an end. The micromagnetics part of that program had made all the contributions it could and I was able to free up my time for the other things on my plate, particularly neuroscience. In addition to my two Ph.D. students, spring semester saw the graduation of two of my professional Master's students, Stan Buelt and Diane Nelson, as well as a Ph.D. student in computer science, Dong Yu, whose committee I had served on. Dong's dissertation, entitled "A Novel Alert Correlation and Confidence Fusion Framework in Intrusion Detection Systems," addressed certain computer security issues related to defending computer systems against cyber attacks. It used a form of artificial intelligence known as a 'colored Petri network' and I had helped Dong a little with the mathematical formalism involved in his system.

The search for a new Dean of Engineering finally netted one. Her name is Dr. Aicha Elshabini and she is an electrical engineer and a Fellow of the IEEE. This made the first time since I had been associated with the UI that the Dean of Engineering was an electrical engineer. Aicha originally came from Egypt so she was also the first Moslem dean of the college as well as the first woman to hold that post. As part of the hiring package she negotiated with the university, she brought with her a colleague, Dr. Fred Barlow, who joined our department, and she was able to negotiate opening two other new faculty positions for us, which allowed us to start rebuilding after the losses we had taken during the budget crisis. All that was very welcome news for the ECE department.

After the school year ended and before Aicha came on board, Chuck Peterson called for a faculty review of Demetrios' performance as chair. Personally, I thought Demetrios had gone a long way in correcting the behaviors that had led to the original brouhaha and had earned the right to continue as chair of the department. Unfortunately, a majority of my colleagues didn't share that opinion and Chuck removed Demetrios as chair. I wasn't happy with that decision, but it had all been done according to the agreement that had been worked out earlier, there was nothing underhanded in any of it, and the will of the majority prevailed. The workings of a democracy usually don't please everyone but either a person has faith in democracy or he doesn't. You don't get to believe in democracy only when it works out your way and in this case I ended up being in the minority. Our faculty closed ranks and that was that.

The decision meant we needed a new chair. I nominated Brian Johnson, my colleague who had taken over the NIATT CID project for me a few years earlier, and someone nominated Jeff Young, my office next door neighbor who was running the AMFeR program. There was no national search this time. Brian wasn't too eager to become chair and I'm not so sure he wasn't surprised about how popular he was with the faculty members, but we had called on him to serve and he accepted it as a duty. Jeff and Brian each

presented their views and what they would try to do as chair, and when the votes were counted Brian won the majority and became our new chair. I apologized to him for nominating him; I knew what it felt like to land in an administration job one hadn't sought. As for Demetrios, he landed on his feet, becoming a dean at a Texas university. My guess is he must have had this in the works even prior to the end of the school year, although I don't know this for sure. He left us prior to the end of the summer.



Three of the 2006 Neuroscience REU participants. Left: Shayna Williams. Right: Nick Garrett and Tom Richner. Shayna won a blue ribbon at the 2006 Sigma Xi student research competition while Nick and Tom brought home a gold ribbon.

The summer 2006 neuroscience REU session was the third session of that contract and the last one for that round of funding. One of the big things I had to do that summer was prepare and submit a new NSF proposal to renew the funding for our REU site. We had eleven more extremely sharp kids participating that summer doing projects spanning biological neuroscience, cognitive neuroscience, computational neuroscience, and neuro-pharmacology. Once again all the kids turned in excellent research results. The Sigma Xi student research competition later that year was held in Detroit, which turned out to be quite a long distance from the home universities of most of our participants. Participation in this research competition by our REU students is voluntary; by the time the Sigma Xi meeting is held the kids are back in school and while we encourage them to go to it by providing some reimbursement for their travel, it's a free country and we can't make students do it. That year only two of our projects elected to go to Sigma Xi, but they represented our program with distinction.

Shayna Williams had come to us that summer after completing her sophomore year at Claremont-McKenna College in California. Her REU project involved the study of the genetic basis of boldness exhibited in zebrafish. As it happens, zebrafish taken from the wild and zebrafish that are grown in domestic laboratories exhibit very different behaviors. Wild type zebrafish will shy away when a person approaches the fish tank, putting as much distance between themselves and the human as possible. Domestic zebrafish raised in the laboratory will do just the opposite. They will approach the human and, thus, they are said to be 'bold' in comparison to the wild type. What Shayna found was that there are genetic differences between the two that correlate to this behavior. This might mean that behavioral qualities such as courage or timidity could have a genetic basis. It's too soon to call this more than just an hypothesis, but if further research bears this out it will be a very significant new finding of fundamental importance. Shayna went to Detroit for the Sigma Xi competition and won a blue ribbon, denoting 'superior' research (best in the conference in that subject area), an accomplishment that places her in a pretty elite class as one of the best young scientists in the nation.

Nick Garrett, a biology major, and Tom Richner, a math major, did a team project that summer that investigated the relationship between physiology and an important type of mathematical neuron model known as 'the Eckhorn neuron.' In the 2005 REU session two of my kids – Tim Montoya, an electrical

engineering major, and Tian Lai Lu, a biomedical engineering major – had constructed a neural network model of the neocortex (the thin outer layer of the brain where higher cognitive processes are carried out). Their model had demonstrated neural dynamics that closely matched experimental data taken from human subjects, thus suggesting a possible explanation for how neural 'circuits' in the brain are organized. The model used Eckhorn neurons in the neural network, and their results immediately raised the question of how biological neurons at the cell level might be interconnected to produce the more abstract mathematical properties of the Eckhorn model. That was the question Nick and Tom worked on in the summer of 2006. They constructed small networks ('netlets') of biologically accurate neuron cell models and succeeded in explaining some of the physiology that could act to produce an Eckhorn behavior. They also succeeded in demonstrating to what I regard as a near certainty that 'the Eckhorn neuron' itself does not actually exist in biology but rather must be the result of interactions among a fairly large population of biological neurons. Their findings will help us to pinpoint more details about how the human brain is organized so far as the neocortex is concerned. Nick and Tom brought a gold ribbon ('excellent' research) home from Detroit. □

Other REU students in the 2006 session with their posters at the REU expo on the UI campus.
Upper left: Beia Gomez and Kristina Eells; Upper right: Zach Maier and Geoff Basore; Lower left: John Rudolph and Stephen Smith; Lower right: Katie McNabb and Tshering Sherpa.

My new duties as the neuroscience program director automatically made me a member of a council known as the University-Wide Programs or UWP council, which works for the Dean of the College of Graduate Studies. This is the college in which the Neuroscience, Bioinformatics & Computational Biology, and Environmental Science programs were lodged. It meant that in addition to reporting to Brian in my role as an electrical & computer engineering professor and Touraj in my role as associate director of the Institute, I now also reported to the Dean of COGS in my role as neuroscience director.

The Dean of COGS is Dr. Margrit von Braun. If that name sounds familiar to you, it is because she is the daughter of Wernher von Braun, the rocket scientist. I first met Margrit back in 1996 when I moved to the Moscow campus following the Engineering in Boise fiasco. Margrit is a chemical engineer by training and when I first met her she was in the process of founding our Environmental Science program, the oldest and largest of the UI's interdisciplinary and university-wide programs. Her office was then right next door to mine, where Jeff Young now resides. *My, my,* I thought at the time, *it really is a small world, isn't it?* Her dad was one of my boyhood heroes.

I think Margrit is an exceptional leader. She has a clear vision for the graduate college, knows where she wants to take it, and does an outstanding job of building consensus among the UWP directors. She has a deep concern for putting our students first – something I don't think can be said of every dean – and an equally strong commitment to the highest quality of graduate education and research. She is able to be a very active and involved Dean without being a micromanager. Of course, from time to time this activity and involvement means my twenty-five-percent-time duties as neuroscience director add up to something a bit more than twenty-five percent. That's the downside of working with a dynamic leader but ah, well, life is like that sometimes and I'd sure rather work for an outstanding leader than for an administrator. Margrit is one of the few deans who doesn't fit the mold of the old academic saying, 'If you don't tell the dean it's a joke, he won't laugh.' It's a privilege to work with her. □

As the summer of '06 drew to a close, Leili completed her thesis research and graduated with her Master's degree. She had been working on the MIMO idea for the AUV and turned up some rather interesting results, which we published at a communication system symposium in the Netherlands. What I found to be the most interesting result was the finding that, rather surprisingly, what is usually regarded as the optimum signal processing method in most applications was very poor when applied to underwater acoustic communications for our little submarines. A slightly different method, usually regarded as suboptimal, performed much, much better. The reason is linked to the dynamics that take place when an adaptive system is used in this application and it has to do with maintaining a robust communication link when the submarines are moving relative to each other. The findings left us with some very interesting food for thought, and I don't think all of the implications of this work are fully appreciated yet.

After completing her degree, Leili was off to Stanford to join her husband. She had been accepted into Stanford's Ph.D. program in electrical engineering and I was curious about how well she'd do down at my old alma mater. Leili was kind of a high maintenance graduate student when she was working for me, and my colleagues down at Stanford aren't exactly known for their unlimited patience. I hoped she'd find a good mentor down there.

Ron, having started on the project later, was still busily engaged in his research work for the AUV. His research centered on a method to greatly improve the capacity for our 'schools' of AUVs to communicate more rapidly. He succeeded in coming up with an adaptive system – quite different from Leili's – to do this and graduated at the end of the spring '07 semester. We haven't published this work yet. One of the things I'd hoped to do was to find a way to combine the methods Leili and Ron had used, but this proved to be more difficult than I had anticipated. The problem of combining the methods is still unsolved. □

One of the aspects of my job I enjoy the most is talking to high school kids and their parents who come to Moscow scouting for a college and a major for after high school graduation. For me these chats pretty much always involve prospective engineering students. Unless at least one parent is an engineer, the majority of folks I see don't know precisely what an 'engineer' is or how engineering differs from, say, being a physicist or being a mathematician. What they do know is that a young person with a Bachelor's degree in engineering is likely to make more money than a person with a Bachelor's degree in physics or math or chemistry, but most of the time that's about as far as it goes.

Most of the time mom and dad – especially dad – do a lot more talking and ask a lot more questions than the student does. Dad especially is usually concerned about bottom line things like 'what are the job opportunities like for this profession?' Since we offer degrees in both electrical engineering and in

computer engineering, dad also usually wants to know which of the two fields has more and better job opportunities. These are very practical questions, they're very pertinent, and I'm always happy to explain the various opportunities and the differences. I've noticed that even if the student doesn't do much talking, he or she usually perks up the ears when we're talking about this topic. Dad also usually wants to know what the post-graduation employment placement rates are like, and this is one of my favorite easy questions because the job placement rate in real engineering jobs – as opposed to flipping burgers – is very high for our graduates.

Mom, if she talks at all (which sometimes is not the case), is usually more interested in what I tend to think of as 'the humanity' of the program. She wants to know what sort of academic help is available, who teaches the courses, that sort of thing. I explain how each and every student has his or her own academic advisor whose job it is to explain what the different courses are, how the curriculum works, and so forth. I'm also always proud to be able to say that in the ECE department the professors – not the graduate students – teach the lower division classes that are foundational to the student's success. Of course, I also point out this isn't universally true in all departments of the university. There are some departments, like the math department, that are known to use graduate students for freshman level courses. I don't approve of the practice, but it does happen and I don't hide that from parents or students. But on the whole the students learn from the professors. That's why we came to the UI; we *like* to teach.

To draw the student more into the discussion, I usually describe what the profession is like by talking about some of the research projects we have going on. This tends to mean a lot more to the student than any dry discussions about jobs or advising or classes. The student typically wants to know what he or she will be *doing* after graduation. So I talk about my own work with neural networks – which visitors usually find utterly fascinating – as well as whatever other projects happen to be going on or just completed in the MRC Institute. Unless the family is pressed for time on their tour schedule, we'll go to several of the labs where they can see and touch the actual real *things* themselves. The AUVs, for example, have a clear plastic outer skin – the lab units do, anyway – that lets folks see inside. With a small bit of luck, we'll also usually bump into some of the undergraduates who work in our labs, and they are usually eager to talk about the cool things they're working on. It usually surprises both parents and student that undergraduates have an opportunity to actually participate in real project work. Most folks assume only graduate students get to do this. That's true in a lot of universities, but at the UI we teach the *practice* as well as the theory.

Students are usually a lot more animated and ask a lot more questions when they visit me without their parents. A lot of times they ask better questions than mom and dad do so long as mom and dad aren't there. I think a lot of people greatly underestimate teenagers. It's true that most of them are pretty naive, but I've usually found them to also be very practical and to possess much better judgment than they're usually given credit for having. Basically, what I've seen time and again over the years is if you treat them like children, they'll behave like children; if you treat them like adults, they'll behave like adults. Last year there was an interesting article related to this in *Scientific American Reports*. The article was entitled "The Myth of the Teen Brain," and it bears out what I've seen for myself over the years. There's a lot of pop talk these days about the teenager's brain, particularly the prefrontal cortex, being 'immature.' Depends on what you mean by 'immature.' I've noticed most folks who talk about this aren't too clear about what they mean by 'immature brain.' I can tell you that 'mature brain' *doesn't* mean 'all hardwired and set to go.' The brain never stops making and re-making neural connections for as long as you're alive. It just does more of it when you're young. Why? Young people haven't had the chance to gain as much *experience* as an older person has. They have more to learn. If a teen makes a bad judgment call – and they do from time to time, more often than older people – I think it's mostly because they lack experience. Put rather bluntly, they aren't old enough to have had very many *bad* things happen to them yet so they haven't yet developed the neural connections that give us what is popularly called 'gut feel.' If anything, teenagers are *too* logical, *too* rational, and tend more often than older people to assume they've got all the bases covered and nothing can go wrong. I treat my young students with respect, I listen to them, I treat them like adults and subtly let them know I expect them to act like adults. And they do.

Ninety-some percent of the time. As for naivety and inexperience, well, that's why we have teachers. □

On September 6th, 2006, I posted *The Critical Philosophy and the Phenomenon of Mind* on the Internet. This book, twenty-four chapters in length plus numerous appendices and a preface, marked the culmination of ten years of intense research into fundamental issues that had been stumbling blocks over all my previous years of research on electronic brains. Its roughly twenty-four hundred pages set down in detail the fundamentals of the phenomenon of mind, its scientific treatment, and the foundations for a new science I call mental physics. The book isn't a blueprint for an electronic brain; it is the operational definition of what a 'mind' – specifically a human mind – is and does. As such, it is also the operational definition of the capabilities anything deserving to be called an 'electronic brain' must possess.

Some forty years had elapsed between the time when the idea of an electronic brain had fired my imagination as a junior high school student in Maquoketa and the time when *CPPM* was ready for its first publication. For the first time in all those years, I finally felt I had accomplished something of fundamental significance. When I began the research that culminated in this book I hadn't had any plan so grand as to hope to find a systematic treatment of the human mind, but in the end it turned out that way and, in retrospect, it really had to because of what I meant for an electronic brain to be able to do.

It's not an easy book to read although I did my best to make the theory as comprehensible to the reader as I knew how. I'm not under any illusion that the theory will catch on quickly. Mind is a complicated thing and cannot be understood by a casual and light reading of this book. It takes hard, concentrated study and a spirit of open-mindedness to master the many fundamentally new ideas in the doctrine. That is one reason, the main reason, I expect it will be younger scholars, not the old timers like myself, who will be the ones to bring this new theory forward into the mainstream of science. Science has always seemed to work that way throughout its history. I see no reason history will not repeat in this case.

I don't even expect to see the theory become popular in my lifetime; there probably aren't enough years left to me for that. But I think it will become the accepted theory eventually. That, at least, is my hope and purpose in giving this work to the world. I do know there are a lot of people out there who are at least reading the book; copies of it have been downloaded at a rate of a few hundred copies a month since the day it went on line. Time will tell if this work makes the difference in science I think it will some day. Meanwhile, I now have a clear direction and clear goals for my on-going work in pursuit of my forty year old dream. There are still countless details to be worked out, but at least I now know what those details involve and I know that *these* problems yet to be solved are *the* problems that have to be solved. And, in the end, that in itself is not such a small accomplishment. □

I don't know if it's something that gets into the air, or into the water, or if God just decides to have a little fun with us every now and then. But over the years I've noticed that events, not clearly related to one another or to what a person's plans happen to be, have a habit of popping up from out of nowhere and converging at a single point – all too often at my desk. We were barely into the start of the fall term when one of these 'harmonic convergences' fell from the sky with a big *plop* and sprayed new meetings all over my calendar.

The opening gong came in the form of an Email from Maryann, Aicha's chief admin (secretary) person for the College of Engineering. It was time for the college to elect a new representative to the university's Research Council and, it seemed, I had been nominated. The UI Research Council is a council of representatives from all the colleges and is chaired by the Vice President of Research. Its purpose is to evaluate research policies, advise the VPR, and act as the conduit for communication between the faculty of the university and the upper administration on research policy matters. It is to research what the Faculty Council of the university is for curriculum and academic policy matters. The Research Council also administers seed grants to faculty members and determines who is going to get seed grant money and who is not.

When I asked, Maryann assured me I was *not* the only nominee this time. There would be an actual,

honest to gosh election for me to lose. That being the case, it was easy to answer the call of Duty this time. I told her I'd accept the nomination. Then I did absolutely nothing. No campaigning, no platform statements, nothing. There were a couple of guys who apparently wanted the job and they did plenty of campaigning for everybody. I figured I was a shoe-in to lose this election. My time for carrying on with my electronic brain research was safe.

No such luck. I won anyway. Now I was a councilman.

The next *kerplop* came in the form of a visit by a consulting company called The Yardley Group. They are a consulting firm that goes around assessing university graduate programs and advising universities on how they stack up against other universities. Part of Tim White's Plan for Renewal called for taking a fresh look at how the UI prioritizes its graduate and research programs, and Yardley was step one. Because I was now the director of the neuroscience program, I was one of the lucky ones who got to spend a considerable amount of 'face time' talking to the people Yardley sent out. They were nice, friendly people and we did have some interesting conversations. Then they went away. But I knew they would be back. Somewhere down the road near the end of the rainbow there'd be a report of some kind. I had no doubt that whatever else that report said, it was sure to say 'And here's the work Wells has to do now.' I urged the Yardley folks to take their time and do a *thorough* and *thoughtful* report. "Take all the time you like," I urged them. Their report came out recently and, sure enough, I now have things to do.

The third *kerplop* was a phone call from my old friend, Mike Kyte. He was calling to ask me what days and times I had available for our regular meetings. "What regular meetings?" I asked.

"The meetings of the College Strategic Planning Committee," he answered.

"What Strategic Planning Committee?" I replied. "And why would I want to attend their meetings?"

"Because you're on the Committee," Mike said simply. Since when? It turned out to be since when Aicha had told Mike I was on the Committee. Somehow she had forgotten to tell *me*.

The irony of it is: I don't really believe in strategic planning. I'd been involved in countless strategic planning exercises in my years as a project leader and a project manager at HP. Almost always a strategic plan turns into either a list of platitudes and praises for mom and apple pie, or else it turns into a *tactical* plan and has about the longevity of a mayfly. Robert Townsend called *long range* planning a 'happening' and wrote that it should always be carried out by the boss (the dean in our case) and his/her key people (the department chairs and associate deans in our case). In *Up the Organization* he wrote, *Once I was asked to head up a new long-range planning effort. My wife listened to my glowing description of my new job. Next evening she blew the whole schmeer out of the water by asking: 'What did you plan today, dear?' Bless her.* In this, as in so many things, Bob Townsend was right. Of all the people Aicha could have picked to be on her Strategic Planning Committee, she picked the one guy in the college who thought such a committee was useless. I told Brian about what had happened.

He laughed. □

Something I had to spend a lot of time on that fall semester was writing NSF proposals. All of the research contracts supplying my funding were drawing to a close, including the one that funded the REU program. I was pretty confident of getting the funding for the REU renewed. It had been a very successful program over its first three years and had an impressive list of statistical accomplishments to its credit. Program officers at NSF have their performance evaluations based in part on how many publications are generated by the people who received funding (publish or perish exists at NSF, too), and the REU had produced a long list of publications. Most of our young participants who were now old enough to have graduated from their home institutions had gone on to graduate school, which is another goal of NSF's REU program, so we were looking pretty good in that department, too. I figured if the REU proposal for the next three years didn't get funded there had to be something very out of whack at the National Science Foundation.

I was less confident about the other proposals I was writing. These had to do with electronic brain research. I had been trying without success to raise funds for this since before the neurofuzzy project had ended. A big part of the problem in getting this funded was the novelty of the kind of system I want to build. I couldn't expect anyone on one of the review panels to know anything about the new theory I had just published, and that made it pretty tough since I had to write the proposals in language NSF's panel of experts understood. For the same reason, I likewise had to find a way to put the research work in the context of more mainstream neural network research. One bit of useful advice Paul Werbos had given me was this: Proposals that propose to do everything don't get funded; proposals that don't propose to do very much don't get funded. The trick was in finding some way to propose significant sub-projects I need to do in a way such that the importance of the work could be understood by the review panel. For technical reasons, that is easier said than done.

The biggest factor looming over all of this is the level of funding NSF has available each year. In the 1960s NSF was much better funded by Congress, or so I'm told. Today the real purchasing power of the dollar is much less and science funding in the U.S. simply hasn't kept up with inflation over the years. Today NSF can only afford to fund about one out of every fifteen of the proposals they receive each year. The fiscal picture is made even tougher by the combination of the huge Bush tax cuts combined with his out of control deficit spending to pay for his Iraq war. There was a time when I thought the Republicans were the party of fiscal responsibility, but I no longer think so. What kind of fools cut government income during a war? I can only think of two historical examples: Czarist Russia during World War I and today's Republican Party. Well, we know how the first example worked out in the end; the Russian economy collapsed and the communists seized power. Time will tell how the second example will go, but I'm not optimistic about it. Nor do I think the liberal wing of the Democrats is any more friendly to science than the Republicans are. Our American system doesn't work when those we elect want to rule us rather than lead us and serve our country.

These factors all combine to make the National Science Foundation a pretty conservative – that is to say, timid – entity when it comes to which proposals they are willing to risk investing in. Dan Wilamowski had an interesting strategy for NSF 'grantsmanship.' Dan's basic idea is to write proposals for things he's already done – thereby being able to prove his ideas will work – and then use the money to do what he wants to do next. It amounts to a kind of retroactive funding. In terms of playing the system, Dan's suggestion is probably the smart play, but I can't do that. I think it's unethical for me to say I'm going to do one thing and then do something else, and I won't play the game that way.

It would probably be easier for me to get 'applications' funding. Very specific applications are easier for review panels to understand and these days the lion's share of engineering funding from NSF goes for projects of this sort. My friend Don Wunsch has advised me to take this approach to obtaining research funding and, circumstances being otherwise, it's good advice that I'd follow. But on the other hand, I'm not getting any younger and with each swiftly passing year I'm more and more inclined, research-wise, to only be interested in achieving my life-long goal of making electronic brains a reality. There is just *so* much yet to do before this can happen. Somebody else can work on new and improved bar code readers. If this means I have to work without the external funding that would help make the work go faster, so be it. One of Gandhi's favorite sayings was a line from a poem by Rabindranath Tagore, "If they answer not your call walk alone, walk alone." I think the Mahatma got it right with this one.

And so I wrote proposals that fall. I did the REU renewal first and then, although I figured it was most likely a waste of time, I did some proposals aimed at some fundamental work needing to be done for my electronic brains program. I sent them in and then I waited. The 2006-07 NSF funding round got to be pretty interesting – again in the Chinese sense – because Congress hadn't bothered that year to pass any budget for the National Science Foundation. NSF had been operating on what is known as a 'continuing resolution' – which is Congress' way of saying "Go ahead and spend money we haven't given you yet; we'll fix it later. Trust us." By January of 2007 I guess trust must have been wearing thin at NSF because the head of the National Science Foundation issued a 'Dear Colleagues' letter in which all actions on

proposals not yet funded were frozen until Congress got around to actually doing its job. That left everything pretty much up in the air for awhile.

Eventually, though, the new Democratic Congress did get around to giving NSF an actual budget, things unfroze, and the process lurched forward. The REU proposal was funded, which elicited a whoop from me the day I got word of that decision. I made such a loud, happy sound that Jeff and Touraj, who were having a meeting in Jeff's office next door, stuck their heads out to see what was going on. As it turned out, this time the REU Program was being jointly funded by NSF and the Department of Defense. NSF and DoD had an agreement to partner up in funding certain kinds of programs and, as it happens, REU programs like mine were one of these kinds.

I felt a very warm glow of personal satisfaction when the REU was renewed. These programs are pretty prestigious and I'm not above feeling awfully proud that our REU 'report card' was good enough for NSF to want the Program to continue. I knew of other REU programs that didn't fare so well and were dropped by NSF after the first three years. The Institute's own center, CSDS, had had an REU program that failed to win renewal only a couple years earlier. I was also happy when I learned DoD was helping to fund the program. The DoD program partnering with NSF is administered by the Air Force Office of Scientific Research (AFOSR), and the Air Force has always been the most consistent supporter of the kind of research into neural networks and 'computational intelligence' at the core of what I do. Having AFOSR involved with the neuroscience REU program raises a spark of hope that I might one day be able to get the electronic brains work funded through a source other than NSF. I keep my fingers crossed.

The other proposals turned out about the way I'd expected, which is to say NSF declined to fund them. I really can't criticize NSF for those decisions. They really do have to operate under some pretty tough budget constraints and it's very hard for a radical new theory such as mine to compete against the kinds of proposals that fit more neatly into the contexts our present-day experts in the field are used to seeing. Paul gave me some informal tips on what I might be able to do next time to improve my chances, which I appreciated. But it still remains a pretty tough sell. As Richard Feynman remarked one time about the resistance his new idea of quantum electrodynamics had been met with by J. Robert Oppenheimer and Niels Bohr, "My machines came from too far away." □

When the 2006 mid-term elections arrived, I felt pretty optimistic about the chances of unseating the Republican control of Congress. The bungled war in Iraq, the spat of scandals involving high-ranking Republican members of Congress, the treasonous outing of a CIA undercover operator by *at least* one high-ranking member of Bush's administration, Bush's bungled handling of the Katrina disaster – all of these were, I thought, ripping the mask from the face of our Republican rulers and exposing the hypocrisy beneath. I didn't actually expect to see enormous, great things come from the Democrats. Throughout the Bush years they'd been a gutless lot afraid to stand up to the little Caesar living at 1600 Pennsylvania Avenue. No, what I was looking for was an end to unrestrained Republican rule, the repeal of the onerous crimes against our constitutional rights, an end to the appalling and shameful use of torture by the Bush administration, at least some restoration of fiscal sanity in funding the government of a country at war, and – as a long shot – the beginning of the end of Bush's private war in Iraq and a return to fighting our real enemy. That was the most I dared to hoped for. Still, although I was optimistic I wasn't sanguine about the election. After all, I'd been very, very wrong about the prospects of ending Bush's reign in 2004. The Republican propaganda machine wasn't to be underestimated.

As the returns came in on election night the results, I thought, were good but not as good as our country was going to need. The Democrats did manage to re-capture a 233-202 majority in the House, enough to end twelve straight years of total dominance by the extreme right wing of the Republican Party but not nearly enough to override Bush's probable veto of any changes to the laws that were empowering him to spy on Americans or burglarize our homes or wage his private war in Iraq. Over in the Senate the news was less encouraging. The Democrats did manage to pull off a 49-49 tie with the Republicans, leaving the swing vote to two Independents in the Senate. It was an improvement, but not nearly enough.

One good thing, long overdue, did come out in the aftermath of the election. Secretary of Defense Rumsfeld was finally sacked. He was the man I held most responsible for failing to bring enough force to Afghanistan to end the Al Qaeda war when it was at its most winnable. He was the man I held most responsible for the tactical bungling that led to the quagmire in Iraq and for aiding and abetting Bush in starting that private war in the first place. He was the man I blamed for sacking competent generals in the Pentagon and replacing them with officers reminiscent of those in the Vietnam War era who had acted more like third-tier corporate managers than like leaders of our Armed Forces. In my opinion, he had run the Defense Department like it was a corporation, and nothing is more stupid and incompetent than that. War isn't a business like manufacturing some widget or retailing bric-a-bracs. It's the most deadly and serious and dangerously unpredictable thing in the world. As Gwynne Dyer observed in his 1985 book, *War,* a company can take it for granted that its salesmen won't be ambushed and killed on their way to their afternoon appointments. Armies can't. Carl von Clausewitz, in the classic book *On War,* wrote

> Kind-hearted people might of course think there was some ingenious way to disarm or defeat an enemy without too much bloodshed, and might imagine this is the true goal of the art of war. Pleasant as it sounds, it is a fallacy that must be exposed: war is such a dangerous business that the mistakes that come from kindness are the very worst. The maximum use of force is in no way incompatible with the use of the intellect. If one side uses force without compunction, undeterred by the bloodshed it involves, while the other side refrains, the first will gain the upper hand. That side will force the other to follow suit; each will drive its opponent toward extremes, and the only limiting factors are the counterpoises inherent in war.
>
> This is how the matter must be seen. It would be futile – even wrong – to try and shut one's eyes to what war really is from sheer distress at its brutality.
>
> If wars between civilized nations are far less cruel and destructive than wars between savages, the reason lies in the social conditions of the states themselves and in their relationships to one another. These are the forces that give rise to war; the same forces circumscribe and moderate it. They themselves however are not part of war; they already exist before the fighting starts. To introduce the principle of moderation into the theory of war itself would always lead to a logical absurdity. . .
>
> If, then, civilized nations do not put their prisoners to death or devastate cities and countries, it is because intelligence plays a larger part in their methods of warfare and has taught them more effective ways of using force than the crude expression of instinct.

It isn't pleasant; it isn't easy to admit; but von Clausewitz was and is still correct. That is why war is always something to try to avoid, never something to start, but always, always something to bring to the swiftest end possible through the application of sheer, naked, brutal, and overwhelming force when once our country is dragged into it. This is a brutal truth I do not like, and I expect you don't like it either. But not liking it doesn't make it go away. The only antidote to war is peace and the only path to prevention of war is diplomacy.

There are many well-meaning and intelligent people today who think our use of the atomic bomb on Japan is something shameful. I do not agree. Quite apart from the now known fact that Japan itself was also working on the atomic bomb and would have used it against us if we hadn't gotten there first, I know what the use of this most destructive of weapons meant to Americans fighting the war with Japan. I know because Dad set it down in his diary:

> August 8, 1945: Today they dropped the atomic bomb on Japan and really knocked hell out of things. They say it's out of this world. Was dropped on a city of 300,000 and there isn't supposed to be anything left of it. That's what we need to save American boys.
>
> August 9: Still at Leyte. Went out for A.A. firing today and did real well at hitting sleeves. Sort of taking the new off the new men we got aboard. Good news today. Russia declared war on Japan. Boy, that also makes things look good for an early homecoming.
>
> August 10: Went out today for more A.A. firing. Half the fantail is covered with empty 5-inch

> and 40 mm [casings]. Did more good shooting today and the best in the Banzai setup. News that Russia is 82 miles into Manchuria already. Dropped the second atomic bomb on Japan. This time on the 12th largest city. Really must be out of this world.
>
> August 11: News came last night about 10:00 PM that the war was over. All the horns and sirens in the harbor began to blow and flares and rockets lit up the darkness. Every searchlight on every ship also went into action lighting up each other and the sky. All the shows [movies] had to stop because nobody wanted to watch it and couldn't hear if they did. The captain served whiskey to the crew in the mess hall and some got drunk. Today we hear the government [of Japan] has refused their ultimatum so the war is still raging. Probably will last another year now.
>
> August 14: Left Leyte Harbor at 6:00 AM with three ammunition ships and one tanker. Only escort vessels are us and one D.E. [destroyer escort]. Headed for a rendezvous with other ships 300 miles south of Tokyo. This should be some trip. About 1300 miles. Hope we miss the typhoons. No word yet about the Jap reply to the peace terms.
>
> August 15: Still underway for 300 miles south of Tokyo to rendezvous with other ships. Received the word today to cease hostilities and use only defensive actions from now on. That means the war is over except for cleaning up the rough edges. Have a cold and don't feel a bit good. Passed two Jap subs surfaced on the water. Went on past as if they weren't there.

I think it's awfully easy for people whose lives were never on the line to take shelter in an abstract world that doesn't exist and decry the use of overwhelming force to end a war. And something I know for a certainty is: I'm glad my Dad came home alive. The bomb made sure that happened. □

Fall semester chugged ahead fairly routinely except for the unusual number of meetings I had to take part in and the unpleasant but necessary amount of administrative work attending Tim's Plan for Renewal activities, the engineering college's strategic planning stuff, and various activities attending putting into place a wider set of documentation and assessment tools for accreditation. Ron and I were making pretty good progress on the AUV project work, and I was enjoying teaching our senior-level class in electronics. The December commencement brought the graduation of two of my Master's students, Leili and Ben Sharon, as well as half a dozen undergraduates I'd grown to know very well over their years in college. One of these students was Tim Montoya, who had worked for me in my lab in both the neurofuzzy and the neuroscience REU summer programs and who had been one of my advisees over the years. I would have loved to see Tim stay on for graduate school, but he elected to take a job with Micron instead.

One very special graduate – special for me, that is – was Scott Carter, son of a dear friend of mine in Boise, whom I'd known ever since he was a little, little boy. You've seen a picture of little Scotty earlier in these memoirs, at the trailhead during a hiking trip we'd taken. I hadn't seen much of Scott while he was in school. He'd majored in computer science and our paths seldom crossed, although I wish they had much more often. When Uncle Wayne had passed away in 2004 it had felt strange to me to find myself an 'elder' in the sense of now being in the oldest living generation of my family. Scotty's graduation brought that feeling back to me again and even stronger. I'd had a feeling of being more elderly than my years back in 2003 during the graduation of the eldest son of one of my long-time close friends. I can remember holding little Timmy Wilson in my arms when he was barely more than a few days old just as if it were yesterday; seeing him cross the stage, grown to a fine, tall young man, and receive his diploma in '03 had made me feel old. Scotty's graduation made me feel as proud as an uncle and, at the same time, made me feel like a relic from another time long ago. Where had all the years gone? □

January 2007 brought the beginning of a spring semester at the UI that was almost dull compared to the immediately preceding years and a year of mounting, on-going scandals in Washington, DC. It started with great fanfare as the Democrats took control of the House and Representative Nancy Pelosi became the first woman to be Speaker of the House. Despite all the hoopla, I almost immediately had my doubts. Almost the first thing Speaker Pelosi announced was there would be no impeachment hearings and no inquiries into misconduct by the Bush administration. My reaction was cynicism. Did she think it was

possible to woo the ultra-right wing Republicans over to support the things the Democrats campaigned for during the election? I thought that idea was sheer nonsense. Perhaps there was a risk that hearings would throw too much light on the gutless way the Democrats had knuckled under in granting Bush those unconstitutional powers in the so-called Patriot Act he now enjoyed? Maybe. If so, it was a cowardly act. Was she worried that the political turmoil any impeachment hearings would bring might endanger the war effort? We were already losing the war. How much more endangered could it get? Or were the Democrats just planning to play it politically cagey? If so, I had nothing but contempt for them. As far as I was concerned, the House Democrats were off to a bad start.

The first day of classes we had two visitors from HP corporate in Palo Alto. That in itself was an encouraging sign that maybe they were starting to repair some of the damage left in the wake of Ms. Fiorina. For years the UI had been one of the top recruiting campuses for HP and HP philanthropy had been an important source of support for the college of engineering. All that had stopped under Ms. Fiorina as HP had slid out of the mold of being a high tech company into whatever it has become now. I was asked to attend a meeting with the HP guys that afternoon, and I looked forward to it.

Unfortunately, I neglected to bring my secret decoder ring with me and whatever their purpose for the visit was, I failed to catch on to it. We discussed no areas of possible mutual interest, nothing substantial about how we might serve HP's educational needs. Indeed nothing I heard them say even hinted HP *had* any educational or research needs. The only thing I clearly understood them to say was they wanted the UI to enroll more women in engineering.

Duh. It is true that women were and continue to be underrepresented in engineering. Everybody knows that, everybody wants to find a way to change that, everybody's been trying to change it for a long time now. I've never heard anyone come up with a plan for doing it that worked nor pony up any money to figure out and then carry out such a plan. It's an easy goal to state; accomplishing it has proven to be another matter. If HP knows how to do it, I'm all ears. But I think they and the rest of the industry are as clueless as we are. When I was with HP the company didn't know how to do it and wasn't interested in ponying up any grant money to get somebody else to figure out how. Our big plan was just to outbid everyone else in trying to hire what women engineers there were. Scholarships, outreach to the junior highs and high schools, advertising: all these are things that might help influence the future plans of young girls and women. But all these things take money. I thought to myself, *Put your money where your mouth is, guys. What are <u>you</u> willing to do to make this happen? Besides just give orders?*

Nothing whatsoever came of that meeting. It was a complete waste of time.

One week to the day after that useless meeting with the HP guys, Bush made a surprise announcement that he was going to generously agree to let a secret court have jurisdiction over the NSA's program of wiretapping and eavesdropping on Americans suspected of ties to terrorists and would end his practice of doing so without warrants. I noticed he hadn't mentioned the FBI. "Suspected" is a convenient word. J. Robert Oppenheimer, who led America's atomic bomb development during World War II, was "suspected" of being a communist and an enemy of America during the McCarthy era in the 1950s. He wasn't. Richard Jewell, the hero who saved a lot of people's lives during the pipe bombing of the 1996 Olympics in Atlanta had been "suspected" of being the bomber and the FBI had dragged his name through the mud for months until finally being forced to admit he was innocent. You can be "suspicious" of anyone you want about anything. The news media will always be there to trump up your "suspicion" into a full-blown public indictment; that's what they do best. I don't like secret courts. Liberty and justice wither in the shadows and only tyranny flowers in the darkness of secrecy. Article Four of the Bill of Rights reads: *The right of the people to be secure in their persons, houses, papers, and effects against unreasonable searches and seizures shall not be violated, and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched and the person or things to be seized.* Congress does not have the power to set these rights aside; neither do Presidents. No matter what. But that was what the illegal powers granted to Bush were designed to do.

One month later, on February 15th, Bush announced that the Afghanistan war was going to erupt once again in the spring, and he called upon NATO to provide an army to combat the resurging Taliban and Al Qaeda forces there. Three days later, intelligence and antiterrorism officials announced that Al Qaeda was reconstituted and had recovered after being scattered during the invasion of Afghanistan. Bush was now asking Europe to take over the real war against America's enemy. Nothing could have made it more clear that the Armed Forces of America had been overextended and tied down in Iraq and we no longer had the military reach to deal with those who had attacked our country. Nothing could have made it more clear that Bush's private war is costing us the real one. As commander in chief, he is an absolute failure.

One week later, on February 22nd, the Bush administration stated there was no need to increase government oversight of the hedge fund industry to protect our country's financial system. By the end of the year the mortgage crisis would be in full bloom, the country would be sliding headlong into recession, and the stock market would be descending into its next major bear market, the second one of the Bush administration. A dozen years of Republican rule had loosened or removed key safeguards put in place years before to protect the American public – safeguards designed to meet the constitutional obligation of our government to promote the general welfare – and the consequences are now starting to come home to roost.

By the end of February the committee Aicha had formed to come up with the college strategic plan had largely wrapped up this assignment and pretty much all that was left was to draft the final draft and present it to the dean. Much as I had expected, the committee had tended all along to want to produce a tactical rather than a strategic plan. My main contribution on the committee had been to keep pointing out the difference between things that were tactical and things that were 'strategic.' In the end we produced a kind of compromise plan. The first sections of it dealt with 'strategy' while a kind of appendix outlined some near term tactical initiatives and set up an administrative structure to oversee the administration of these tactical initiatives. The final document ran to about thirty pages. The strategic plan itself ran to about five pages. I was glad when the committee finally declared victory and disbanded.

On March 6th Lewis Libby, Cheney's ex-chief of staff, was convicted of perjury during the investigation of who had leaked the identity of CIA operative Valerie Wilson. He would be sentenced to thirty months in prison on June 5th and his sentence would be commuted by Bush on July 2nd. I was outraged. I thought to myself, *Even Nixon hadn't been this bald-faced in covering up the Watergate scandal.* A scapegoat found, a ceremonial sacrifice having been made, the Valerie Wilson crime was allowed to fade from public view. Congress did nothing about it.

On Friday, March 9th, the Director of the FBI publicly admitted the Bureau had "improperly used" the Patriot Act to spy on Americans. Congress affected outrage at this revelation. *'Well, Congressman,'* I thought, *'welcome to my world.'* It had been almost three years since the FBI had started spying on my students. I guess Congressional outrage only lasts about four months because on July 20th the White House announced that permission had been given to the CIA to resume torturing terror suspects in secret overseas prisons, and on August 4th the House caved in to Bush's demands and gave him the changes he wanted in a terrorist surveillance program, granting the executive branch broad new powers to violate the Bill of Rights. By then I was beginning to wonder, *whose side are these guys on?* Not my side; that's for sure. So much for the oath every Congressman takes to preserve, protect, and defend the Constitution.

On April 16th a mentally disturbed student at Virginia Tech went on a shooting rampage – two, actually – and murdered thirty-two people, wounding fifteen more. Sixty Minutes conducted an interview with a liberal psychologist – or maybe he was a psychiatrist; I don't remember which – who took the view that it would be a bad thing to forbid mentally ill people to purchase firearms.

Well, that's just nuts. I wondered what color the sky was on this guy's home planet.

That sort of thinking is book smart and life dumb. It is living in an abstract world full of abstract people with no thought to the social contract that alone makes civilized society possible. We had two

murder cases that year here in Moscow, and both involved mentally ill assailants. In the first case, the killer drove up from California and gunned down a student he'd gone to school with here at the UI. The victim had been in the History of Philosophy class I was again helping to team teach that semester. The killer also stopped off in Boise and murdered another student down there. In the second case, a mentally ill man murdered his wife in their home and then went downtown that night and opened fire on the police dispatch office where his wife had worked, and on the courthouse as well. One of our local police officers was killed in the shooting, and a student who lived nearby off campus and had heard the shots being fired was wounded after he grabbed his pistol and came charging in like Wyatt Earp to take on the gunman. After killing the officer and wounding the student, the killer broke into a nearby church and murdered the elderly custodian who lived there before shooting himself. I heard about it early Sunday morning when Sherri called to make sure *I* wasn't the guy who decided to play Wyatt Earp. I guess she thought that was just the kind of thing her brother might be reckless enough to do.

Mental illness isn't rare. It is often possible to control the effects of mental illness through medication, and people receiving proper treatment for their disease are able to function in society. I've had students over the years who were able to do precisely that. It is just part of my job that from time to time I have students who are being treated for schizophrenia or mood disorders. But it is also true that some mentally ill people stop taking their medication for one reason or another, and when they do the psychosis returns. Allow mentally ill people to own guns just for the sake of an abstract and very questionable principle? Hey, there, Sigmund Fraud, if you want to gamble bet your own life, not mine.

Guns are forbidden on the UI campus, with the single exception of the ROTC folks. In the aftermath of the Virginia Tech shooting, predictably, the would-be Wyatt Earps among us have started to call for a law forbidding universities to forbid guns on campus. One of our brainy Idaho Republican legislators is trying to get such a bill passed this year. Now there's a brilliant idea. Let's set things up so that thousands of students undergo the sometimes high-stress pressures of their studies or their social lives, mix in the availability of alcohol and the habit of binge drinking, and arm the students and faculty to the teeth. What could go wrong with that? Some people don't have the common sense God gave a goose. □

Aicha did come through with new faculty positions for the ECE department that let us rebuild at least some of the specialty areas that had been decimated during the budget crisis. Throughout the spring semester we had prospective new colleagues visiting the department to interview. As a faculty we had carefully discussed what sort of professional specialties to seek in rebuilding our ranks. There was unanimous consent that our two priority areas were in electronics and in computer engineering. I would also have liked to have been able to bring at least one new systems person in as well, but we only had so many positions available and I did agree the other two specialties were higher priorities.

The easiest hire was Dr. Greg Donohoe. Greg was very well known by us. He had come to Moscow from New Mexico several years earlier when the UI had established a research center to help serve the growing population in the Coeur d'Alene-Spokane region. This had been done by the simple expedient of recruiting an existing center at the University of New Mexico to leave there and come here. The director of this center was Dr. Gary Maki, who was a former UI professor of electrical engineering and who had, in fact, been the founder of the Microelectronics Research Center, the forerunner of the MRC Institute. While most of the members of Maki's center lived and worked in the little town of Post Falls, ID, midway between Coeur d'Alene and Spokane, Greg had chosen to live in Moscow and had been working side by side with us ever since. He held the position of Research Associate Professor, an untenured job, and his position was funded on what is known as 'soft money.' What this meant was that it was up to him to bring in enough research dollars each year to pay for his own position.

Positions like this are fairly high risk, in terms of job security, for people who hold them because they are vulnerable to low tides in the flow of research contract dollars. Like a small businessman, a professor in a position like Greg's can be put 'out of business' in any year where the availability of external funding dries up for any reason – usually Congress. Because his position was entirely self-funded with no safety

net in the form of 'hard money' dollars in the university budget, a funding drought would leave him without an income. When Greg first came to us another Research Associate Professor named Dave Cox, also with Maki's center, likewise came along and chose to live in Moscow. Dave was an older guy, now in his sixties, and, like me, a former HP engineer. During 2004 he had hit a funding drought and had to leave the university. Fortunately for Dave, he landed a job as VP of engineering with a small New Mexico electronics company. Greg had survived the drought that time – he's one of our most productive guys in terms of annual research funding brought in – but, as you can appreciate, it's a precarious way to make a living. Greg is married and he was looking to better his financial security. When the new position for a 'hard money' tenure track faculty member was approved, he applied for it. By then we knew him very well and knew him to be a capable teacher as well as a first-rate researcher. Hiring him turned out to be a no-brainer for us. Although Greg's main area of research is in a new class of computer chip, known as a 'reconfigurable computer,' he is also able to teach systems courses and, like me, is a good 'utility infielder' for the department.

Our second hire was a younger, relatively new Ph.D. named Suat Ay. Suat immigrated to the U.S. from Turkey and his specialty is electronics. He's a quiet, easy-going family man and was clearly the best of the candidates we interviewed for our second job opening. He joined us as a tenure track Assistant Professor.

We also ended up getting a third new professor, and in this case the circumstances were quite unusual. Joe Hass was also an untenured Research Associate Professor working in the Post Falls center. During the 2006-07 school year he had become a whistle-blower when accounting irregularities began taking place up in that center. That resulted in a university audit of the Post Falls center and, eventually, the removal of Maki as the director of that center. But before that took place, Maki, so it is said, tried to shift the blame over on Joe, an action that ultimately resulted in Joe and his wife filing a lawsuit against the university. I have to say that our upper administration did not perform splendidly in dealing with the situation, particularly our VP of Research who, as it happened, planned to retire that year anyway. I don't know too many of the details of what all went on, but the UI eventually agreed to make Joe an untenured Research Associate Professor in Moscow. So when all the dust settled, we had another faculty member specializing in VLSI. All three guys officially joined us in the fall semester of 2007.

Funding for the AUV project ran out at the end of spring '07, the victim of the congressional pogrom against 'federal earmarks' that began in January of '07. Earmarks, known as 'pork barrel' in an earlier time, have long been the target of a lot of criticism by the news media as well as by particular members of Congress. Former Senator Mike Mansfield used to annually come out with his "golden fleece" awards – a list of specific earmark projects he regarded as the most egregious cases of pork barrel for that congressional year. Usually this list contained a few university research projects whose names made them easy prey for ridicule. The scientific purposes of those projects were usually conveniently omitted in the public show the golden fleece awards could be counted on to produce in the media. The current anti-earmark champion is one of the Republican congressmen from New Mexico.

There are at least three species of congressional earmark projects: the silly ones, those involving at least the suspicion of bribery, and those that are good, useful, and important. The first two get all the publicity and the third tends to be painted with the same brush as the other two so that the public is left with the impression that all earmarks are cases of greedy feeding at the public trough of taxpayer money. I'm all for clamping down on the first two types, but I also think it isn't good to throw the baby out with the bathwater. Many earmarks produce valuable results in high risk areas of research that would likely be perceived as too risky for the federal funding agencies to chance. I also think it isn't too likely that federal earmarks are going to go away. After the current dust settles, I think they'll be called something else and congressmen will continue to win friends and votes back home by getting them passed through Congress.

In the case of the AUV, I thought it was unfortunate this particular baby was disappearing with the bath water. It leaves the promise of a lot of good and important military applications unfulfilled. But the

effect of all this on me personally was very slight. Ron had finished up his thesis work on the acoustical communication system, went on to graduate at spring commencement, and took a job in the private sector. Likewise, Kaylani Merrill, who developed the artificial intelligence system for the AUV language, finished her work, graduated, and is currently intending to pursue her doctoral studies. Two other graduate students whose committees I served on also graduated that spring. One became an electrical engineering professor at another university, the other, Roger Lew, continued to work on his doctorate in neuroscience with the UI neuroscience program. Shingis and nine other undergraduates I knew fairly well also graduated at that commencement. Some went on to graduate school, most took jobs in the private sector. And so the 2006-07 academic year quietly came to an end. □

REU '07 ice cream social with REU students in the Washington State University REU program in material science. The guy standing behind and to the left of me in this picture is the WSU REU director.

One of the learning experiences I think an REU program should provide its participants is exposure to other research fields outside the students' home disciplines. The interdisciplinary nature of the neuroscience REU makes this pretty automatic for our participants, but the close proximity of Washington State University, just eight miles down the road from Moscow, provides an extra opportunity for this. WSU has a strong REU program in material science, and the director of that program and I take advantage of being next door neighbors by giving each others' REU students daylong tours of each others' programs. The UI participants usually find the material science research their young peers are doing wildly exotic, and the WSU kids likewise find the research in the many facets of neuroscience we carry out to be, in a manner of speaking, mind boggling. I get a huge kick out of the kids' reactions, and students from both programs ask extremely good and penetrating questions of each other. But, after all, that's to be expected. These kids are among the finest young minds in the country. The tours are topped off by a social event, usually either a barbecue or an ice cream social, where the kids can get to know each other better and make new friends.

The summer 2007 REU participants. And me. The pictures on the wall behind us are all the past presidents of the University of Idaho. This picture was taken at our annual banquet at summer's end. The students usually dress much more casually.

We had ten more excellent young participants in the REU program for the summer of 2007, which was the first session under our renewed funding. The kids ranged in age from just completing the freshman year to one who was a senior with just one more semester to go. They came from all over the country, from Bowdoin College in Maine, to the University of Portland in Oregon, to Seattle Pacific in Washington.

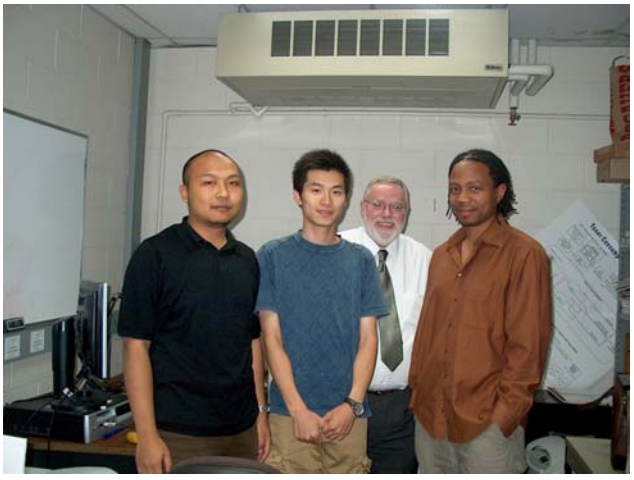
Shayna Williams, now having finished her junior year at Claremont-McKenna, returned to participant again in the '07 session. It's not too common for a student to take part in our program twice, but Shayna has everything it takes to be a brilliant scientist. One key objective at NSF for the REU program is to encourage young people to make a career in science and research, and when we find an extra-extraordinary young person like Shayna, we do everything we can to

nurture the intellectual gift and develop the talent for science.

In ’07 we had seven different research projects carried out by our team. Four of these ended up going to the 2007 Sigma Xi national competition in Orlando, FL. There were well over two hundred research projects entered in the competition that year. For some reason, the organizers of the Orlando conference chose that year to have only a single category of award, a medal corresponding to the blue ribbon of years past, rather than the usual three-ribbon tiered method for judging the contest. I didn’t approve of that change; after all, one big purpose for this competition is to help inspire talented young people to go on to a career in research and I don’t see how a one-winner system of judging the competition serves that. But hubris and elitism aren’t rare in the academic world, unfortunately, and a lot of things go on in Florida that I think are pretty oddball and sometimes outright dumb.

That year they awarded twenty-five medals for the most outstanding research projects, and we won two of those. Shayna repeated her blue ribbon performance for the second year in a row, continuing to build on her work of discovering the genetic correlates of boldness in zebrafish. The team of Alan Flavel, a senior double majoring in math and electrical engineering (back row, second from the left in the picture above), and Meredith Drennan, a junior majoring in electrical engineering (front row, second from the right in the picture above) took the other medal for their project on the design of an artificial neural network capable of ‘learning’ through human-like psychological conditioning. Albert Bush, a junior majoring in math (back row, third from left) and Linda Mummy, a sophomore majoring in math (back row, fourth from left), presented their team project which involved neural network modeling of the development of early sensorimotor learning in human infants. Kimberly Russo, a junior majoring in biology (front row, third from the left), presented her work on factors that control normal and abnormal development of the retina in zebrafish eyes. Personally, I think if the Orlando competition had been using the traditional three-ribbon system, both these projects would have probably won gold ribbons. They were that good. □

XI. Epilogue



Three of our computational neuroscience graduate students and me in my lab (2007). They are, from left to right, Lungsi Sharma, Junwei Zhang, and Richard Hill.

Well, that brings me up to the present and what will follow in my life only God knows. I’m not so old yet according to the calendar, but every year always seems anymore to go by faster than the one before. My guess is I probably have a dozen useful and productive professional years ahead of me yet before I come to retirement. My guess is also that these will seem to go by in no time at all. Maybe by then I’ll have done all I can and be able to say I have kept the Promise I made so many years ago.

A few things aren’t too tough to predict. My term as neuroscience director runs until the end of spring semester of 2009, so I know I’ll be doing administrative things until then. After that it’ll be another colleague’s turn for awhile. I didn’t come to the university to be an administrator. The current funding for the neuroscience REU runs through the end of 2009, so I’ll continue to guide this wonderful and successful program and I’ll be putting in the necessary proposal to NSF to keep it going after 2009. I think for the next proposal I’ll probably be bringing in a younger colleague as co-principal investigator and training him or her to take my place some day as director and principal investigator. There’s no reason the REU program shouldn’t long outlast me with the right people at the helm and the 2009-10 session feels like a good time to start breaking in my replacement. After all, I haven’t been immortal for a

long time now.

Touraj tells me he'll be retiring in just a few more years. I tell him he's not allowed to retire until I do. He's a terrific leader of the Institute and it'll be hard to find a new Director as good as he is after he retires. I know the new Director won't be me. I don't want the job and I know I couldn't do it as well as Touraj. His shoes will be hard to fill and they're too big for me.

Discussing the modeling of brain systems with graduate student Richard Hill (Mar. 2007)

Most important of all are the students. At the rock bottom of things, the students are why I'm here and they are the reason I do what I do. The majority of my students will continue to be undergraduate students in engineering and most of the rest will be engineering graduate students. But hopefully the neuroscience program will continue to grow and more of my students over time will come to be computational neuroscience graduate students. I do believe neuroscience is the science of the twenty-first century. Computational neuroscience is a fresh young science and it's exciting to be part of its youth and perhaps have a little influence on how it develops in the years to come. I do have a few ideas of my own in regard to a possible program of research I think might one day prove to be useful in unraveling the mystifying complexities of how the brain is organized and how its biological and psychological dimensions might be integrated with the theory of mind presented in my 2006 E-book. Time will tell whether my approach will be a large success, a modest one, or not a success at all. I have reason to feel optimistic, but it is the nature of research to uncover unanticipated surprises. As I tell my graduate students, somewhat tongue in cheek, "If we *really* knew what we were doing, we wouldn't be doing research." That really is the big difference between inventing and doing research.

Teaching is at the center of what I do and it's going to stay at the center. Yes, it's fun to do research. It's fun to keep learning new things every year. There's a tremendous amount of personal satisfaction in the scholarly work I do, and I do still have electronic brains to bring into existence. But teaching is the core. Teaching and developing the young people who will own the future of America is the best and most important thing I do to keep the Promise I made forty-five years ago.

There is a kind of magic in being a teacher. Would you like to hear something sublimely marvelous? From time to time – usually when I've spent too many hours at a stretch doing paper or committee work – I get in a cranky and irritable mood. But I have found that no matter how bad a mood I might be in, all I have to do is see my students and my bad mood evaporates like the morning dew on a summer day. That's the magic. My students bring me inner joy every single day. Some of them of fearfully serious, some of them are a little goofy and rambunctious, most of them are inexperienced and often more than a little naive. But all of them hold this magic for me. I tell my colleagues I really don't mind spending all day long in meetings provided the people I'm meeting with aren't old enough to legally drink. In mind and body they are youthful adults in the bloom of the high summer of life, but their hearts are still unsullied by the world and still beat with the idealism and innocence of the springtime of childhood. They are now in the best and freshest passage of life, and somehow their youth renews me. I think Charles Kingsley captured the spirit I'm trying to describe:

> When all the world is young, lad,
> And all the trees are green;
> And every goose a swan, lad,
> And every lass a queen;
> Then hey for boot and horse, lad,
> And round the world away;
> Young blood must have its course, lad,

And every dog his day.

If there ever comes a time when I no longer feel this special magic, I'll know the time has come for me to go. It will mean I'll have given everything I have in me to give and the time has come to make way for a younger person to take my place. It will be time to pass on the torch.

Across the street from the Institute there is an elementary school. When I take my breaks during the day I usually go out to the balcony that runs around the outside of the building and watch the little tykes at play during recess on the school playground. All of them are belt-buckle high at their tallest, and I get a big kick out of watching them. They never walk when they can run. They never talk when they can shout. They chase each other around, swing like little monkeys on the monkey bars, tumble all over each other, and just generally go about the business of being little kids. When school lets out in the afternoon, they come trooping out to get on the bus or into mom's car wearing backpacks that are almost bigger than they are. They're comic and alive and energetic and innocently wonderful. I saw one little boy one day – he couldn't have been older than about fourth grade – riding his bicycle down the street. Every second push of the bike pedal, he rose up on the pedals and let out a shout, *Woo! Woo! Woo!* as he went on his way, completely oblivious to the idea anyone could see or hear him. He was in his own magic world. The little tykes remind me of my own childhood back in Maquoketa so many, many years ago, and they make me feel so much more appreciative now than I was then at how very, very lucky I was to have been born where I was born and when I was born.

Then there are the young assistant professors. There is always a new generation coming up behind in an unbroken succession. The young professors are mostly still in the summer of life, fresh and eager to begin their careers and make their marks on the world. With each passing year I'm finding it harder and harder to tell at a glance on the first meeting who is a young colleague and who is a graduate student. The march of life is seamless and one generation blends into the next. I am now what was once called an elder and with this comes a responsibility to coach, to mentor, to help those who will one day be what I am now, to help prepare them to take my place. I take this as an *obligation* to my country and to society. My affection for them is barely less than the affection I feel for my students, and I took this duty upon myself years before they were even born on that sad night in my special place when I made my Promise.

No person knows the span of the years of his or her life but I am aware that I'm coming to the end of the autumn of mine and that ahead lies the wintertime and my final season. This is no cause for melancholy and, for me at least, brings no dread. Whatever is to come and whenever it comes, my faith tells me one unshakeable thing: God never makes a mistake. Not ever. For every grief, for every pain, for everything I have experienced in my life, something good and fine came out of it eventually. My life has taught me to trust God unconditionally. The one thing I ask God for in my prayers is that however my own life comes to an end, I will be able to find the strength of character within me to meet that end with quiet dignity and the ability to keep my self respect. This is what I ask for myself. The rest is up to God and I'm okay with that.

I don't know if there is anything waiting beyond the grave, but I think there is. There are many things in my faith that don't really make much sense if there isn't. But I don't know for sure and I'm okay with not knowing. What I do hold to be true first and foremost is God never makes a mistake and that's enough for me. In the end that is what the word *faith* comes down to meaning: simple, categorical trust in God. I think that of all the manifold human virtues, it must be true that God values faith above all else. Faith is holding to be true that which you know you can't know for certain. Preachers who preach that the Bible is the revealed word of God, whether they mean to or not, are really trying to substitute doctrine for faith. That is a poor and fragile and empty substitute without any moral worth at all. Faith trumps certainty.

I think life is like a school and its purpose is discovered in self-formation. St. Anselm had a motto, *Faith seeking to understand,* and I think Anselm got this right as a dictum for how to lead one's life. Of all the things each of us is faced with understanding in life, I think the most important is, *What kind of person will I make of myself?* Kant believed every person is born with an innate Moral Law built right in,

but here Kant was wrong. What my study of mental physics has taught me is that we are each born not with an in-built moral law but instead with the in-built ability to *build* a Moral Law within our own hearts. The process in which one does exactly this is called *life*. That is why coming to know and decide what kind of person you will make of yourself is so important. The person you choose to make yourself reflects the quality of the Moral Law you build in yourself. Love, friendship, joy, conflict, triumph, grief, service, duty: these are the experiences in life from whence come the raw material for the Moral Law each of us erects in our individual hearts. We all learn from experience, make mistakes, and are blessed with the capacity to learn from those mistakes and, through new understanding, to make ourselves into the kind of person we choose to be. No one can choose this for another person. It is the one thing each of us must choose for ourselves. I think *coming to understand this choice* is the real task of a lifetime. I think that is why each of us is here: to teach ourselves to recognize and learn to act from *a good will*, and to be a catalyst for others in learning and in-forming their own choices.

Dogma only confounds and confuses and works against this purpose, erecting a wall of willful ignorance between a person and God. You do not learn to know God from a book. I think in life none of us serve God. Does a little child serve its parents? Does God need to be served? No. I think life is a preparation for something. What that something might be I do not know, but I think the virtues we choose to nurture in the person we choose to become probably do much to determine it, much like what the child chooses to learn and master and love greatly determines the adult he or she will be.

So what has my life taught me?

I think maybe the biggest lesson has been that the good life is not about things. For me it has always been – even before I realized it – about the people I have lived it with. There are some who look upon me as a 'self-made man' and there is a germ of truth to this. But my life has not been an island and I never at any time 'pulled myself up by my own bootstraps' (as the saying goes). At every step along the way there have always been others who lent me a helping hand when I needed one, who made my life richer by being a part of it, from whom I've learned and grown from this learning, who have presented me with challenges to learn how to overcome, or from whom I've received and given love and affection. No, the good life is not about things; it is about the people in your life. The very best part of my life has been and always will be my family and my extended family of those who became my brothers.

Everything that has ever happened to me worked out for the betterment of my life. There is a corner in my heart where I wish the long years when I estranged myself from my father had not happened, but even here there was a good that grew. I learned in that time to respect myself, and through learning self respect I learned in time to respect others. I learned to be self reliant and I learned the limits of self reliance and the need to trust and rely on other people, and I learned the virtue of becoming someone who others in their turn could rely upon. In the fullness of time the estrangement I felt towards Dad faded and the son did give himself back to the father, so even that was only a passage. Do you want to know something marvelous? I think my dad never knew for a single second there even was any estrangement. I've thought about this very carefully, sifting through my memories, and I can find not one hint or clue that he ever knew of it. I took myself away from him for many long years, yet *he* never lost *me*. The older I get, the more this seems miraculous to me. My life has taught me to think life contains myriad miracles, all small and subtle and so evanescent that God is never caught in the act and so the need for faith is never damaged or displaced. In my work as a scientist I can not and do not give countenance to miracles because science cannot make any practical use of miracles and still be science. That is why so-called 'creation science' is a fraud and a lie, a hoax trying to masquerade as science and as without substance as astrology or ghosts or witchcraft.

But in living my life, I have learned to count on them. Not the big miracles claimed in the Bible. I don't believe in them at all. But small gossamer miracles, yes. I think there are a lot of these. Call them 'coincidences' if you wish because that's what they look like. I don't believe in coincidences.

I learned to live and govern my life by a creed long before I ever knew any words to express that

creed. But I recognized the first time I saw them these beautiful words that gave my creed a voice: *To believe in the Life of Love; To walk in the Way of Honor; To serve in the Light of Truth.* These are not just words for me; they are the soul of my pure Reason.

I learned why to love my country and how to love her. I love America because of the shining Ideal that is the soul of the Idea of America: *liberty with justice for all.* I *felt* the *righteousness* of this Ideal in my core as an instinct when I was a little boy long before I began to understand the Ideal itself. Like all Ideals, liberty with justice for all is not a state of being but a perfection to continuously strive to achieve.

The striving to achieve it is called *citizenship* and citizenship is how to love America. Citizenship is not a right and it is not a privilege. It is a *Duty*. Citizenship is not a state of being but acting to uphold and cherish and strengthen and protect and teach the social contract that binds individual people into one People. History teaches us no society and no country endures unless its people take it onto themselves to accept the social contract as an obligation. The Roman historian Livy shows us in his writings how Rome grew in prosperity and majesty while the people of Rome *lived* their social contract and the government of Rome was a *res publica,* a public affair. This is where the word 'republic' comes from and the Roman Republic was the first republic in history. The American historian Will Durant shows us how the Roman Republic fell and the Roman Empire was born when its citizens ceased to live their social contract. I think the fatal weakness of the Roman Republic can be found in its class system, the patricians and the plebeians, and the fall of the Republic went hand in hand with the economic subjugation of its plebian class. By the time of Caesar Romans had become divided into the great majority living in grinding poverty and the tiny few into whose hands the wealth of their society had fallen. The crucial strength of the American Republic was founded on an Ideal of classlessness. The long shameful history of slavery in our country does not alter this fact. The existence of grinding poverty in our country does not alter this fact. Liberty with justice for all *is* our American Ideal, it *is* something for all citizens to strive for. Everything else stands or falls on this. There can be neither liberty nor justice for all in a country where economic slavery is tolerated and dismissed as 'the natural state' even if that slavery involves neither bondage nor whips and chains.

The leaders of our founding fathers were men well educated in the lessons of history and the political theories of Locke, Rousseau, and other great Western thinkers. In *The Social Contract* Rousseau wrote,

> Man is born free; and everywhere he is in chains. One thinks himself the master of others, and still remains a greater slave than they. How did this change come about? I do not know. What can make it legitimate? That question I think I can answer.
>
> If I took into account only force, and the effect derived from it, I should say: "As long as a people is compelled to obey, and obeys, it does well; as soon as it can shake off the yoke, and shakes it off, it does still better; for, in regaining its liberty by the same right as took it away, either it is justified in resuming it, or there was no justification for those who took it away." But the social order is a sacred right which is the basis of all other rights. Nevertheless, this right does not come from nature, and must therefore be founded on convention. . .
>
> I suppose men to have reached the point at which the obstacles in the way of their preservation in the state of nature show their power of resistance to be greater than the resources at the disposal of each individual for his maintenance in that state. That primitive condition can then subsist no longer; and the human race would perish unless it changed its manner of existence.
>
> But, as men cannot engender new forces, but only unite and direct existing ones, they have no other means of preserving themselves than the formation, by aggregation, of a sum of forces great enough to overcome the resistance. These they have to bring into play by means of a single motive power, and cause to act in concert.
>
> This sum of forces can arise only where several persons come together; but, as the force and liberty of each man are the chief instruments of his self-preservation, how can he pledge them without harming his own interests and neglecting the care he owes to himself? This difficulty,

in its bearing on my present subject, may be stated in the following terms:

> *"The problem is to find a form of association which will defend and protect with the whole common force the person and goods of each associate, and in which each, while uniting himself with all, may still obey himself alone, and remain as free as before."* This is the fundamental problem of which the *Social Contract* provides the solution.
>
> The clauses of this contract are so determined by the nature of the act that the slightest modification would make them vain and ineffective . . . These clauses, properly understood, may be reduced to one – the total alienation of each associate, together with all his rights, to the whole community; for, in the first place, as each gives himself absolutely, the conditions are the same for all . . . Moreover, the alienation being without reserve, the union is as perfect as it can be . . . Finally, each man, in giving himself to all, gives himself to nobody; and as there is no associate over whom he does not acquire the same right as he yields others over himself, he gains an equivalent for everything he loses, and an increase of force for the preservation of what he has.
>
> If, then, we discard from the social compact what is not of its essence, we shall find that it reduces itself to the following terms:
>
> *"Each of us puts his person and all his power in common under the supreme direction of the general will, and, in our corporate capacity, we receive each member as an indivisible part of the whole."*
>
> At once, in place of the individual personality of each contracting party, this act of association creates a moral and collective body, composed of as many members as the assembly contains votes, and receiving from this act its unity, its common identity, its life and its will. This public person, so formed by the union of all other persons formerly took the name of *city,* and now takes that of *Republic* or *body politic.*

Those who today call themselves conservatives and advocate for the abolition of all regulation and all restraints of government over the individual's unalienated right to do howsoever he pleases do not advocate for republicanism. They advocate for a return to a state of nature whose logical and inevitable consequence is anarchy, brutality, and lawlessness. These advocates have no right to hide behind the name Republican. They are the antithesis of republicanism. Those today who call themselves liberals and advocate for special laws, passed in stealthy manners so that the public gaze does not fall upon these acts of legislation, advocate for an unequal distribution of rights and powers and so, like the conservatives, advocate the betrayal and destruction of the social contract. Both ways can exist and sustain themselves only through *rulers,* and the ultimate perfection of ruler-ship is tyranny. Citizenship must oppose both.

Our leaders who drafted the Constitution knew this, and they knew achieving a true republican form of government was an art requiring great care to construct and perfect. In *The Federalist* (number 39), Madison wrote:

> The first question that offers itself is, whether the general form and aspect of the government be strictly republican. It is evident that no other form would be reconcilable with the genius of the people of America; with the fundamental principles of the Revolution; or with that honorable determination which animates every votary of freedom, to rest all our experiments on the capacity of mankind for self-government. . .
>
> If we resort for a criterion to the different principles on which different forms of government are established, we may define a republic to be . . . a government that derives all its powers directly or indirectly from the great body of the people, and is administered by persons holding their office during pleasure, for a limited period, or during good behavior. It is *essential* to such a government that it be derived from the great body of the society, not from an inconsiderable proportion or a favored class of it; otherwise a handful of tyrannical nobles, exercising their oppressions by a delegation of their powers, might aspire to the rank of republicans and claim for their government the honorable title of republic.

To prevent tyranny and to make republican government practicable, the framers set up a government on principles of checks and balances. The balances were to come from the division of government into different parts: legislative, executive, and judicial. Each was to have checks against usurpation of power by the others. But the most important check depended on the people – you and me – themselves. In *The Federalist* (number 51), it is written:

> In order to lay a due foundation for that separate and distinct exercise of the different powers of government, which to a certain extent is admitted on all hands to be essential for the preservation of liberty, it is evident that each department should have a will of its own; and consequently should be so constituted that the members of each should have as little agency as possible in the appointment of the members of the others. . .
>
> But the great security against a gradual concentration of the several powers in the same department consists in giving to those who administer each department the necessary constitutional means and personal motives to resist encroachments of the others. The provision for defense must in this, as in all other cases, be made commensurate to the danger of attack. Ambition must be made to counteract ambition. The interests of the man must be connected with the constitutional rights of the place. It may be a reflection on human nature that such devices should be necessary to control the abuses of government. But what is government itself but the greatest of all reflections on human nature? If men were angels, no government would be necessary. . . In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place oblige it to control itself. A dependence on the people is, no doubt, the primary control on the government . . .
>
> It is of great importance in a republic not only to guard the society against the oppression of its rulers, but to guard one part of that society against the injustice of the other part. Different interests necessarily exist in different classes of citizens. If a majority be united by a common interest, the rights of the minority will be insecure. . . In a free government the security for civil rights must be the same as that for religious rights. It consists in the one case in the multiplicity of interests and in the other in the multiplicity of sects. . . Justice is the end of government. It is the end of civil society. It ever has been and ever will be pursued until it is obtained or until liberty be lost in the pursuit.

In my lifetime I have watched the slow and steady decay of this principle as divisions of government give way to the divisions of political parties, to the extent where today unholy alliances exist between the Congress and the Executive along party lines, and in which the duties vested in Congress are neglected and subordinated to the desires of the parties. The very existence of but two strong political parties is antagonistic to the framers' intention that there exist a multiplicity of interests, and the sly clauses in the War Powers Act, the so-called Patriot Act, and other politically-induced abandonments by Congress of its Constitutional interests and obligations is, I think, the direct consequence of this. But in all the years of my life, the most rapid disintegration of checks and balances has taken place in the Bush years. I am afraid the consequence is too terrible to be credible at first glance: we are no longer a republic.

I think it is no coincidence that the march away from the principles of our republic has gone forward hand in hand with the disappearance in public and higher education of the golden principles contained in the Great Books, particularly in the sphere of civics, political science, and the study of western civilization. Two years ago I asked some of my young students what was being taught in the civics courses in junior high and high school. I was astounded to find these students did not even know what the word 'civics' *meant.* It does not surprise me when even highly educated people have never heard of Rousseau or Locke or Mill. I only learned these men ever lived because the spirit of the principles they authored were part of the moral leadership training I received as a teenager in the Civil Air Patrol; and because the spirit of these principles is so compelling, I made myself track down the great works and I studied them for myself.

Citizenship calls upon each one of us, as a *duty,* to be part of the political process – not as Democrat or

Republican but as *American.* When the great moderate majority of our country pays no attention to the issues of government, only the extremists on both sides of the spectrum know what they want, and both ends of this spectrum want to rule us rather than lead us. Control of our government by our people can be preserved by nothing less than an interested, informed and *educated* electorate.

I have noticed with no little alarm in the past decade how party partisans – particularly Republicans – have dismissed higher education as nothing more than a private good and no longer a public good. Of all the attacks upon America from within, this is the most insidious. But we educators are left vulnerable to this attack because of the ill-founded ideas of the radicals of the sixties that led to the death of liberal education across the breadth of our country. Small wonder this has seeped down like a mold into the public schools as well. People today clamor over more emphasis in math and science in the public schools; this is not our most urgent need. Our most urgent need is *citizenship* education, and this means providing our youngsters with exposure to the Great Ideas of Western thought the American republic was founded upon. That is what 'liberal education' *means.* Liberal education is nothing else than education about preserving, protecting, and perfecting liberty with justice for all.

This year, barring evil catastrophe, will be the last of the Bush years, and good riddance to them. There has been a beacon of bright hope that has appeared already in the round of primary elections. There seems to be enormously more turnout for the primaries and caucuses than I have seen in many years now. Perhaps it is a sign of a reawakening of the body politic of America. I hope so. Watching the election and caucus outcomes, I am heartened to see evidence that we are again seeking for the best men and women to fill our public offices, and to see evidence that perhaps the hold on power of the two parties is weakening. I'm not sure about the latter yet. I am particularly distrustful of the so-called 'super delegates' being used by the Democrats this year. And I do know that the response to the crises our country faces cannot be settled in only one day by the mere casting of ballots. The Congress is broken and it is supremely important for us *as citizens* to see to its repair. But I have a greater level of hope than I have had in many years now that our country will right itself and re-establish the true nature and vitality of our republic. As for me, I have decided on who I am supporting. In Senator Obama I see the reflection of President Kennedy. I don't *know* I won't be disappointed once again, as I was ultimately disappointed by President Reagan. I don't even yet know if Senator Obama will be the Democratic candidate. But to turn Congress back to the path of its long-neglected duty will take a leader who is not in the mold of those who now control both parties, and I think Senator Obama is that leader. I hope so.

Whether he proves to be so or not, I will still work to keep my Promise so simply but sublimely set out in the words of President Kennedy nearly a half century ago: Ask not what your country can do for you; ask what you can do for your country. That was the Promise I made; it is the Promise I will keep for all the days of my life. It isn't a hard thing to do. I don't have to be President or a congressman or even a city councilman to keep this promise. All I have to be is an American citizen.

Some day my time will come to an end. Although I may be the only one who might think so, I think on the whole I've led an interesting life and one that has been worth the living. I hope when my time is up there will be some who think me worthy to be carried in their hearts as I carry all those people I have loved over the years who have passed on before me. I do know what I would like my own epitaph to be. The words were penned more than a century ago by the poet Matthew Arnold:

> Is it so small a thing
> To have enjoyed the sun,
> To have lived light in the spring,
> To have loved, to have thought, to have done;
> To have advanced true friends,
> And beat down baffling foes?

All these things this Maquoketa boy has done. □ □ □