

CHAPTER 4

First Epilegomenon: Representation and Metaphysics Proper

The pursuit of wisdom has had a two-fold origin.
Diogenes Laertius

§ 1. Questions Raised by Representation

The outline of representation presented in Chapter 3 leaves us with a number of questions we need to address. In this chapter we will take a look back at our ideas of representation and work toward the resolution of those issues that present themselves in consequence of the theory as it stands so far. I call this look back an *epilegomenon*, from *epi* – which means “over” or “upon” – and *legein* – “to speak.” I employ this new term because the English language seems to have no word that adequately expresses the task at hand. “Epilogue” would imply logical *conclusion*, while “summary” or “epitome” would suggest a simple re-hashing of what has already been said. Our present task is more than this; we must bring out the implications of representation, Critically examine the gaps in the representation model, and attempt to unite its aggregate pieces as a system. In doing so, our aim is to push farther toward “that which is clearer by nature” although we should not expect to arrive at this destination all in one lunge. Let this be my apology for this minor act of linguistic tampering.¹

In particular, Chapter 3 saw the introduction of three classes of ideas that are addressed by the division of *nous* in its role as the agent of construction for representations. We described these ideas as ideas of the act of *representing*. They were: 1) the functional invariants; 2) Kant’s *Verstandes-Actus*; and, 3) Kant’s threefold synthesis of apprehension, reproduction, and recognition. At present these ideas are united only by virtue of being regarded as ideas pertaining to the pure mental element – *nous* – of the Organized Being model. Thus they are united only topically and not Critically. This is a situation we must work to remedy. Furthermore, within these ideas lie yet unanswered certain other fundamental questions, especially regarding the meaning and implications of the ideas of comparison, reflexion, and abstraction – questions that were raised in Chapter 3 but not given clear answers therein.

¹ The word *epilegomenon* is suggested by the word *prolegomenon*. A *prolegomenon* is a preliminary or introductory text coming prior to a work. In this spirit, an *epilegomenon* is a backward-looking analysis intended to set the stage for building upon what has gone before by clarifying problems and issues.

Furthermore, the ideas of the functional invariants – organization and adaptation – are rational principles built out of grounds that are, strictly speaking, empirical and suggested through mere *analogy* to similar properties exhibited by biological organisms. While reasoning by analogy can be useful and properly employed in the discovery process, mere analogy cannot serve to produce a proper science unless we can find a transition from empirical theory to metaphysics proper. Without this transition, we have merely a *saltus*, which lacks the universality and necessity required for a proper systematic doctrine.

§ 2. The Idea of Organization

The idea of organization runs throughout the study of mental physics, beginning with the Organized Being model. In Piaget’s view organization is the idea of the functional totality of an organism, an idea which states that when considering any one *part* we must not lose sight of the fact that this part is an integral part of the *whole*. Organization fills the role of a regulating function for the intellect and is one of Piaget’s two functional invariants.

There are two sides to this description of organization. The first – the idea of the whole as the totality of parts – is reflected in common language when we refer to “an organization” as a noun. The second – organization as a regulating function – is typically not what comes to mind when we use the word “organization” in everyday speech, although some form of “regulation” in an operational or control theory sense is implicit in our common idea of “an organization.” In common usage the idea of organization brings to mind a picture of specialized pieces or “functional units” so arranged as to work together with other such pieces toward a common global purpose or result. Examples of human organizations abound – an army corps organized into divisions, a company organized into functional areas such as production, marketing, etc., a public school organized into grades, and so on. Biological examples are also commonplace, e.g., the organism “organized” in terms of the skeleto-muscular system, the respiratory system, the central nervous system, etc.

What, then, does Piaget’s idea denote for *mental* organization? Piaget’s writings tend to focus on the application of this idea to mental structures and the manner in which these mental structures develop – e.g., “schemes” and “schemata” – and he is careful to never let his rational explanations wander too far from what can be factually observed. This is, of course, to his credit, but this strategy also limits his rational principles to the realm of the empirical. Let us ask: Can this empirical principle of organization be tied to metaphysics proper? Most likely you are anticipating a “yes” answer to this question because I bring it up here, but also most likely it is not very apparent how this linkage is to be established with objective validity. Let us find out.

§ 2.1 Organization and Rational Cosmology

In Kant's terminology Rational Cosmology is that part of metaphysics proper which deals with the idea of an objective world seen as the whole of all objects within it in accordance with the Idea of a *necessary* whole. More specifically, Rational Cosmology is concerned with acroamatic *a priori* principles for establishing or regulating how such a whole must necessarily be conceived. It would therefore seem that Piaget's empirical principle of organization aligns topically with this part of Kant's system of metaphysics proper.

We briefly introduced the idea of Rational Cosmology in Chapter 2, although we made no attempt there to expound upon what its *a priori* principles might be. If we are to understand how Kant's system of metaphysics proper, and Rational Cosmology in particular, could possibly have anything to do with Piaget's idea of organization, we must fill in some of the details regarding what we mean by the metaphysic of Rational Cosmology. First, Kant defines metaphysics proper as metaphysics "when it is applied to Objects themselves" [KANT19: 427 (29: 956)]. As we have already seen in Chapter 3, the term "Object" conveys a general connotation of the organization of the structure representations. To make use of this we must have some subdivisions of the general idea. One such division we can make of the idea of Objects is to look at objects in terms of the origin of their representations, and in this we can at once classify objects as: 1) sensible, i.e., objects of representations that take their origin from the data of the senses; and, 2) intelligible, i.e., supersensible objects that owe their representations to our reasoning processes. These latter kinds of objects are those we have previously called objects represented by ideas.

Piaget's "organization" is such an object. We cannot point to something and say, "There! *That* is organization," in the same sense that we can point to something and say, "There! *That* is an apple." Piagetian organization is not merely some aggregation of the parts of an organism but, rather, is the idea that somehow or other these divers parts are actually united in *one* object – an organization – and that it is only in relationship to this object that the parts themselves have meaningful *Existenz*. We can, for instance, speaking meaningfully of a "stomach" insofar as its *Dasein* is concerned, but a stomach is an "organ" only with respect to an "organism."

Rational Cosmology is the subdivision of metaphysics proper concerning the process by which an aggregation of divers objects is united *necessarily* in the idea of Nature. Its topic, in other words, is Nature and, more specifically, with how Nature must be conceived as a necessary whole. This word "necessary" is particularly important here. Our idea of "the world" (or, if one prefers, "the universe") is an idea within which we find "objects of experience" and ideas of "abstract objects" that serve to unite these objects of experience. For example, the paperweight on my desk is an object of experience for me. That I hold to be true that this object possesses a property called "mass" exemplifies one way in which an "abstract object" – e.g., the idea of supersensible "mass" – enters into my idea of Nature as an idea that unites this thing called "my

paperweight” with other sensible objects. However, all objects of experience presented to me through the data of the senses are always *contingently* presented. In other words, there are particular delimitations placed upon my representations of such objects, and these delimitations are the *conditions* which allow me to specify that “this object” is a paperweight and not a dog.

These conditions themselves have conditions placed upon them. Suppose that just before I go to bed I notice my paperweight is sitting on my desk. If, when I get up in the morning, I find something that looks like my paperweight sitting on the kitchen counter (and notice the absence of my paperweight from my desk), I would find this situation puzzling to say the least. Do I regard this object to be “my paperweight”? If so, do I: 1) ascribe self-locomotion to my paperweight? or, 2) ascribe its presence on the kitchen counter as evidence that someone moved it there during the night? If I live by myself, does (2) mean: 1) someone entered my house unknown to me during the night and moved the paperweight? or, 2) I am a sleepwalker and moved the paperweight myself during the night? or, 3) that I just forgot that I moved it before going to bed?

The point to this example is just this: To “make sense” of Nature we must always consider a *series* of conditions. This idea of a series of conditions is what we generally mean when we refer to “logical implications” – i.e., If *A* then *B* and if *B* then *C* and etc. Usually, *we* terminate this series in our thinking only when we find “a satisfactory explanation” for the given experience that “started” this “chain of reasoning” or when we decide that “it’s not worth worrying about.” In one way of looking at things, a “satisfactory explanation” can be viewed as “an explanation that is not worth worrying about any further.” This sort of pragmatic reasoning is commonplace and needs no further discussion at this particular time (although the Nature of this behavior is something we will come back to later in this treatise).

However, when we are “worrying about” a scientific topic, we require for a “stopping criterion” something is less subjective and more objective than the commonplace pragmatic criterion just mentioned. And when our topic is not some specific object of experience but rather is Nature, it would seem that our “stopping criterion” for explanation must be the most objective and stringent of all. After all, how are we to decide how (or if) Piagetian “organization” can be grounded in a systematic doctrine of Nature if we do not first understand what it means for something to be “natural”? The latter is a question we must now discuss.

§ 2.2 Rational Cosmology and the Idea of Nature

Knowledge of empirical experience, as we discussed in Chapter 3, is the outcome of a process of cognition through concepts, i.e., *thinking*. This, however, immediately raises another question: Out of the manifold of perceptions providing possible subjects of thought, what is it that determines the subject toward which one’s thinking is to be directed? What, in other words, regulates the thinking process? Let us recall James’ fifth “character of thought” from Chapter 1:

“Thought is interested in some parts of [the possible objects of thought] to the exclusion of others, and welcomes or rejects, i.e. chooses from among them, at all times.”

It is a simple fact of our own experiences that mind does indeed possess the capability of directing attention, a capability to which we alluded previously. This ability of mind to act as an agent in directing the thinking process must necessarily presuppose some *process* of Self-regulation since, under the Copernican hypothesis, this direction cannot be attributed to the transcendental object. To this power of Self-regulation of the capacity to think we give the name *Reason*, and this act of Self-regulation itself we call *reasoning*.

Now whatever other capacities Reason may possess, one of its outcomes is the employment of the capacity to think and to produce the representation of an object of appearances. As a representation, the cognition of an object of appearances requires in its representation both the composition of the object and the *nexus* or connecting of the object in the manifold of cognitions. This latter connection is representation in the *context* of *Existenz* and it is in this manner of representation where we find a necessary relationship between Reason and Rational Cosmology. This relationship must therefore have its determination in some transcendental ground (or else we could not claim necessity in the relationship between Reason and Rational Cosmology). However, since Reason stands in immediate relationship to thinking – the cognitive act – rather than to the cognition itself, the transcendental ground we seek can only be a *regulative principle* of pure² Reason. Such a principle, since it stands only mediately in relationship to the cognition of an object of experience, must in fact be merely a *formal* principle in which abstraction is made of the matter of thinking.

We saw in the previous section that insofar as Rational Cosmology is concerned the connection of an object in the manifold of cognitions is always *conditioned* by the formal connection of implication, which in one of its simpler forms is: If *A* then *B* and if *B* then *C*, etc. Now, there are always two ways in which such a series of implications can be synthesized. We can view *A* as the condition of *B*, *B* as the condition of *C*, and so on down. If *A* is given, then the synthesis of the series leading to *B*, *C*, and so on is called a *progressive synthesis* or synthesis *in consequentia*. On the other hand, if some other term, say *C*, is the given, we can also synthesize the series upward from *C* to *B* to *A*. In this case, we call the synthesis a *regressive synthesis* or synthesis *in antecedentia* [KANT1: 309-310 (B: 437-438)].

Now let us suppose that the object of such a synthesis is the representation of Nature. The object of Nature is the world, i.e., *everything*.³ Since such an idea encompasses all things of every

² Recall that we apply the adjective "pure" to that which contains no sensuous elements. Thinking is necessary for the possibility of experience, and the regulation of the thinking process by reason is likewise necessary for the possibility of *directed* thinking. Therefore, the regulative principle can contain nothing sensational and, instead, must be part of that innate "know-how" we call pure knowledge *a priori*.

³ We will not deal here with the idea of God nor with the biblical distinction of a “kingdom not of this

sort, the idea of the world is necessarily the idea of something singular. As such, the idea of the world is *the idea of an absolutely unconditioned object*. There can be no “If A” term that antecedes and conditions the world-object because outside of the world there exists (by definition) nothing else.⁴ Let us pause for a moment and consider how strange this commonplace idea actually appears from an empirical point of view. Not one of us has ever or will ever encounter in experience the entirety of “everything that is.” All our experience comes to us, in a manner of speaking, piece-by-piece. Yet we do not hesitate to regard every part of our experience as being part and parcel of some un-encountered *noumenon* we call the world (or, if one prefers, “the universe”). Everything that happens to us, every emotion we experience, every perception risen to consciousness, is taken in stride as “just part of the world we live in.”

Yet there is nothing at all given in our contingent experiences which requires *with necessity* that we so regard the whole of all our experience as being “part of” or “contained in” the unconditioned thing we call the world. In our lives we never have an *actual experience* of an encounter with “the unconditioned.” If one’s actual data of experience does not present the necessity of viewing Nature as an unconditioned whole, then the view of Nature as such an unconditioned whole is not necessary but, rather, *made necessary (necessitated)* by *oneself*.

Nature, then, can justly be called an *Idea of Reason*. What is meant by this phrase? In representation Nature is clearly the idea of an object; however we said earlier that Reason is the power of the self-regulation of thinking. Therefore Reason does not stand in immediate relationship to any cognition. The phrase “Idea of Reason” should therefore be taken to mean “an outcome of thinking that results from the process by which Reason regulates the process of thinking.” Since Reason is not concerned directly with the representation of any specific object, the possibility of the idea of Nature must be grounded in a regulative *a priori* principle. We may call this principle *the principle of the connection of conditions in a series*. Kant stated this principle in the following fashion:

If the conditioned is given, the whole sum of the conditions, and consequently the absolutely unconditioned, is also given, whereby alone the former was possible [KANT1: 309 (B: 436)].

Although it is possible to so interpret Kant’s words, this principle does *not* mean that if we are presented with some empirical appearance then we are also sensibly presented with the entire chain of antecedent conditions upon which this “given” is conditioned. Rather, this principle means that when we are “given” some empirical presentation *Reason will act in such a fashion as if the series of conditions has objectively real existence*. Phrased another way, Reason requires us

world” because these are supernatural ideas rather than ideas of Nature.

⁴ In recent years there has been a certain amount of transcendent speculation in physics regarding whether or not so-called “parallel universes” exist. In these untestable speculations the idea of ‘universe’ is made distinct from that of ‘world’ and ‘world’ would be that which contained every ‘universe.’

to think of our experiences as connected in a series of antecedent conditions, the logical “end point” of which can only be the absolutely unconditioned. Note that this presumption of Reason does *not* guarantee the actuality of such an unconditioned; it merely requires us *to think* in the *formal structure of* a series of conditions. Put another way, we could say that “the unconditioned” is the “destination of the process of reasoning.”

The principle of the connection of conditions in a series is called the *cosmological principle* of Critical metaphysics proper since the Idea of Reason it serves is Nature. And here it is important for us to take note of a feature of the idea of Nature that is at once quite remarkable and at the same time so commonplace as to almost pass unnoticed: *Our exhibition of the idea of Nature is never complete.* With every new experience we *add* to our knowledge of Nature; we “learn something new every day.” If we use Piaget’s words, *the structure of Nature is open-ended.* It constantly changes, evolves, and grows during the entire course of our lifetimes.

Now, as we said before, Reason (in its speculative character⁵, which we will later call “ratio expression”) pertains to thinking and only has a mediate relationship with cognitions. Yet, although its connection with cognitions is only indirect, this connection is nonetheless a real connection. How are we to represent this connection? It is clear that this connection must be nothing other than a connection *via principles* through which we can exhibit Reason’s ability to regulate thinking. Employing our general theory of representation, we can give this representation form by using our 2LAR structure of Quantity, Quality, Relation, and Modality. This provides us with four representations of the effect of the cosmological principle on the process of thinking. Collectively, we call these four representations *the system of cosmological Ideas*. We will next examine these Ideas from what in this treatise we will call the **theoretical Standpoint**.

§ 2.3 Rational Cosmology and the System of Cosmological Ideas

The cosmological Ideas belong to metaphysics proper. They are not representations of any innate intuition or concept. Rather, the Ideas are regulative principles of the effect the process of reasoning has on the representation of the manifold of cognitions. They are not themselves representations of innate Objects but instead can be regarded as schemata of construction by which Reason labors in the employment of the Organized Being’s capacity for understanding. It is because of this we designate them as Ideas (*Ideen*) rather than as ideas (*Begriffe*) – the capitalization of the term being used to distinguish them from the representations of supersensible objects constructed by empirical thinking.

⁵ We will see later that the power of Reason also has a *practical* character, and that it is in this practical character where we find the most fundamental explanation and first principle of pure Reason, namely as the master regulator of all acts of spontaneity of the Organized Being.

We have called Nature a world model constructed by empirical thinking, and seen that this idea takes the form of connections of cognitions in series of conditions. In these series each higher concept is a condition of the representations immediately below it, which in turn then serve as conditions for the next lower concepts. The cosmological principle is the regulative principle of Reason which states that Reason directs thinking to produce empirical cognitions in a regressive synthesis of ever-higher conditions, under which stand the conditioned concepts of empirical experience.

There is no objective ground for any expectation that such an ascending series can be completed in actuality, only a schema and principle which states Reason must *attempt* this completion. In terms of Rational Cosmology we say that the Object of this speculative Reason is **absolute completion of the series of conditions**. In terms of the four titles of the 2LAR of representation this goal of speculative Reason is represented by:

- 1) in Quantity, absolute completeness of the composition of the given whole of all appearances;
- 2) in Quality, absolute completeness in the division of a given whole in appearance;
- 3) in Relation, absolute completeness in the origin (beginning) of an appearance generally; and,
- 4) in Modality, absolute completeness as regards the dependence of the *Dasein* of what is changeable in appearance.

These are the cosmological Ideas [KANT1: 312 (B: 443)].

It is important we take note of the fact that the cosmological Ideas are expressed in terms of *appearances*. An object of experience is represented through connections synthesized in the manifold of appearances by means of concepts and exhibited in intuitions of the appearance of this object of experience. The cosmological Ideas pertain to this representation of the appearance of objects of experience and not to things-in-themselves. Rational Cosmology is the metaphysics proper of Nature, not the physics of Nature.

The Cosmological Idea of Quantity

In the 2LAR of representation in general, Quantity is the form of the matter of representation, i.e. the form of a composition. When the Object is Nature this refers to the representation of the structure of the manifold of all cognitions. The entirety of all particular cognitions of experience constitutes the Quantity of composition of the Idea of Nature. Because a cognition is an objective perception in which concepts are exhibited in intuition, Nature is “the given whole of all appearances.”

Within Nature's composition a mere collection of particular cognitions of experience is an aggregation and does not form a series of conditions. However, the idea of Nature *as a whole* is an idea slowly built up by the successive addition of one new item of experience after another. When we consider this "building up" process, the idea of a "new" cognition of experience necessarily presupposes one can differentiate between the "new" cognition and the totality of "prior" already-composed cognitions. In other words, the identification of a cognition as "new" is defined by a kind of "mental welding process" by which it is joined to prior appearances of experience. If it were otherwise we would have no justification for applying the appellation "new" to the "new" cognition of experience. In the synthesis of the manifold of experience *the synthesis* of every "new" cognition of appearance is consequently *conditioned by* the entirety of prior experience such that the cognition of new appearances is integrated into the manifold of experiences to make one complete whole of experience.

The first cosmological Idea therefore expresses the *identification* of an appearance in terms of the *differentiation* of this appearance from the sum-total of all experience. This, however, is nothing other than our functional idea of integration in the Quantity of representation. Let us recall James' model of the stream of thought from Chapter 1. In James' "second character of thought" – the character that "thought is always changing" – James made a distinction between the "resting places" or "substantive parts" of thought and the "transitive parts" of the stream of thought. He used this description as an argument that the Lockean notion of simple ideas is contrary to one's actual and personal experience *of thinking*. However correct James' empirical theory of the stream of thought is regarded, James' rejection of the idea of an individual experience raises a problem: if the idea or "*Vorstellung*" really is "as mythical as the Jack of Spades," why do we speak of having "particular" experiences? James' division of the stream of thought into substantive and transitive parts – rather like characterizing a stream in terms of whitewater rapids and stretches of calm waters – is his attempt to deal with this seeming contradiction between the empirical and the rational theories of the process of thinking.

The first cosmological Idea is an alternate picture of the process of thinking. James' objection to the theory of Lockean ideas is not so much an objection to the individual idea as it is to the notion of "permanent individual" ideas. He recognized, in other words, that the "atomism" of Lockean ideas produces only an aggregate incapable of grasping Nature *as a complete whole*. James' "transitive parts of thought" play the role of a kind of "fuzzy link" between the "substantive parts" of the stream of thought. He insisted that the substantive parts of thought are *conditioned by* what precedes it. The first cosmological Idea is the Idea of indefinite regress in empirical reasoning *seeking completion in understanding* under the Idea of one complete Nature.

In picturing all this we must keep in mind that the regressive synthesis of Nature refers to the process of thinking and not just to the receptivity of successive perceptual "clusters" of the data

of the senses. My cognition of a “new” experience can be conditioned by experiences I “had” many years ago. The first cosmological Idea exhibits a principle of Reason that calls for seeking *absolute completeness* of the composition of Nature. Empirical experience “gives” no ‘whole of appearance’; rather, Reason mandates the structuring of a whole. If we think of the items of experience as being like the pieces of a jigsaw puzzle, the Idea is like our knowledge that the puzzle composes into *one* complete portrait. Reason tolerates no “islands of experience” cut off from the rest by a non-experiential sea. For us there can be only *one* Nature.

The Cosmological Idea of Quality

Quality is the matter of the matter of representation, i.e. the matter of composition. As expressed by Kant in *Critique of Pure Reason*, the wording of the second cosmological Idea might seem at first to express Quantity rather than Quality because he uses the word “division” (*Teilung*) in his description of this Idea. Our functional ideas of Quality, on the other hand, are agreement, opposition, and subcontrarity in the 2LAR of representation. How, then, does the second cosmological Idea express Quality?

The matter of Nature consists of cognitions of experience that make up its composition. The individual cognitions are the “parts” of Nature, and in every case these cognitions, as representations of empirical experience, are conditioned. Furthermore, each such “part” may itself have an “internal” representation (the internal Relation of its representation), and this internal representation is a condition of the part. The “internal parts” of the representation of a cognition may, in their turn, have further representation in terms of their own “internal parts” which constitute even more remote conditions, and so on. This is Quantity writ large, as differentiation on a global scale. It is this vast representation of detail in the *form* of composition that constitutes the division of the given whole in the appearance of Nature, and so the “division of the given whole in the appearance” does indeed pertain to Quantity.

However, the second cosmological Idea is not the idea of this vast division of detail in appearance; it is the Idea of *absolute completeness* of this detail. Reason is tasked with the finding of the absolutely unconditioned in the series of conditions. This tasking presupposes the possibility of a reasoned determination that this task is accomplished. On what grounds could such a determination *be possible*?

To examine this question, let us take an example from physics. In the present theory, the electron is regarded as an “elementary particle.” This means that the electron is viewed as being a thing that is indivisible into more elementary things. The basis for this view lies, on the one hand, in the fact that the “splitting” of an electron has never been experimentally observed and, on the other hand, the fact that no present theory of elementary particles calls for the divisibility of an

electron on other objective grounds. Whatever the theoretical concepts of the electron may be (e.g., its association with the idea of “virtual photons” or the expression of electrodynamics in terms of “probability amplitudes”), whenever a single electron has been experimentally “observed” it always appears as if it were a single “particle” with a radius on the order of about 10^{-15} meters,¹ a value more or less in agreement with theoretical calculations.

However, this idea of the “classical radius of the electron” raises some very puzzling questions regarding the “nature of the electron.” For example, if the electron “really” has such a radius, does this mean it must be “made up” of something even more elementary?² Attempts to answer this question, either in the affirmative *or* in the negative, have led to contradictions with other laws of physics with the result that, at present, the idea of the “electron radius” is typically regarded as a sometimes useful model to aid thinking but is not to be taken too literally. The electron is, in the words of one textbook, “a riddle wrapped in a mystery inside an enigma.”³ At our present state of understanding the electron is regarded as “something that just *is*” and, while it does not correspond to the philosophical idea of a “simple substance,” it is as close to this idea as modern physics permits itself to come. The lack of any success in “probing the depths of the electron” has even led some physicists to wonder if the “enigma of the electron” might not suggest “physical space” is not “continuous” but, rather, might be quantized into units of some fundamental and elementary “length.”⁴ In such fashion goes the search for an answer to the mystery of the electron. But for now the electron is ‘at the endpoint of the division process.’

We are in no short supply of ideas for trying to explain the riddle of the electron. It is not through considerations of Quantity (form of the matter) that the division of the idea of the electron into “parts” is stymied. Rather, the problem lies in the Quality (matter of the matter) of its representation. The ideas of electron division that have been proposed to date all exhibit agreement with some parts of the manifold of experience, disagreement with others. Thus, attempts to further “break down” the idea of the electron into more fundamental “internal divisions” have run afoul of cognitions of appearances that have produced *contradictions*.

The second cosmological Idea is absolute completeness in the series of internal conditions

¹ In English units, the electron radius is about 70 millionths of a billionth of an inch.

² An electrically charged particle having a definite radius, as an “extended body,” seems to need some kind of additional “forces” (e.g., “Poincaré stresses”) to keep it from flying apart due to the fact that like charges repel (see [FEYN4: 28: 1-10]). In turn this raises the issue of the electron seeming to need some sort of “internal structure” - i.e., “parts” within the electron itself. Difficulties of this sort accompany the theory of every kind of “charged particle.” The theory of quantum electrodynamics (QED) is able to avoid having to invoke such a structure by means of a peculiar mathematical process, and so avoids dividing the electron.

³ William F. Leonard and Thomas L. Martin, Jr. borrowed this quote from Churchill in their textbook, *Electronic Structure and Transport Properties of Crystals*.

⁴ The list of eminent physicists who have voiced this opinion include Nobel Laureates Werner Heisenberg and Richard Feynman as well as the highly regarded George Gamow. According to Gamow, other eminent thinkers who have voiced this opinion include Pythagoras, Henri Poincaré, and Bertrand Russell.

without contradictions of Quality occurring in the manifold of cognitions. The occurrence of contradictories is an impetus for Reason to seek a condition that can turn these contradictories into mere *contraries*. Borrowing from the terminology of formal logic, the assertions “*x* is *y*” and “*x* is-not *y*” are contradictories. However, if we have a condition *z* with which we can assert “if *z* then *x* is *y* and if-not *z* then *x* is-not *y*,” then we have a valid subcontrary pair of assertions, i.e. “*x* is *y*” and “*x* is-not *y*” can both be true. Until such a condition is found, the cognition that is responsible for the contradiction when it is divided cannot be categorically subdivided but Reason does not rest easy in its representation. Thus, the second cosmological Idea is a principle of regressive synthesis through a kind of “negative” cognition of, so to speak, either “something is missing” or “something is wrong.” On the other hand, when no contradictions are presented there is no “reason” for requiring the further breakdown of a cognition on the basis of the second cosmological Idea alone. If a division produces contradiction, the division can not be predicated assertorically (although possible divisions can still be predicated problematically).

The Cosmological Idea of Relation

Relation is the form of the form of representation and in our 2LAR of representation the functional ideas under Relation are the internal, the external, and the transitive. The third cosmological Idea pertains to Relation insofar as the representation of Relation presents a series of conditions under which one cognition of appearance is subordinated to another. Now, as far as the form of the *form* of representation is concerned, neither the internal nor the transitive pertains to a series of conditions by which one *appearance* is subordinated to another. The internal Relations of *an* appearance represent a series of conditions with respect to *matter* (composition), but not with respect to *form* (which pertains only to the *nexus* of the manifold of cognitions of appearances). Put another way, internal Relation does not go “outside” the particular appearance. Thus it does not provide for a series of conditions that relate multiple appearances. In a like fashion, the transitive is not viewed as a representation that subordinates one appearance *to* another as the condition of the former’s possibility. A series of conditions in Relation must consequently look to the external Relation, for only the functional idea of the external provides the possibility of a series of conditions placed upon the form of *the manifold* of appearances.

All cognitions of experience are conditioned. The principle exhibited by the third cosmological Idea is a principle of Reason which holds that one cognition of experience will have its *possibility* conditioned by some *other* cognition of appearance. To say this another way, Reason regulates thinking in such a manner as if to say “for everything there is a reason.” The third cosmological Idea seeks for *explanations*, i.e. cognitions that bind and unify the manifold of experience. Metaphorically speaking, Reason asks “Why?” and demands that judgmentation

provide a “because.”

The Cosmological Idea of Modality

Modality is the matter of the form of representation. Its functional ideas in our 2LAR of representation are those of the determinable, the determination, and the determining factor. In the representation of Nature, Nature – as the manifold of all cognitions of experience – is the determinable and the connection of the cognitions of appearances in this manifold is the determination. However, the representation of Nature is an *open-ended* representation and is constantly added to by “new experiences” – the changeable in appearance.

Now let us ask an apparently silly question: *Why should the changeable in appearance add to the idea of Nature?* We certainly have no grounds for saying that there is “something in the world external to *nous*” that *forces* one’s mind to assimilate the changeable in appearance into the manifold of experience; this is tantamount to saying that the enlargement of Nature is “contingently necessary” – an absurd contradiction. Yet it is undeniable that in human understanding perceived changes *do* enter into this manifold.

The enlargement of Nature by the changeable in appearance is not necessary “by Nature” but, rather, is necessitated *for the possibility* of Nature as we know it. The fourth cosmological Idea is the Idea of absolute completeness in the series of conditions insofar as this series is dependent on the existence (in the *Dasein* sense) of the changeable in appearance. Again speaking metaphorically, not only does Reason dictate that “for everything there is a reason,” but it also dictates *there is a reason for Everything*. The fourth cosmological Idea is the principle that Reason strives to complete the series of conditions by finding an absolute ground of *all* conditions. It searches, in other words, for “the ultimate reason” and this search is the *determining factor* in the matter of the form of the manifold of experience.

Let us imagine the representation of the manifold in Nature as if it were a structure built up from a set of bricks. The first and third cosmological Ideas provide us with principles of Reason that allow us to envision Nature taking shape initially as a multiplicity of individual “pyramids.” Occasionally “bridges” are built connecting these various pyramids to each other until there takes shape a structure connected “laterally” so that the whole “building” can be seen as *one* structure. But without the fourth cosmological Idea, the apexes of these pyramids would remain forever separate and we could not conceive of their ever joining together *necessarily* at a single summit. We would have, in other words, an aggregate of interlocking “natures” joined in a few places by bridges of co-dependencies, but we would not have *one* Nature. The fourth cosmological Idea is the principle of the *Dasein* of a *singular* global Reality.

§ 2.4 The Applied Metaphysic of Organization

When we narrow our topic from Nature in general to the representation of Piaget's functional invariant of organization, we inquire into what can rightly be called "the nature of organization." As is the case for all ideas, the object of the idea of organization is a *noumenon*. Therefore, when we investigate the nature of organization, the system of cosmological Ideas tells us that, as a part of Nature, the applied metaphysic of the nature of organization can speak only of the representation of this idea in terms of cognitions of its appearance.

The applied cosmology of organization, as a cosmology contained under and conditioned by the Rational Cosmology of metaphysics proper, can be concerned only with the series of conditions in the representation of organization. The system of cosmological Ideas provides us with our starting point for examining what is allowed and what is required of the series of conditions in organization. In making this examination it seems appropriate to begin with an examination of the objective validity of the idea of organization itself.

By identifying "organization" as an object we mean that we regard the *idea* of organization as the representation of a sub-manifold in the manifold of all appearances. Organization therefore contains a manifold but must also be viewed as part of the matter of experience in general. In the latter view the idea of organization must be subordinate to some other ideas of experience that condition it, and must also be a condition to which still other representations of experience are subordinate. This is a requirement placed on the idea of organization by the third cosmological Idea.

Piaget is surprisingly vague in his description of "organization"; perhaps he felt the term's meaning is more or less obvious. It is "the relationships between the parts and the whole which determine the organization" [PIAG1: 7]. This, however, is a description that does not go beyond the Quantity of organization and external Relations among the "parts" of organization. This is obviously insufficient, for the identification of the whole of organization presupposes the determination of its boundaries, and such a determination can be the result only of conditions placed on organization by the synthesis of the manifold of experience. This begins with the differentiation of the Organized Being from the remainder of the environment and proceeds synthetically in the series of subdivisions down to the level where we differentiate between *physical* (or biological) organization and *mental* organization. This latter species of organization is something with which mental physics is primarily concerned – the organization of mental phenomena in terms of ideas that are not themselves subordinate to physical or biological constructs. The latter belong to physical organization, not mental organization. At the same time, while it is obvious that mental organization must contain internal Relations, it is meaningless and incorrect to view mental organization as being independent of external and transitive Relations connecting it to physical organization.

While the possibility of drawing a boundary line between mental organization and physical organization is a consequence of the first cosmological Idea, the validity and necessity of external Relations with non-mental Nature is a requirement placed on organization by the third cosmological Idea. Organization in general (i.e., the whole of physical, psychic, and mental organization¹) has for its *empirical* condition the phenomenon of experience; for its *rational ground* it has the principle of transcendental apperception, which grants objective validity to organization by grounding the reality of the *Dasein* of experience. Once we have established the objective validity of organization in general, its division into parts (the three ‘substructures’ of organized being) is objectively valid so far as and only to the extent that: 1) this division is regulated by the second cosmological Idea to be free of contradiction; 2) the boundaries that differentiate these parts are established by conditions in the synthesis of cognitions of experience in accord with the first cosmological Idea; and, 3) each subdivision of organization is conditioned by external Relations to the other subdivisions in the manifold of experience in general in accord with the third cosmological Idea. Finally, we must never lose sight of the fact that each subdivision is conditioned by organization as a whole, which is the determining factor for each subdivision in accord with the fourth cosmological Idea.

In this explanation of the applied metaphysic of organization, we can now see why in Chapter 1 and elsewhere it has been stressed that the division of Organized Being into the “components” (*nous*, *soma*, and *psyche*) is merely a logical division. I have used this description, logical division, to state the metaphysical *necessity* that the substructures of organized being cannot be viewed independently of each other. There is no mind-body problem because it is metaphysically incorrect to regard these components of Organized Being as unconditioned by each other. *Nous* necessarily must possess the power of receptivity in order that it can be conditioned by *soma*. Likewise, *soma* must possess its own “receptivity” for being affected by *nous* since if it were otherwise no external Relation by which *soma* could be conditioned by *nous* would exist – which would be a violation of the third cosmological Idea. However, the metaphysical requirement for this reciprocity of *nous* and *soma* also necessarily presumes a government by a system of *regulative* principles, an ‘organization of organization’, the principles of which must likewise conform to the cosmological Ideas. The organization of these principles is called *psyche*, and these principles we will call the **animating principles**.

This description of the metaphysic of organization is as far as we will go for now. The next obvious task in the explanation of organization is to begin filling in the details – the what, when, how, and why of the metaphysic of organization. However, the discovery and elucidation of these details will require, on the one hand, the ontology of transcendental metaphysics and, on the other

¹ i.e., the organization of *soma*, *psyche*, and *nous*.

hand, the testimony of experience in order that the metaphysic of organization be conditioned by Nature, of which it is merely a constituent matter. This treatise has not yet come to grips with these elements, and so we must postpone for the present our continued pursuit of the metaphysic of organization. We can, however, make use of the investigations in this and the previous chapters to begin an examination of the composition of the *nous*.

§ 3. Power and the Idea of a Faculty

The idea of various mental “faculties” runs throughout both Kant’s philosophical writings and those of Locke as well. In more modern times, the term “faculty” has fallen into disfavor in the eyes of at least some authors. For example, we find in Pluhar’s translation of *Critique of Judgment* the following translator’s footnote:

I am using 'power' rather than 'faculty' in order to dissociate Kant's theory (of cognition, desire, etc.) from the traditional *faculty psychology*; i.e., I am trying to avoid *reifying* the Kantian powers (which are mere abilities), in other words, avoid turning them into psychological entities such as compartments, sources, or agencies "in" the mind [KANT5a: 3fn].

Palmquist has also noted this modern trend of distrusting and disliking the use of the term “faculty” and has offered the following comment on this topic:

Two ambiguities arise out of Kant's habit of referring to the 'faculty of representation'. The first concerns his frequent use of the word 'faculty'. This and many of the terms used in connection with it are often condemned by modern critics as reflecting Kant's unphilosophical acceptance of 'the imaginary subject of transcendental psychology'. The only proper response, they say, is to 'de-psychologize' his theory in order to purify its truly philosophical content. . . In defense of Kant's general habit of using such unusual terminology, it should be noted that, although it appears to the twentieth-century reader as if he is arbitrarily inventing words at nearly every step, most of these terms were familiar to philosophers in Kant's own time. . . This alone, of course, does not justify our continued use of such terms; but it does suggest they are meaningful in their own context, so they cannot simply be discarded by the interpreter without seriously misrepresenting Kant's System.

The specific reason why we should continue to use Kant's faculty terminology when interpreting his philosophy is that it is not, in fact, intended to be psychological. . . It is simply the way he has chosen to refer to the subjective *functions* of human knowing in his radically perspective-bound philosophy [PALM1: 395].

The “psychological” context that raises so much objection to the idea of “faculties” can probably be largely blamed on the theory known as “faculty psychology.” This is the theory that the mind is divided into separate powers or faculties such as intelligence, memory, perception, and so forth. The theory goes further and associates these “faculties” with specific spatial locations in the brain. Aside from the fact that faculty psychology attempts to subordinate mental organization to brain organization (an attempt which, in view of our previous discussion of the applied metaphysic of organization, we should beware of), the disrepute into which faculty

psychology fell can be pinned on two other factors. The first, and most serious, is that faculty psychology became associated with the pseudo-science of phrenology – the now-discredited hypothesis that one could determine a person’s psychological character by feeling the bumps on his head. The second serious but less absurd problem with faculty psychology is that there is empirical evidence that “faculties” such as memory and perception are apparently *not* independent of each other, thus making it much more difficult to draw a boundary mark in the brain between one “faculty” and another. Nonetheless, faculty psychology survives today, albeit in greatly modified form, within cognitive science – which takes the view that it is useful to describe the brain in terms of “modules” for purposes of modeling the presumed connections between behavior and brain function.

It is tempting to dismiss the controversy over the idea of “faculties” as a silly argument over mere words. However, to do so would be to ignore the observation of Lavoisier quoted in Chapter 2 regarding the importance of lexicon in a science. Inasmuch as Kant seems to have used the terms usually translated as “faculty” and “power” in much the same way as Locke, except for the fact that Kant makes his use of these terms conform with the Copernican hypothesis rather than Locke’s purely empiricist perspective, let us begin our examination of these ideas with Locke.

§ 3.1 Locke’s Description of ‘Power’ and ‘Faculty’

Locke uses the terms “power” and “faculty” more or less synonymous. In the *Essay* we find the idea of “power” first occurring in Book II, Chapter VII:

Power also is another of those simple ideas which we receive from sensation and reflection. For, in observing in ourselves that we do and can think, and that we can at pleasure move several parts of our bodies which were at rest; the effects, also, that natural bodies are able to produce in one another, occurring every moment to our senses, - we both these ways get the idea of power [LOCK: 132-133].

When Locke gets around to having more to say about the idea of power, he devotes an entire chapter of the *Essay* (Book II, Chap. XXI) to the topic and its implications.

Thus we say, Fire has a power to melt gold . . . and gold has a power to be melted; that the sun has a power to blanch wax, and wax has a power to be blanched by the sun . . . In which, and the like cases, the power we consider is in reference to the change of perceivable ideas. . .

Power thus considered is two-fold, viz. as able to make, or able to receive, any change. The one may be called *active*, the other *passive* power. . .

I confess power includes in it some kind of *relation*, (a relation to action or change,) as indeed which of our ideas, of what kind soever, when attentively considered, does not? . . . Our idea therefore of power, I think, may well have a place amongst other *simple ideas*, and can be considered as one of them; being one of those that make a principal ingredient in our complex ideas of substances, as we shall hereafter have occasion to observe [LOCK: 179].

This idea of power, as the ability to make a change *or* to be changed in any way, clearly is

seen by Locke as having some relationship to notions of causality, cause, and effect. It is but a short step to regard “active power” as the ability to act as a causal agent, and “passive power” as the ability to receive an effect – i.e. the ability to act as a patient. According to Locke, the mind evidently is in possession of a number of such “powers”:

5. *Will and understanding two powers of mind or spirit.* This, at least, I think evident, - that we find in ourselves a power to begin or forbear, continue or end several actions of our minds, and motions of our bodies, barely by a thought or preference of the mind ordering, as it were commanding, the doing or not doing such or such a particular action. This power which the mind has thus to order the consideration of any idea, or the forbearing to consider it; or to prefer the motion of any part of the body to its rest, and *vice versâ*, in any particular instance, is that which we call the *Will*. The actual exercise of that power, by directing any particular action, or its forbearance, is that which we call *volition* or *willing*. . . The power of perception is that which we call the *understanding* . . .

6. *Faculties, not real beings.* These powers of the mind . . . are usually called by another name. And the ordinary way of speaking is, that the understanding and will are two *faculties* of the mind; a word proper enough, if it be used, as all words should be, so as not to breed any confusion in men's thoughts, by being supposed (as I suspect it has been) to stand for some real beings in the soul that performed those actions of understanding and volition [LOCK: 179].

There is a degree of ambiguity that creeps into Locke's *Essay* at this point. On the one hand he calls “power” a simple idea, while on the other a “power of the mind” is an *ability* it possesses. Locke himself seems not to note this ambiguity, but he is fully aware of the potential confusion the term “faculty” may pose.

It is plain then that the will is nothing but one power or ability, and *freedom* another power or ability so that, to ask, whether the will has freedom, is to ask whether one power has another power, one ability another ability; a question at first sight too grossly absurd to make a dispute, or need an answer. For, who is it that sees not that powers belong only to agents, and are attributes only of substances, and not of powers themselves? So that this way of putting the question (*viz.* whether the will be free) is in effect to ask, whether the will be a substance, an agent, or at least suppose it, since freedom can properly be attributed to nothing else. If freedom can with any propriety of speech be applied to power, it may be attributed to the power that is in a man to produce, or forbear producing, motion in parts of his body, by choice or preference; which is that which denominates him free, and is freedom itself. . .

However, the name *faculty*, which men have given this power called the will, and whereby they have been led into a way of talking of the will as acting, may, by an appropriation that disguises its true sense, serve a little to palliate the absurdity; yet the will, in truth, signifies nothing but a power or ability to prefer or choose: and when the will, under the name of a faculty, is considered as it is, barely as an ability to do something, the absurdity in saying it is free, or not free, will easily discover itself. For, if it be reasonable to suppose and talk of faculties as distinct beings that can act (as we do when we say the will orders, the will is free,) it is fit that we should make a speaking faculty, and a walking faculty, and a dancing faculty, by which these actions are produced, which are but several modes of motion . . . [LOCK: 181-182].

By warning of the ease with which the term “faculty” can evoke the idea that a faculty is a “substance” and an “agent,” Locke warns us against both the homunculus misconception and almost seems to foresee the problems with faculty psychology. It is not a “power” or “faculty”

which *is* the causal agent, he says. The *agent* is the man himself. The “faculty” is only the idea that the agent possesses this ability.

The terms “power” or “faculty” denote particular “relations” (in Locke’s terminology) between different actions, operations, events, and so on.

19. *Powers are relations, not agents.* I grant, that this or that actual thought may be the occasion of volition, or exercising the power a man has to choose; or the actual choice of the mind, the cause of actual thinking on this or that thing: as the actual singing of such a tune may be the cause of dancing such a dance, and the actual dancing of such a dance the occasion of singing such a tune. But in all these it is not one *power* that operates on another: but it is the mind that operates and exerts these powers; it is the man that does the action; it is the agent that has power, or is able to do. For powers are relations, not agents: and that which has the power or not the power to operate, is that alone which is or is not free, and not the power itself [LOCK: 182].

Thus, when we spoke earlier in this chapter of, for instance, “Reason regulating thinking,” this manner of speaking is *relational*, not anthropomorphic. And when we said, “Reason asks, ‘why?’ and demands that judgmentation provide a ‘because,’” this is merely a metaphorical manner of speaking and not the reification of Reason and judgmentation into homuncular agents. Perhaps it would be better to avoid such poetical mannerisms of expression, as Locke seems to advise; but perhaps, on the other hand, the intuitions that simile and metaphor can summon up are more useful for planting the seeds of difficult ideas. If both author and reader are aware of Locke’s warning against reifying abstract ideas, perhaps no great harm will be done and some benefit will be gained by the use of such expressionism. As the saying goes, “a word to the wise is sufficient.”

§ 3.2 Faculties and Organization

Locke’s theory that “power” is a “simple idea” was attacked and killed by Hume [HUME2: 472-478]. Hume first disposed of the possibility that power could be an idea received by sensation on the grounds that “power” is not an idea that can be “discovered” *in* any sensation. That left the possibility that power might be an “idea of reflection.” This, too, was disposed of by Hume in quick order. Hume then went on to examine the supposition that perhaps “power” was just another name for cause and effect relations, a supposition he destroyed by destroying “cause and effect” itself as something that could possibly be *known*. “(The) necessary conclusion *seems* to be that we have no idea of connexion or power at all” [HUME2: 476]. What we *do* have, said Hume, is merely an idea of events being conjoined in actual experience. But that these events are “connected” rather than merely conjoined as coincidences, the Great Skeptic concludes, is a mere fantasy and nothing but a habit of thought. And so the stage was set for Kant’s Critical analysis.

First, let us dispose of the “faculty vs. power” issue of terminology. Kant was, of course, an 18th century German philosopher and did not write or lecture in English. The word he used was

Vermögen, which is usually translated as *ability*, *capacity*, or *power* (e.g. *alles was in meinem Vermögen steht* – all that lies in my power – or *nach bestem Vermögen* – to the best of one’s ability). However, it was the custom and practice at that time for textbooks to be written in Latin², where the word in correspondence with *Vermögen* was *facultas*³ (feasibility, possibility, opportunity, power, means; and, in transference, capacity or ability). Our English word “faculty” comes down to us from this Latin origin⁴. Thus, terms such as “faculty of desire” (for *Begehrungsvermögen*, corresponding to *facultas appetitiva*), are common translations⁵ and do not carry *any* of the 19th century “faculty psychology” connotations from which Pluhar tries to protect us and against which Locke forewarned us.

Now let us look at Locke’s idea of “power” from Kant’s Copernican perspective. The topic of our study is the phenomenon of mind and under this topic is our current object of discussion, namely the organization of the *nous*. Now, the idea of “mind” is the idea of a supersensible object, a *noumenon*. It is therefore obvious that, as Rational Cosmology reminds us, we can develop theory only on the basis of exhibitions of the idea of mind. For mind these appearances are those capabilities and “powers” that we come to know by consciousness of our own mental activities such as reasoning, understanding, judging, and so on. If we would call these *faculties* (faculty of reason, faculty of understanding, faculty of judgment, etc.), all we can mean by this is that we regard these “faculties” as distinguishable characteristics or capacities of *nous* which, taken together, make up the matter of composition of the organization of the *nous*.

Now, Hume would be quite correct were he to say that we never have a direct perception of *nous*, let alone a perception that *nous* is organized, and still less that the organization of *nous* is composed of such things as reason, understanding, etc.⁶ However, the *Dasein* of transcendental apperception is something the reality of which can hardly be doubted, let alone dismissed as fantasy. We will call our *representation* of transcendental apperception ***pure consciousness***. In Kant’s words, consciousness is “the representation that another representation is in me” [KANT8: 37 (9: 33)]. In order to treat this representation, we must organize this representation in terms of matter and form. It is the matter representations that we regard as ‘powers’; this matter has no connotation of “material matter” or “substance” (as Locke pointed out quite clearly in his own *Essay*). Nor do we regard ‘the faculties’ as objects of perception that can originate from the data of the senses. Rather, the idea of a faculty is an idea of an ability *to* represent, and such an idea must be grounded in necessity. In other words, if we propose to describe *nous* in terms of

² Kant was among the early proponents of writing philosophy in German rather than Latin.

³ c.f. [KANT19: 557, note 11].

⁴ From *facultas* to Old French, *faculte*, to Middle English, *faculte*.

⁵ In this treatise, *Begehrungsvermögen* is translated as ‘appetitive power.’

⁶ And, in fact, Hume *did* say as much, a skeptical stance that allowed people of his time to have their little joke at the expense of both Berkeley and Hume: “no matter, never mind.”

‘faculties,’ each such faculty must be an idea of organization expressing an ability *necessary for the possibility* of our experience of the phenomenon of mind. As for the form terms in the representation of pure consciousness, we will view these in terms of *processes* necessary for the possibility of *empirical* consciousness in the manner in which we experience this phenomenon as human beings. The corresponding 2LAR we will name the faculty of pure consciousness.

We have seen that Locke strongly objected to the idea that a “power” could in any way “have” or “possess” *another* “power” as an attribute. He called such an idea “absurd.” Is this objection valid? It would be *if* a “power” *were* one of his “simple ideas.” However, Hume has disposed of this idea handily and, as we shall see, there is nothing particularly “simple” about our ideas of the different powers or faculties. Under the Critical Philosophy, a faculty is an idea that represents the form of an ability necessary for the possibility of our experience of the phenomenon of mind. To represent such an ability we must have a description of it, as in our 2LAR, since we must regard an “ability” as ‘something.’ Thus the idea of a particular faculty will contain its delimiting attributes (its “matter of the form”) as well as Relations among these attributes (the “form of the form” of the faculty), i.e. the Modality of its *nexus* and the Relation of its *nexus*. The idea of a faculty is exhibited as a cognition of its appearance, but nothing in this requires in any way that the faculty be regarded as a classical “substance” (as Locke believed it must).

We have already encountered several ideas of “abilities” that are part of the phenomenon of mind. The list includes, so far, *receptivity* as the representation of the ability of mind to be affected by “the senses,” *Reason* in terms of regulative principles of the ability to think, *pure consciousness* as the representation of transcendental apperception, and so on. Are these abilities to be called “faculties” or are they to be called something else? Let us adopt the convention that, in order to be characterized as a faculty, an ability must be represented as an idea of *organization*. A faculty, in other words, is part of the representation of an ability, insofar as this ability is represented in terms of its Quantity, Quality, Relation, and Modality, that determines (or contributes partially to the determination of) the synthetic unity of the Organized Being model. The faculty *of* an ability therefore is a representation of the organized form of that ability, i.e. how an ability is exhibited in experience. When we speak of an ability in terms of “what this ability is able to do,” we shall call this description the *power* of the ability. **Power and faculty, then, are ideas of matter and form, respectively, of an ability.** We will later see that we can make further distinctions in these ideas.

By making this distinction between the words power and faculty, we can guard ourselves against slipping into the error of reifying a faculty. We thus answer Locke’s objection to the misuse of the word faculty. At the same time, we clarify the ambiguity Locke’s usage of the word power contains. Power speaks to the *Dasein* of an ability, faculty to its *Existenz*.

§ 4. Adaptation and Rational Psychology

Adaptation is Piaget's second functional invariant. This idea makes its appearance in the earliest of Piaget's works (see *The Language and Thought of the Child*, *Judgment and Reasoning in the Child*, and *The Origins of Intelligence in Children*), and occupies a central position in Piaget's doctrine. The very word "adaptation" is inseparable from the idea of change from one state or condition to some other state or condition. It carries the further connotation that this change has its seat in the Nature of the Organized Being rather than as something imposed *on* the Organized Being by external agency. We would, for example, call *learning* an "adaptation" in this sense, but we would not call an event such as breaking a fingernail an adaptation (even though such an event changes the Organized Being). Nor do we generally call normal biological maturation an adaptation, even though maturation is both a change (and one of great extent) and certainly has its seat in the Nature of the maturing organism. On the other hand, structural changes in the physiology of a species from one generation to the next which are thought to be effects due to the animals' environment *are* typically called adaptations¹ (specifically, *evolution* and *variation*).

Mental adaptation enters into Piaget's doctrine as a pair of complementary functions – the explicative function and the implicative function [PIAG1: 9], [PIAG22: 227-237]. The explicative function is manifested by the process of accommodation; the implicative function is manifested by the process of assimilation. Both types of adaptation are connected in general adaptation through the idea of equilibration. This picture of the development of intelligence runs throughout Piaget's theory and is the general idea that ties together all of Piaget's observational data.

But however well Piagetian adaptation accords with experimental and observational fact, can we, with objective validity, grant to this idea a fundamental role as a power or faculty of *mind*? Analogy is a source of ideas when we grope for explanations of natural phenomena, but analogy can provide no proof of validity. Furthermore, through all of his many books on the subject, we do not find Piaget making use of the principle of adaptation to *predict* new findings. He may indeed have used this principle in deciding what experiments to conduct and to establish what effects to look for, but if this is actually so, Piaget himself does not hint at this in his writings. Rather, he shows us the facts and then *ex post facto* shows how these facts accord with the principle of adaptation. There is, of course, nothing wrong with this; but if we are to regard the theory of adaptation as more than a merely historical principle, we have the right to demand of it

¹ Piaget's earliest scientific work was in the study of the development of mollusks in the lakes near Neuchatel. He discovered that the shell structure of mollusks is affected by rough vs. calm lake water and changed when a particular variety of mollusk was transferred from one lake to another. By 1907 Piaget was regarded as one of the world's few experts on mollusks.

that it show itself capable of making predictions that can be subjected to observational or experimental testing.

A vague theory is not useful for making scientific predictions. If too many variables are left undecided, if too many possible ways of applying the theory present themselves, then the theory cannot be specific and particular empirical outcomes cannot be held to a standard of judgment by which the theory risks refutation. The science of psychology is sometimes criticized as holding vague theories that cannot be seriously tested to the same degree to which, say, a theory of physics can be tested. Feynman, for example, was frequently critical of psychology for just this reason:

Another thing I must point out is that you cannot prove a vague theory wrong. If the guess that you make is poorly expressed and rather vague, and the method that you use for figuring out the consequences is a little vague - you are not sure, and you say, 'I think everything's right because its all due to so and so, and such and such do this and that more or less, and I can sort of explain how this works . . .' then you see that this theory is good, because it cannot be proved wrong! Also if the process of computing the consequences is indefinite, then with a little skill any experimental results can be made to look like the expected consequences. You are probably familiar with that in other fields. 'A' hates his mother. The reason is, of course, because she did not caress him or love him enough when he was a child. But if you investigate you find out that as a matter of fact she did love him very much, and everything was all right. Well then, it was because she was over-indulgent when he was a child! By having a vague theory it is possible to get either result. . . It is usually said when this is pointed out, 'When you are dealing with psychological matters things can't be defined so precisely'. Yes, but then you cannot claim to know anything about it [FEYN2: 158-159].

The more that an idea is systematically connected within a doctrine, the greater are the limitations placed upon how that idea can be rightfully employed and the fewer are the degrees of freedom in deducing the consequences of that idea. In other words, the more systematic the doctrine, the less vague are its theories. Indeed, the practice of science can be seen as much as an on-going effort to construct the beams and crossmembers that interconnect theories (thereby placing the limitations on them needed to replace the vague with the distinct) as it can be seen as the effort to construct the little islands of theory which these crossmembers connect. This aspect of scientific practice seems to be something of which mystics and scientific crackpots are apparently unaware. Science has become such a familiar presence in our modern lives that we sometimes lose sight of its architectonic character. Judging from the widespread division of the sciences into ever-smaller communities of specialization (communities which largely live and work in isolation from each other), the architectonic character of science seems to be unappreciated even by scientists. We would do well to heed the words of Francis Bacon, written at the dawn of modern science:

95. Those who have treated of the sciences have been either empirics or dogmatical. The former like ants only heap up and use their store, the latter like spiders spin out their own webs. The bee, a mean between both, extracts matter from the flowers of the garden and the field, but works and fashions it by its own efforts. The true labor of philosophy resembles hers, for it neither relies

entirely nor principally on the powers of the mind, nor yet lays up in the memory the matter afforded by experiments of natural history and mechanics in its raw state, but changes and works it in the understanding. We have good reason, therefore, to derive hope from a closer and purer alliance of these faculties (the experimental and the rational) than has yet been attempted.

100. We must not only search for, and procure a greater number of experiments, but also introduce a completely different method, order, and progress of continuing and promoting experience. For vague and arbitrary experience is (as we have observed) mere groping in the dark, and rather astonishes than instructs. But when experience shall proceed regularly and uninterruptedly by a determined rule, we may entertain better hopes of the sciences.

103. When we have thus properly and regularly placed before the eyes a collection of particulars, we must not immediately proceed to the investigation and discovery of new particulars or effects, or, at least, if we do so, must not rest satisfied therewith. For, though we do not deny that by transferring the experiments from one art to another . . . many new experiments may be discovered tending to benefit society and mankind, by what we term literate experience; yet comparatively insignificant results are to be expected thence, whilst the more important are to be derived from the light of new axioms, deduced by certain method and rule from the above particulars, and pointing out and defining new particulars in their turn. Our road is not a long plain, but rises and falls, ascending to axioms, and descending again to effects.

104. Nor can we suffer the understanding to jump and fly from particulars to remote and most general axioms (such as are termed the principles of arts and things), and thus prove and make out their intermediate axioms according to the supposed unshaken truth of the former. This, however, has always been done to the present time from the natural bent of the understanding, educated too, and accustomed to this very method, by the syllogistic mode of demonstration. But we can then only augur well for the sciences, when the ascent shall proceed by a true scale and successive steps, without interruption or breach, from particulars to the lesser axioms, thence to the intermediate (rising one above the other), and lastly to the most general. For the lowest axioms differ but little from bare experiments; the highest and most general (as they are esteemed at present), are notional, abstract, and of no real weight. The intermediate are true, solid, full of life, and upon them depend the business and fortune of mankind; beyond these are the really general, but not abstract, axioms which are truly limited by the intermediate.

We must not then add wings, but rather lead and ballast to the understanding, to prevent its jumping or flying, which has not yet been done; but whenever this takes place, we may entertain greater hopes for the sciences.

106. In forming our axioms from induction, we must examine and try whether the axiom we derive be only fitted and calculated for the particular instances from which it is deduced, or whether it be more extensive and general. If it be the latter, we must observe, whether it confirm its own extent and generality by giving surety, as it were, in pointing out new particulars, so that we may neither stop at actual discoveries, nor with a careless grasp catch at shadows and abstract forms, instead of substances of a determinate nature: and as soon as we act thus, well authorized hope may with reason, be said to beam upon us [BACO2: 126-128].

Bacon's everlasting contribution to science does not lie in his own scientific discoveries (which were few and of little importance), but in his call summoning science to submit itself to the discipline of a doctrine of method that is architectonic in nature. In this he can be said to have been the first to call for what in this treatise we name a *unified theme*. The doctrine of method is none other than that by which we evaluate our ideas to find their place within the architectonic of our doctrine of science, to free our thinking from Baconian idols, and to check our speculative impulses. The doctrine of method is coordinate with the doctrine of elements in a science, neither

taking precedence over it nor subordinating itself to it. Under the Copernican hypothesis our doctrine of method calls for elementary (or possibly elementary) ideas to be submitted to analysis under that which Kant called metaphysics proper. This we must do with the idea of the functional invariant of adaptation.

If adaptation is to be considered an objectively valid idea in our theory, we must find out “where it fits” in the general architectonic of Organized Being, and we must examine what this vague idea can and (equally important) can *not* tell us about the phenomenon of mind. What assumptions are we permitted to make about adaptation, and where are the limits to the validity of this idea (if, indeed, it has any objective validity whatsoever)? In order to decide where to begin, we can first note that we are faced with a choice: we may begin by an examination of the power of adaptation (what it does), or we may begin with an examination of the faculty of adaptation (the idea of its organization).

Now, since at this point in our treatise the idea of adaptation is vague, beginning our exploration with the faculty of adaptation seems at best speculative. How are we to examine the organization of something if we do not have a distinct idea of what that something is supposed to do? Yet it seems rather apparent that we do not yet have a well-formed idea of what adaptation implies. To what phenomena does it apply? What phenomenal inferences can we objectively draw from the idea of adaptation? Indeed, are we justified in regarding adaptation as one “power” with two distinguishable aspects (physical and mental), or must we treat these two particulars as separate “powers” of Organized Being? Piaget, of course, could be expected to argue in favor of the former. Unfortunately he does not set down in his works a detailed treatment of the specifics of the phenomenon of adaptation, so are we merely to take his word on this for a fact?

It therefore seems best to begin with an examination of the power of adaptation. Power, however, is an idea that concerns “what something does.” Consequently, the power of adaptation must pertain to objects of experience and its examination therefore belongs to that hemisphere of metaphysics proper. In this hemisphere we are presented a second choice. Do we regard adaptation in relationship to “external objects” (Rational Physics) or to “objects of inner sense” (Rational Psychology)? Really, we must do both since Piaget’s idea is one that takes in both physical and mental adaptation.

But with which shall we begin? Of these two possible aspects of adaptation, it would seem that physical adaptation is the less mysterious (because here the phenomenon of physical adaptation can be and is subjected to examination by the physical sciences). The more speculative aspect of adaptation, but the one that makes it of fundamental interest to a science of mental physics, is the idea of a mental aspect of adaptation. Accordingly, let us begin with that and examine adaptation from the viewpoint of Rational Psychology.

§ 4.1 The Object of Rational Psychology

When we discussed Rational Cosmology we said that its Object was Nature, i.e. one's model of "the world." This idea, if not easy to grasp in its entirety, is at least an idea with which we may all feel comfortable. No person seriously objects to taking the idea of "the world" as objectively valid in one form or another. No nations have ever gone to war over as uncontroversial an idea as Nature, and no one has ever been burned at the stake for holding-to-be-true the idea of "the world."

In discussing Rational Psychology, we move to the opposite end of the spectrum because the object of Rational Psychology *is* controversial and people *have* been burned at the stake for the opinions they held about this object. And yet we cannot avoid talking about this object because our topic is mind and the science of the phenomenon of mind, and we therefore cannot turn aside from coming to grips with and taming the idea of this most controversial of objects. If the community of physicists at the beginning of the twentieth century had summarily rejected and refused to even consider the ideas of Einstein's relativity because the relativity theory demolished the cherished idea of the "luminiferous æther" and the mechanistic philosophy of physics, we would condemn them today as acting out of ignorance and prejudice.² So, too, we must come to grips with the object of Rational Psychology. What we will find is that it is not the object of Rational Psychology itself that produces in humankind such heat and passion, but rather it is the speculative and mystic connotations that people attach to this object which produces the controversy. We must separate of the object of Rational Psychology from these unscientific and transcendent subreptions that always seem to accompany it like barnacles on a ship.

Rational Psychology is that division of metaphysics proper which pertains to *a priori* principles that must govern objects of inner sense – that is, mental *state* – of the thinking Subject. As is the case generally for metaphysics proper, Rational Psychology is a doctrine in which we can introduce no *empirical* element, although experience can (and does) lead us by way of our reasoning powers *to* the idea of Rational Psychology. Thus, Rational Psychology does not deal with feelings, emotions, sensations, or other strictly empirical ideas. These belong to empirical rather than Rational Psychology. But the very idea of "objects of inner sense" presupposes the existence *of* something called "inner sense" and, beyond this, to the existence of some sort of substratum with respect to which this inner sense is a *meaningful* idea.

² This vignette is not as far-fetched as it might seem. In the anti-intellectual pogrom of Nazi Germany, the relativity theory was in fact subjected to condemnation by official state policy on grounds as ludicrous as the intent was evil. So it was that in 1933 physicist Philipp Lenard wrote in the official Nazi paper: "The most important example of the dangerous influence of Jewish circles on the study of nature has been provided by Herr Einstein and his mathematically botched-up theories . . . Even scientists who have otherwise done solid work cannot escape the reproach that they allowed the relativity theory to get a foothold in Germany, because they did not see, or did not want to see, how wrong it is . . . to regard this Jew as a good German."

It is with the Nature of this substratum that the principles of Rational Psychology are concerned. What can we say about this idea of such a substratum of inner experience? First and foremost, we need to be clear about what is meant by the idea of “inner experience.” It is self-evident that our sensible experiences are not limited to only objects of outer sense. We also experience “feelings” which we describe by such phrases as “feeling depressed” or “experiencing joy.” We do not ascribe such experiences to objects in the corporeal sense nor do we *experience* this clinically in terms of hormone levels or other such ideas that belong to the science of physiology. I cannot paint for you a picture of “what joy looks like,” but I have no doubt that you have a good idea of what I probably mean by the word “joy” since you yourself have surely had an inner experience you describe with the same word.

The idea of a “substrate” upon which rests such “inner experiences” is not the idea *of* this sort of experience but, instead, is the idea of the *possibility of having* such an experience – an idea that must find connection with the other representations in the manifold of cognition. As Kant put it:

[Inner] experience in general and its possibility, or perception in general and its relationship³ to another perception without any particular distinction or empirical determination being actually given, cannot be regarded as empirical cognition, but must be regarded as knowledge of the empirical in general, and belongs to the investigation of the possibility of every experience, which is of course transcendental [KANT1a: 412 (B:401)].

“Knowledge *of* the empirical” means, in effect, *awareness* of empirical experience and, therefore, is an idea tied to that fundamental awareness of one’s own *Dasein* we call the transcendental apperception. But if we are to speak meaningfully of an “object of inner experience” we must have more than just the simple transcendental apperception of *Dasein* because this apperception is nothing but a global “sense of aliveness” whereas the idea of an object is an idea of just some “piece” *in* one’s whole of awareness. Anyone who has participated extensively enough in athletics to have experienced a painful injury yet simultaneously experienced the joy of victory knows what an athlete means when he or she speaks of “a good hurt.” The ability to experience such a thing presupposes a structure or order or *form* of the inner experience, and such a form requires not only an awareness of *Dasein* but of *Existenz* as well.

The knowledge of an empirical object rests not merely on consciousness (the representation of transcendental apperception) but on *self-consciousness*, for to perceive “an” object in the particular one must be able to regard one’s own Self *as an object among objects*. Without this differentiation there can be no form of objective distinction within the totality of inner sense. As we pass from the radical ego-centrism of infancy to self-awareness, this passage is marked by the ability to differentiate between one’s own Self and other not-Self things. It is through this

³ *Verhältnis*

remarkable phenomenon of self-apperception that we find the object of Rational Psychology. It is “the *I*” – the idea of the transcendental Subject.

The “I” and the “Soul”

I have called the “I” the *idea* of the transcendental Subject. It is with this idea that Rational Psychology is concerned, the object of which is the object of this branch of metaphysics proper. It is the task of Rational Psychology to properly delimit this idea – to set bounds upon what we can and can not include in its exposition or, in short, to set forth the *principles* that must *regulate* the theory of the transcendental Subject. These principles must be *pure* and *a priori* because they concern the very possibility of self-apperception *as an objectively valid idea*.

There is, however, another idea produced by the process of reason and so closely tied to the “I” that it is easily mistaken for it. It is this second idea which becomes embroiled in controversy, which raises the hackles of materialist thinkers, and which sometimes plunges people (even entire nations) into conflict and acrimony. To understand the difference between these two ideas, we must give our attention to that habit of thinking denoted by the verb *to reify*:

reify [from L. *res*, thing; and *-fy*.] To treat (an abstraction) as substantially existing, or as a concrete material object.

When we reify an idea, we treat this idea as if its object possesses, in relation to other objects, a particular *Existenz* for which we have no objectively valid or verifiable way of ascertaining the truth. Truth, we recall, is the congruence of a cognition with its object and, for us, we have no way to obtain an experience *in concreto* other than by means of the senses. Now the supersensible object of an idea – a *noumenon* – is beyond our capacity for sensuous experience. At best we can *exhibit* an idea through some particular lower concepts of its object in a sensible representation, but this is not the same as *actual experience* of the object. We must, rather, view our exhibitions of supersensible ideas as *problematic* representations from the Standpoint of a theoretical perspective.

When we reify an idea we add to our conception of its object attributes, properties and essences for which we can truthfully find as their source only a similitude of analogy or a faulty induction. Our imagination, freed from Bacon’s lead and ballast, “takes flight” and paints connections between the initial concept and other representations in the manifold of concepts *on none other than rational argument* for which no sufficient objectively valid ground is to be found. The idea thereby becomes *transcendent* – passing beyond the horizon of any possibility of *actual* sensible experience. Here we have speculation in the pejorative connotation.

Of the objective validity of one's own personal *Dasein* each of us is as certain as it is possible for a human being to be. However, it is with our specific ideas of the *Existenz* of one's Self – the form and object of one's inner being – that human beings differ from one to another. It is when we regard the *transcendental* "I" of apperception as an *essential* "I" made a *Ding an sich selbst* – "I in myself as I *essentially* am" – that the "I" passes from an idea of the transcendental Subject to a transcendent idea of *Self-Existenz* made by one's own reasoning. When one so reifies the idea into this transcendent form of "my essential self" we have the idea of the *soul*.

The refusal by science to admit the soul into its theoretical constructs is often misunderstood by well-meaning people outside the sciences and is sometimes misconstrued as evidence that all scientists are atheists. This is, of course, nonsense. There are religious, agnostic, and atheistic scientists just as there are religious, agnostic, and atheistic non-scientists. Science does not try to deal with the soul precisely and only because the idea of a soul is beyond the ability of science to investigate. This does not mean there have not been attempts to produce "soul theories" in philosophy and in pre-modern science. It was the complete failure to attain any success through such efforts that pointed modern science away from such efforts. Throughout history and into the present day there have been many ideas of the soul, and many of these ideas are contradictories of each other to such a degree that all one feels comfortable with in asserting the idea of the soul is that all such ideas have their root in the empirical "me" of Self-apperception. Beyond this the soul is a matter of religion and faith, not science, and science can speak neither in favor of nor in opposition to the idea of a soul (although on occasion it can speak against particular *soul theories*). This is what is meant (or at least what *should* be meant) when a scientist *speaking as a scientist* says that the idea of the soul is "completely unscientific."

We therefore have two similar-sounding but objectively quite different ideas. In the first place, there is the transcendental "I" of apperception, the object of Rational Psychology. In the second place, there is the problematical and transcendent idea of the "soul." There has always been in discourse an unfortunate tendency to erase the boundary separating these two quite distinct ideas or, even worse, a temptation for an author to appropriate the word "soul" when he means the "I" – an understandable but unwise practice because when philosophy takes the word "soul" for its own use it is in effect taking it away from religion and religious theology, and this theft does not go unnoticed by theologians.

William James and the "Soul"

As an example of this last point, let us look at what William James had to say concerning science and "soul theory." Chapter VI of James' *Principles of Psychology* discusses the "mind-dust" theory, of which we spoke briefly in Chapter 1. Near the beginning of this chapter, he writes:

In a general theory of evolution the inorganic comes first, then the lowest forms of animal and vegetable life, then forms of life that possess mentality, and finally those like ourselves that possess it in high degree. As long as we keep to the consideration of purely outward facts, even the most complicated facts of biology, our task as evolutionists is comparatively easy. We are dealing all the time with matter and its aggregations and separations; and although our treatment must perforce be hypothetical, this does not prevent it from being *continuous*. The point which as evolutionists we are bound to hold fast to is that all the new forms of being that make their appearance are really nothing more than results of the redistribution of the original and unchanging materials. The self-same atoms which, chaotically dispersed, made the nebula, now, jammed and temporarily caught in peculiar positions, form our brains; and the "evolution" of the brains, if understood, would be simply the account of how the atoms came to be so caught and jammed. In this story no new *natures*, no factors not present at the beginning, are introduced at any later stage.

But with the dawn of consciousness an entirely new nature seems to slip in, something whereof the potency was *not* given in the mere outward atoms of the original chaos.

The enemies of evolution have been quick to pounce upon this undeniable discontinuity in the data of the world, and many of them, from the failure of evolutionary explanations at this point, have inferred their general incapacity all along the line. Every one admits the entire incommensurability of feeling as such with material motion as such. "A motion became a feeling!" - no phrase that our lips can frame is so devoid of apprehensible meaning. Accordingly, even the vaguest of evolutionary enthusiasts, when deliberately comparing material with mental facts, have been as forward as any one else to emphasize the "chasm" between the inner and the outer worlds.

. . . Now this book will tend to show that mental postulates are on the whole to be respected. The demand for continuity has, over large tracts of science, proved itself to possess true prophetic power. We ought therefore ourselves sincerely try every possible mode of conceiving the dawn of consciousness so that it may *not* appear equivalent to the irruption into the universe of a new nature, non-existent until then [JAME2: 95-97].

In the pages that follow James takes on various "mind-dust" theories, the arguments in their favor, and the arguments against these theories. One by one, he demolishes the materialistic theories that had been brought up and proposed as ways to bridge the "chasm" between corporeal matter and the arrival of consciousness. Finally, near the end of Chapter VI, he writes:

But is this my last word? By no means. Many readers have certainly been saying to themselves for the last few pages: "Why on earth doesn't the poor man say *the Soul* and have done with it?" Other readers, of anti-spiritualistic training and prepossessions, advanced thinkers, or popular evolutionists, will perhaps be a bit surprised to find this much-despised word now sprung upon them at the end of so physiological a train of thought. But the plain fact is that all the arguments for a "pontifical cell" or an "arch-monad" are also arguments for that well-known spiritual agent in which any scholastic psychology and common-sense have always believed. And my only reason for beating the bushes so, and not bringing it in earlier as a possible solution to our difficulties, has been that by this procedure I might perhaps force some of these materialistic minds to feel the more strongly the logical respectability of the spiritualistic position. The fact is that one cannot afford to despise any of these great traditional objects of belief. Whether we realize it or not, there is always a great drift of reasons, positive and negative, towing us in their direction. If there be such entities as souls in the universe, they may possibly be affected by the manifold occurrences that go on in the nervous centers. To the state of the entire brain at a given moment they may respond by inward modifications of their own. . . The separateness is in the brain-world, on this theory, and the unity in the soul world; and the only trouble that remains to haunt us is the metaphysical one of understanding how one sort of world or existent thing can affect or influence another at all. This trouble, however, since it also exists inside of both worlds, and involves neither physical improbability nor logical contradiction, is relatively small.

I confess, therefore, that to posit a soul influenced in some mysterious way by the brain-states and responding to them by conscious affections of its own, seems to me the line of least logical resistance, so far as we yet have attained.

If it does not strictly *explain* anything, it is at any rate less positively objectionable than either mind-stuff or a material-monad creed. *The bare PHENOMENON, however, the IMMEDIATELY KNOWN thing which on the mental side is in apposition with the entire brain-process is the state of consciousness and not the soul itself.* Many of the staunchest believers in the soul admit that we know it only as an inference from experiencing its *states*. In Chapter X, accordingly, we must return to its consideration again, and *ask ourselves whether, after all, the ascertainment of a blank unmediated correspondence, term for term, of the succession of the states of consciousness with the succession of the total brain-processes, be not the simplest psycho-physic formula, and the last word of a psychology which contents itself with verifiable laws, and seeks only to be clear, and to avoid unsafe hypotheses.* Such a mere admission of empirical parallelism will there appear the wisest course. By keeping to it, our psychology will remain positivistic and non-metaphysical; and although this is certainly only a provisional halting-place, and things must some day be more thoroughly thought out, we shall abide there in this book, and just as we have rejected mind-dust, we shall take no account of the soul [JAME2: 118-119].

In this lengthy quotation we may take note of two things. First, we can see that James' view of psychology is bound to the positivistic attitude prevalent at the end of the nineteenth and beginning of the twentieth century. Second, we can see he reifies "consciousness" and the "mental world" in Cartesian dualism – an attitude of surrender to the prevailing mechanistic picture of corporeal Newtonian physics in his day. He does distinguish between "consciousness" (which, in *Principles of Psychology* means *self-consciousness*) and the "Soul" but it does not occur to him to regard these *both* as *ideas*. To James "consciousness" is a *phenomenon* (rather than the representation of a phenomenon) and the "Soul" is a matter for "metaphysics." In the next section, we will see that the "I" is a matter for Rational Psychology and the soul is beyond its reach.

§ 4.2 The Ideas of Rational Psychology

Like most philosophers, Kant succumbs to the temptation of appropriating the word "soul" as his nickname for the idea of the substratum of apperception. In *Critique of Pure Reason* and in his others writings and lectures, we often find him calling Rational Psychology the "doctrine of the soul." In quoting from Kant we will, as always, preserve his wording (to the extent that it is possible to do so in English), but let us all the while bear in mind that Kant's "soul terminology" is in fact synonymous with the "I" of apperception.

Hume, Kant, and James¹ all share a common point of agreement regarding our knowledge of the "soul": all three men point out that when we bring our attention to bear on this seeming awareness we have of our "essential self" and try to pluck out from our feelings and thoughts the

¹ Piaget avoids the question altogether. For him, "consciousness" is the same thing as awareness and becoming aware means the *act* of "cognizance" (see J. Piaget, *The Grasp of Consciousness*, Cambridge, MA: The Harvard University Press, 1976).

“I” of apperception, we find ourselves coming up with *no* feeling, intuition, or other cognition. One does not “find my essential self” in the data of inner sense. Hume finds “but a heap or collection of different perceptions, united together by certain relations, and suppos'd, tho' falsely, to be endowed with perfect simplicity and identity.” For James this introspection yields nothing but “a *Thought*, at each moment different from that of the last moment, but *appropriative* of the latter, together with all that the latter calls its own” [JAME2: 259]. As for Kant,

If we compare the doctrine of the soul², as the physiology of inner sense, with the doctrine of bodies³, as a physiology of the objects of outer sense, then we will find that aside from the fact that in both much can be known empirically, there is nevertheless this remarkable difference; that in the latter science much can be recognized *a priori* from the mere concept of an extended impenetrable being, but in the former science nothing at all synthetic *a priori* can be known from the concept of a thinking being. . . For in that which we call the soul, everything is in continual flux, and it has nothing abiding, except perhaps (if one insists) the *I*, which is simple only because this representation has no content, and hence no manifold. . . rather, it is the mere form of consciousness, which accompanies representations and which can elevate them to cognitions only insofar as something else is given in intuition, which provides the material for the representation of an object. Thus the whole of rational psychology, *as a science transcending all the powers of human reason*⁴, collapses, and nothing is left except to study our soul following the guidelines of experience, and to remain within the limit of those questions that do not go beyond that whose content can be provided by a possible inner experience [KANT1a: 432-433 (A: 381-382)].

Let us mark closely what Kant has said. Unlike the doctrine of Rational Physics, under which it is possible for objects to be given *as appearances*, the doctrine of Rational Psychology finds that the *I* of apperception is not given *even as an appearance*. All that is found that can be attributed to the *I* is contentless form. This form is expressed in words as the “*I think*” that *logically* accompanies all judgments, e.g. *I think X is Y*. The doctrine of Rational Psychology is a doctrine entirely devoid of *content in appearances* and any attempt to build up from the *I* of apperception knowledge of things – i.e. to construct a *positive* methodology capable of transcending the knowledge of the senses – is entirely in vain. Inner sense gives us “to know only of a change of determinations, but not of the determinable object” [KANT1a: 432 (A: 381)].

As a doctrine Rational Psychology therefore is useful as a *negative* doctrine – that is, a doctrine for guarding theory against *dialectic* inferences that transcend any possible experience and which produce only what Kant elsewhere calls *transcendental illusions*. For example, the idea of the *I* of apperception can be viewed only as a *formal* idea, i.e. a kind of “immaterial moving principle in an organic body⁵” [KANT10: 195 (22: 97)] and is useful to theory *only* as an idea of the form of the empirical manifold. If we try to go farther than this, to reify the *I* of apperception to the idea of a *soul* (in either the spiritual sense or even in Aristotle’s connotation

² i.e., Rational Psychology.

³ i.e., Rational Physics.

⁴ The italics are not in the original; I have added them for emphasis.

⁵ By “organic body,” Kant means an Organized Being [KANT10: 60 (21: 184)].

of soul as “the actuality of a body” having “life potentially within it” [ARIS9: 656 (412^a20)]), we attempt to introduce *material significance* into an idea where no possible matter of appearance is to be found.

The use of the negative in a doctrine is employed sufficiently infrequently that it is worthwhile to belabor this point even at the risk of weariness. The *negative doctrine* of Rational Psychology is not a refutation of the transcendent idea of a “spirit” in the sense of denying the *possibility* of a “spiritual world”; it is a doctrine denying the possibility of making *any* objectively valid judgment about the *actual* existence of such a world. It is just as incorrect under Rational Psychology to say “the soul does not exist” as it is to say “the soul does exist.” *Both* these statements make an *assertoric* judgment – either against or in favor of a “spiritual world” – and it is the impossibility of making *any* objectively valid assertion on this *matter* that Rational Psychology asserts. The doctrine of Rational Psychology is a strictly *formal* doctrine and the question of a soul is *formally undecidable* because this question involves an unknowable *material* premise.⁶

Owing to the lack of any sensible appearance of an object being given in inner sense, the Ideas of Rational Psychology can be only *regulative principles* for the employment of one’s capacity for understanding by speculative Reason. Since any theory is a representation of ideas, we expect and again find a system of four Ideas of Rational Psychology, corresponding to the four titles of representation in our 2LAR structure. Kant developed these Ideas from an analysis of what is contained in the proposition *I think*.

Now since the proposition *I think* (taken problematically) contains the form of every judgment of understanding generally, and accompanies all categories as their vehicle, it is clear that the inferences from this proposition can contain a merely transcendental use of understanding, excluding every admixture of experience . . .

All *modi* of self-consciousness in thinking are therefore not yet themselves notions of the understanding of Objects (categories), but mere logical functions, which provide thought with no object at all, and hence also do not present my self as an object to be known. It is not the consciousness of the *determining* but only that of the *determinable* self, i.e., of my inner intuition (insofar as its manifold can be compounded in accord with the universal condition of the unity of apperception in thinking) that is the *Object* [KANT1a: 445 (B: 406-407)].

When we discussed the process of reasoning in connection with Rational Cosmology we said Reason regulates understanding in such a manner as to seek for the *unconditioned*. In Rational Cosmology this unconditioned is the unconditioned ground in the series of conditions in the manifold of representations. For Rational Psychology the unconditioned sought by reasoning is the unconditioned *Object* of representation. The transcendental Subject would seem to be a

⁶ This is one of the features of Kant's philosophy that got him into trouble with the king and the religious authorities in 1794. It was not enough at that place and time to simply have good faith in the soul; one had to profess one's *certainty* in the existence of the soul or risk indictment.

candidate for being precisely such an unconditioned Object. However, when we analyze what we actually find in the *I* of apperception, we find nothing other than the formal condition or substratum of representation *per se*. The *I* is not presented in inner sense even as an appearance. What we have is merely consciousness of a *determinable* Self. This *functional* character of the *I* has profound consequences for the speculative employment of thinking and in formulating the theory of the phenomenon of mind. The transcendental Subject *as object* is a *logical function*.

These consequences are summarized in the following four Ideas of Rational Psychology [KANT1a: 432-444 (A: 381-405)]:

1) Unconditioned unity of all relationships (psychological Idea of Relation):

The *I* of apperception is logically the determining Subject of all judgments and can never serve as the predicate of any judgment. If we make a speculative hypothesis such as "the corporeal body interacts with the immaterial soul" we attempt to make "the soul" the predicate of a judgment. However, there can be no objective validity in such a proposition because our *knowledge* is not the knowledge of things-in-themselves but, rather, only cognitions of appearances. All such representations are representations *of* the phenomenon of mind. Therefore, while we may *logically* divide our knowledge as knowledge of "outer" and "inner" sense, to *reify* this division and treat *in theory* "inner" and "outer" Objects as if our cognitions were cognitions of things-in-themselves, rather than appearances, is a transcendental illusion. All our cognitions are representations only of appearances and never of things-in-themselves, and so the theory of the phenomenon of mind cannot treat relationships between "inner" and "outer" appearances as if they were relationships among things-in-themselves of an "outer world" and the Self as a thing-in-itself or Soul.

2) Unconditioned unity of Quality (psychological Idea of Quality):

All cognitions of experience must have agreement in this one point, namely, that they are all representations of appearances. The *I* of apperception "cannot be resolved into a plurality of subjects" and, therefore, is *logically simple*; however, logical simplicity does not signify *material* simplicity. Even the division of the Organized Being into separate parts (*nous, soma, psyche*) is nothing but the logical form of its appearance and can never be regarded as representative of a real (i.e. material) division. The Cartesian problem of "mind-body duality" is nothing but a transcendental illusion brought about by the attempt to reify mere appearances as "substantial things-in-themselves." Our knowledge can have no objective validity unless the objects of experience are *all* regarded as appearances.

3) Unconditioned unity in the multiplicity of time (psychological Idea of Quantity):

The proposition of the identity of "myself" is likewise a logical proposition underlying every judgment. This logical identity is a condition for the possibility of thinking in general and is an Idea of Quantity, namely the idea of the *logically* singular nature of the transcendental Subject. It is not objectively valid to think of the *I* as something which itself is *changeable* but only as the logical substratum for the representation of change in appearances.

4) Unconditioned unity of *Dasein* – i.e. the consciousness only of the *Dasein* of the transcendental Subject and of other things merely as its representations (psychological Idea of Modality):

That I can distinguish "myself" from other things is merely an analytic proposition by which "other things" are defined as "other"; this logical distinction does not signify that *I* could exist as a thinking being without being a *human* being.

These Ideas of Rational Psychology may seem, at first encounter, to be sterile and of no use. They have indeed little positive application for construction of a *constitutive* theoretical doctrine. Their theoretical function is as a “No!” constraining theory when one is tempted to overstep the bounds between what is transcendental (and therefore pertains to the conditions which *a priori* make experience possible) and what is transcendent (and therefore is only problematical speculation). They are *regulative* principles and in this role will be quite useful.

Rational Psychology has utility in the extermination of harmful vermin. For example, consider James’ view of the ‘chasm’ between the continuity requirements of materialist evolution theory and the emergence of consciousness. This ‘mystery’ hinges on a transcendental illusion, namely the reification of one’s ideas of corporeal appearances by regarding the representation of these appearances as representation of things-in-themselves. The materialist idea is that “reality” is “material reality” – that nothing actually exists which is not built out of material “corpuscles” and the laws by which these corpuscles interact. Perhaps this is so; perhaps it is not. Rational Psychology tells us we have *no way to know this for certain*. Our knowledge of these things is a knowledge only of how these things *appear* and this knowledge is limited by *what we can know through sensible appearance alone*. James’ version of the mind-body problem is logically undecidable owing to the impossibility of establishing the *material truth* of his possible solutions. Truth is the congruence of a cognition with its object, and in James’ view of the mind-body problem the objects are regarded as a real division between things-in-themselves. But we have no way to “get at the essence” of James’ mind-object as a thing-in-itself because all we can know for a fact are representations of appearances of the phenomenon of mind.

This is why it is emphasized repeatedly that the division of the Organized Being model in terms of *nous*, *soma*, and *psyche* is merely a *logical* division – a strictly *formal* representation of the *appearance* of the Self. We must not regard these three representational divisions as things-in-themselves nor as “substantial” elements of one’s own being. In like fashion, the “powers” and “faculties” of Organized Being can contain in their representations only what can be known through appearances of inner and outer sense or can be established through a transcendental (*not* a transcendent) deduction.¹

§ 4.3 The Implications of Rational Psychology for Adaptation

From what we have just seen, Rational Psychology provides us with no positive constitutive insights upon which we can establish the objective validity of Piagetian adaptation. It does, however, provide us with some guidance, in the form of regulative negative principles, for

¹ Even the division into inner and outer *sense* is subject to the requirements of Rational Psychology. The objective validity of the sense is established upon transcendental grounds as that which is necessary for the possibility of experience.

evaluating Piaget's hypothesis.

Our first concern is with the objective validity of Piaget's idea of mental adaptation as an extension of biological adaptation. Piaget argued for the plausibility of his hypothesis based upon the making of a formal analogy. He did not say "mental adaptation is *like* biological adaptation"; his hypothesis was: mental adaptation *is* an extension of biological adaptation. But Kant tells us,

There are inferences nonetheless where we infer from the particular to the universal. . . Induction is the inference where I hold for true what comes from many as if it came from all under a general inference and concept. I infer thus: what is due to as many things as I have ever known must also be due to all that are of this species and genus. This kind of inference is completely opposed to logical rule, to be sure, but we cannot do without it, and along with it most of our cognitions would have to be abolished at the same time.

Secondly, as for what concerns inference according to an analogy, this is nothing other than an induction, but an induction only in respect to the predicate. Namely, when two things have come together in respect of all properties I have been able to know in them, then they will also come together in the remaining properties, which I have not known in them, and thus runs inference according to analogy. Analogy and induction are merely crutches for our understanding. For in universal propositions of truth we will always be able to proceed according to logical strictness, but in the use of our cognition (*a posteriori*) we often have to make do with the probable too [KANT8a: 232 (24: 287)].

Argument by analogy does not wield the persuasive strength of argument by logical deduction; on the other hand, one cannot apply logical deduction to obtain the general from the particular since deduction proceeds analytically from premise to consequence [ARIS3: 40 (24^b18)].

When one presumes, as most psychologists and neuroscientists do, that 'mind function' can and must be explained in terms of biological functions, calling mental adaptation an extension of biological adaptation is only a small step and seems to remain within the traditional methods of the science. However, the doctrine of Rational Psychology tells us that it is not objectively valid to draw a *real* division between "mind" and "body" because *both* objects are known to us only through the cognition of appearances. If we wish the idea of mental adaptation to be objectively valid, we must not regard it as a mere *extension* of biological adaptation. Instead, we must regard both mental and biological adaptation as different accidents (in the logic sense) of a more general power – adaptation in general – of Organized Being.

Mental adaptation, therefore, cannot be viewed as being in some way *subordinate* to biological adaptation. Rather, we must view mental and biological adaptation as two *logical* divisions of the *same* Object. This does not, of course, establish that the idea of adaptation in general is objectively valid. Rational Psychology cannot *validate* theories; it can only *invalidate* them. It does mean, however, that Piaget has committed no fundamental *saltus* in "reaching across the mental-biological boundary" to obtain his idea of mental adaptation because *there is no real boundary* between our empirical cognitions of the *soma* and those of the *nous*.

This picture of adaptation in general also provides us with some guidance in positing the

faculty of adaptation within the model of Organized Being. If mental and biological adaptation must be viewed as coordinate characteristics of the same Object, then we must view a faculty of adaptation in general – the Object in which these two characteristics are united – as belonging neither to *nous* nor to *soma*. The empirical evidence in favor of the idea of biological adaptation is well established in biology; the empirical evidence in favor of the idea of mental adaptation is likewise well supported by Piaget’s research. However, since the former pertains to ideas of *soma* while the latter pertains to ideas of *nous*, a faculty of adaptation in general must be an organization capable of, so to speak, “touching” both aspects of Organized Being. It follows that the transcendental *place* for a faculty of adaptation in general, within the model of Organized Being, is the *psyche*. We will look at this in more detail in Chapter 15.

§ 5. Adaptation and Rational Theology

If we had hoped to find the ground of objective validity for the idea of adaptation within Rational Psychology, we have been disappointed. Rational Psychology cannot show us objective validity; it exposes the absence of objective validity in a theory. Consequently, we will have to seek elsewhere within metaphysics proper for the validity of proposing a theory of adaptation.

If we cannot achieve our goal through Rational Psychology, should we turn to Rational Physics instead? Rational Physics is that part of metaphysics proper concerned with objects of outer sense. However, since our knowledge of such objects is, ultimately, only the knowledge of their appearances, we might suspect (correctly) that Rational Physics is concerned only with the valid representation of appearances. We do not yet seek to know the *appearance* of the functional invariant of adaptation; we presently are looking for the ground of the objective validity of adaptation *as a part of the theory* of the phenomenon of mind. This will not be found within Rational Physics.

In a like manner, we will not find this objective ground within Rational Cosmology. As we have already seen, Rational Cosmology deals with the Idea of the complete series of conditions. It does so through its four cosmological Ideas. It does not, however, grant us any guarantee that the unconditioned ground of the series of conditions can be found because it offers no guarantee that the regressive series of conditions will actually terminate in an ultimate ground. The Idea of Rational Cosmology is not the Idea that such a ground can in fact be found; it is the Idea that Reason must *presuppose and search* for something suitable as this ground.

This very idea – that Reason must search for a possibly non-existent ground for the series of conditions – would be *irrational* unless there was some valid reason for supposing such a ground exists. Likewise, the idea of trying to establish the objective validity of the idea of adaptation is irrational unless we have some reason to think there *really is* such a thing as objective validity *for*

an idea. The question we find ourselves confronting is as old as philosophy itself: *What do we mean by 'Reality'?* It is with this question that Rational Theology is concerned.

§ 5.1 The Ideas of Rational Theology

After what we have already said regarding the reification of the transcendental *I* of apperception into the idea of a soul, it should come as no surprise to us that Rational Theology – as a branch of the metaphysics proper of transcendental philosophy – does not speak of the idea of God or of gods. If we are incapable of knowing our own “souls” how much less capable must we be of knowing a supreme Author of the universe? “God theory” is the province of *religious* theology, not Rational Theology. Rational Theology does not speak to what *is* real; it speaks to what the Idea of *Reality* means.

Religion is older by far than philosophy and we might debate whether or not it is appropriate to use the word “theology” in the context of Kant’s Rational Theology. Such a debate, however, would merely second-guess the ancients (who coined the term theology) and the classical and medieval scholastics who developed the Jewish, Christian, and Islamic theologies in their current forms. The credit (or, if one prefers, the blame) for the use of the word “theology” in the context of what Reality means can perhaps be laid at the feet of Aristotle [ARIS7: 1619-1620 (1025^b1-1026^a32)] who defined it as “the science of that which is eternal, immovable, and separable.” In any case, Kant kept this terminology (inherited from Wolff) and so shall we.

If we diagram metaphysics proper in terms of our 2LAR, Rational Physics, Rational Psychology, and Rational Cosmology would go, respectively, under the titles of Quantity, Quality, and Relation. Rational Theology, in its turn, takes the title of the Modality of metaphysics proper – the matter of the form of metaphysics proper. In turn, if we regard this matter of the form of metaphysics proper in detail and divide it up into its own 2LAR structure, our four titles corresponding, respectively, to Quantity, Quality, Relation, and Modality are represented in the following four Ideas of Rational Theology [KANT1a: 553-559 (B: 599-611)]:

- 1) The Idea of *entis realissimi*;
- 2) The Idea of *ens originarium*;
- 3) The Idea of *ens summum*, and;
- 4) The Idea of *ens entium*.

The object of this matter of the form of metaphysics proper was given the name *transcendental Ideal* by Kant. In our discussion of cognitions we have seen that cognitions are representations of the manifold of appearances. Behind this idea of appearances we have the idea of objects whose appearances our powers of perception are supposed to be representing. Empirical knowledge is always conditioned or *limited* by our powers of perception and thinking

and, hence, our knowledge of these objects is made contingent.

Reason, however, in the employment of one's power to think, strives to achieve knowledge that is *unconditioned*. If we did not possess this character of innate *curiosity*, the drive to *know*, the act of thinking would be utterly inexplicable save by resort to some copy of reality hypothesis. We can, therefore, view the idea of striving to obtain knowledge of the unconditioned *thing in itself* (the unconditioned object "as it really is") in terms of an Ideal towards which Reason drives understanding. Rational Theology is the metaphysic that describes the nature of this task one's power of pure Reason sets for oneself.

A concept – that is, a rule for the construction of intuitions – is indeterminate with regard to anything not contained within or combined with it. Logically, the construction of a concept must follow a principle of determinability. If we use the word "predicate" in the sense of meaning "the rule that the concept prescribes," this principle of determinability can be stated as: Of every two contradictorily opposed predicates only one can apply to the object. This is called the **principle of contradiction** and it is merely a condition required for the formal possibility for determination of a cognition.

However, when we are concerned with the cognition of objects we must have more than merely a formal principle. We need, in addition, a principle for the *material content* of the predicate of the concept or else the concept would be an *empty* rule, a rule without meaning. Without such material premises there could be no possibility for our knowledge to be knowledge *of* objects. However, as an *a priori* principle, this principle governing the content of a concept must itself be strictly a principle of form since it cannot rely on specific empirical matter. Put another way, this principle cannot itself depend on the contents it prescribes for concepts.

Such a formal principle governing the material premises of a concept can be obtained by examining what concepts *do* in the general scheme of representation. Concepts are rules by which the aggregate representations of appearance are combined and united to produce representations of objects. Thus, the principle we seek is a principle pertaining to the *possibility* of thinking about objects in a manner congruent with Reason's task of seeking for the unconditioned objects of our representations. Seen in this way, the principle in question is a **principle of the thoroughgoing determination of objects by their concepts**.

Understanding of an object is achieved only by a concept that encompasses *many* predicates within its sphere. Each such predicate serves to more sharply delimit the concept of the specific object from concepts of other objects. It is easy to envision this concept-building as an on-going process of determination in which each piece of "new knowledge" can be weighed and judged with respect to its applicability or non-applicability to a specific object, and the concept of the object is altered appropriately in light of this new knowledge (as an *adaptation* made to and in the manifold of concepts). Now if we "look forward" to where such a process "is going," we find that

the principle of thoroughgoing determination can be stated as follows:

of *all possible* predicates of *things*, insofar as they are compared with their [contradictory] opposites, *one* [of these predicates] must apply to it [KANT1a: 553 (B: 599-600)].

At first glance this would seem to be nothing other than the principle of contradiction restated. However, a second look shows us that there is indeed a new factor contained in this principle for *it now makes a statement concerning the Nature of a thing*. It is saying that a *thing* cannot exist (in the full scope of that word, i.e. both *Dasein* and *Existenz*) except in a manner that is fully “self-consistent” – a thing cannot contradict itself. Now, there is nothing in empirical experience, nothing brought to us by the data of the senses, that can *require* a thing *must* be self-consistent. Indeed, empirical appearances often seem self-contradictory – especially in science where the occasion of such apparent self-contradiction is the starting point for scientific investigation to remove the inconsistency. The principle of thoroughgoing determination of a thing is therefore a pure principle of Reason. However, all such pure principles require a transcendental ground upon which their objective validity rests. It is with this transcendental ground that the transcendental Ideal of Reason is concerned.

We described the principle of the thoroughgoing determination of a thing in terms of the idea of “all possible predicates” that might be made concerning that thing. However, this principle presumes and is grounded in an idea – namely, the idea of *the sum total of all possibilities* (i.e., the sum total of all possible predications). Now, within this idea we find something curious: the positing of one possible predication always leads to a second possible predication – the predication of its contradictory opposite. To use one of Kant’s examples, if I have been totally blind from birth I can have no experience of “darkness” because I have no experience of “light.” If someone says to me, “it must be terrible to live in a world of darkness,” their words could hold no meaning for me because I would have no experience with any other kind of world. I could only try to imagine what a “world of light” might be based upon my own experiences, and “light” would be no more an experience for me than “living in a total vacuum” is an experience for any human being. Without an idea of “light,” the idea of “dark” loses its experiential compass. To appreciate this argument, try to imagine the idea that some people might possess a “sixth sense” *without imagining this sixth sense in terms of* the normal “five senses.” When I attempt this myself, I come up with no idea whatsoever of any “sixth sense.”

The idea of a thing, as the embodiment of all its possible predicates, is an idea in which we find that the inclusion of some predicates mandates the *exclusion* of others – namely those that are contradictorily opposed to the ones included.

If we consider all possible predicates not merely logically but transcendently, i.e., as to their contents which can be thought in them *a priori*, then we find that through some of them a being is represented, and through others a mere non-being. . . . A transcendental negation . . . signifies non-being in itself, and is opposed to transcendental affirmation, which is a Something, the concept of which in itself already expresses a being, and hence is called reality (thingness), because through it alone, and only so far as it reaches, are objects Something (things); the opposed negation, on the contrary, signifies a mere lack [KANT1a: 554-555 (B: 602)].

Now let us recall that concepts – rules for the construction of intuitions – are mental constructs, and that their construction necessarily presupposes *a priori* rules by which this construction is carried out. We called these “rules about rules” *notions*. These notions “predicate” the concepts they construct and by doing so they *make* transcendental affirmations. Put another way, these notions are the source of the transcendental *content* of concepts that constitutes the “realities” understood through the concept. These realities “contain the data . . . for the possibility and the thoroughgoing determination of all things” [KANT1a: 555 (B: 603)]. All transcendental negations are grounded in an opposed transcendental affirmation because the “not *X*” of such a negation necessarily must presuppose the *X* that it negates. A notion is negated simply by employing a different notion that is contradictorily opposed to the first notion in the construction of the concept. This means we need look no farther than the sum total of all possible transcendental affirmations to find the transcendental *substratum* “which contains as it were the entire storehouse of material from which all possible predicates of things can be taken” [KANT1a: 555 (B: 603)].

By the phrase “sum total of all possible transcendental affirmations” I do not mean merely some catalog or list of notions, nor even the total number of ways such a list of notions could be ordered (in pairs, triplets, etc. – i.e., the mere combinatorics of the “catalog” of notions). Notions, rules about rules, have no content without being *given* sensible data of intuition. The phrase “sum total of all possible transcendental affirmations” means the idea of every possible way that a manifold of *empirical* concepts could be constructed using all possible data of the senses.

Here we have an Idea² – the Idea of a “transcendental substratum” – which is at the basis of the principle of the thoroughgoing determination of objects. It is simply the Idea of “all possible predicates” – i.e., “the Idea of an All of Reality (*omnitude realitatis*). All true negations are then nothing but *limits*, which they could not be called unless they were grounded in the unlimited (the All)” [KANT1a: 555 (B: 603-604)]. We cannot think of “a” particular “reality of a thing” without grounding this thinking in the Idea that the “particular reality” is but a single instance taken from some “All of Reality.” There can be no part where there is no All that it is a part *of*. The Idea of this All is what Kant means by the phrase “general notion of Reality in general.”

² *Idee* in the original German text.

The general notion of a reality in general cannot be divided up *a priori*, because apart from experience one is acquainted with no determinate species of reality that would be contained under that genus. Thus the transcendental major premise for the thoroughgoing determination of all things is none other than the representation of the quintessence of all reality, a concept that comprehends all predicates as regards their transcendental content not merely *under itself*, but *within itself*; and the thoroughgoing determination of every thing rests on the limitation of this All of reality, in that some of it is ascribed to the thing and the rest excluded from it [KANT1a: 556 (B: 605)].

The Transcendental Ideal

With this Idea of a substratum – the All of Reality – we are now in a position to explore the transcendental Ideal of pure Reason, which is the practical object of Rational Theology.

The grasp that realism has on our thinking finds no better expression than in the idea of a thing-in-itself, an idea which finds its voice in the phrase “the thing *as it really is*.” The idea for the thing-in-itself has its objective basis in this Idea of All of Reality. As young children we were all uncritical realists and it is probably safe to say that the great majority of people remain so all their lives. Even philosophical sophisticates who like to point out the “deception in appearances” do not seem to be able to shake off this Idea of an All of Reality or the idea that behind every appearance is the “thing as it essentially is.”

Yet it is equally clear that no one among us ever has an actual experience of an unlimited All of Reality even though we take the notion so entirely for granted that we rarely think about it. Even armed with what Nicholas of Cusa would call the enlightened *docta ignorantia* of Kant’s philosophy, I cannot resist thinking that behind the cat that I see lurks the unconditioned cat-as-it-is, the “essential cat.” The idea of a thing-in-itself is the idea of the completely determined thing, fully delimited in all its particulars and uniquely occupying a place in Reality.

But this stubborn idea is a mental creation. We *never* have the experience of the unconditioned thing-in-itself, even through the sum total of all of our individual experiences. Consequently we can never *know* the thing-in-itself, in the sense of having a completely determined concept of the thing. This state of affairs – which is a key outcome of Kant’s Critical Philosophy – is utterly repugnant to some people. Writers of philosophy have in the past criticized Kant with Zeno-like arguments such as: Kant says we cannot know the thing-in-itself; yet he says we *know* something about the thing-in-itself, namely that we do not know it; if we do not know the thing-in-itself, how could we know we don’t know it? Therefore Kant contradicts himself; therefore Kant is wrong.

This argument is as specious as if I were to say: I cannot hit a curve ball, therefore no one can hit a curve ball. The false premise in arguments such as the one summarized in the preceding paragraph comes from a failure to understand: that to know the thing *as* a thing-in-itself means to have a complete determination of the thing, including all its *supersensible* particulars with none

of these whatsoever left undetermined, and not merely those sensible particulars we find in its appearances. We know a thing-of-appearances, and we know of the *Dasein* of the thing-in-itself, but we can not know the thing-in-itself in its essential *Existenz*.

Yet, despite the ultimate futility of every effort to know the thing-in-itself, Reason persists in directing our thinking towards the attempt to make ever more complete determinations of appearances. The idea of knowledge of the thing-in-itself is not a goal to be achieved but an *ideal* of what the *perfection of one's knowledge* should be *if one were* to achieve it. In other words, the transcendental Ideal is a *standard* of pure Reason for the employment of one's powers of understanding and thinking. The Ideal is grounded in the Idea of the transcendental substratum – the Idea of Reality.

What can we say of this transcendental Ideal? What description (representation) of it can we make through our idea of the 2LAR structure of representation in general? Let us begin with the form of the matter (i.e. Quantity) of the transcendental Ideal.

The Idea of *Entis Realissimi*

The name given to the Quantity of the transcendental Ideal is *entis realissimi*¹ – a phrase that means “most real of being.” In this little phrase of Kant's we encounter two of philosophy's troublesome words joined together in one statement. What does the Idea of *entis realissimi* mean?

In the Critical Philosophy “being” – Margenau's “verb inflated into a most independent noun” – is not a real predicate. “Being” is not thing-like; it signifies a particular *state* of existence, e.g. “being tall” or “being angry” or “being a cat.” When we promote “being” to the status of a noun – e.g. a *human being* or an *organized being* – this manner of speaking does not signify anything that is not equally well predicated by using “being” as a verb – e.g. *being human* or *being organized* – but our use of “being” as an object noun in such cases lays emphasis on the *Dasein* aspect of the existence of whatever adjective modifies “being.” In other words, to predicate *human being* is to predicate an object whose representation contains in its concept the specification of delimiting characteristics, the totality of which is signified by the word “human.” In making this representation *the characteristics are made coordinate (or subordinate) marks of the concept of the object, and the concept of the object, once established, can be subsumed under new characteristics later.* I need not be in possession of a complete *definition* of “human” to

¹ The standard English translations of *Critique of Pure Reason*, including both [KANT1] and [KANT1a], take it upon themselves to replace Kant's original Latin phrase with the phrase *ens realissimum* - “most real being.” I think, and I hope to show the reader, that the little word “of” in Kant's *entis realissimi* is important. Kant himself frequently said, quite clearly, that when ideas must be precisely understood, they should be phrased “in a dead language so that the meaning of the words will not change over time.” I therefore think it is a mistake to change Kant's Latin phrases when translating his work.

recognize the *object* “human being.”

It is this manner of representation that introduces the idea we call a “real thing.” To *be* a real thing is *to be understood as an object*. When we say a lion, a leopard, and a common house cat are “real cats” and that Carroll’s Cheshire Cat is *not* a “real cat,” we *mean* that the concepts of the first three objects contain *all* the delimiting concepts that recognize the concept of the animal “cat” and that the concept of the Cheshire Cat contains a transcendental negation of one or more of those characteristics.

Now if we make abstraction from all the adjectives that could specify the word “being” used as a noun, we find ourselves left with an empty concept. By making this abstraction we take away all the coordinate and subordinate concepts that give context to the object. We are not left with an idea of “reality in itself” because by this phrase we mean the idea of the sum total of all possible predicates; “Being” elevated to the status of Margenau’s “most independent noun” is not the sum total of all possible predicates but, rather, is the lack of *any* predicates whatsoever. We are left with only some amorphous notion of a *Dasein* without an *Existenz*. The phrase “most real Being” (*ens realissimum*) is objectively meaningless. There can be no “most real Being” because absolute “Being” is not even an Object (it has no representation), much less a real object, and there can be no “most real” of that which is not real at all. The cherished “Being” of traditional non-Critical metaphysics has meaning only as “a-word-that-has-no-real-meaning.”

However, if “being” remains a verb the situation is different. We *can* ask ourselves, in a meaningful fashion, what it is that goes into the idea of a most real *of* being (*entis realissimi*) because by this question we are merely asking what it is that must always be in our representation of a thing. Put another way, we are merely asking what it means to make a predication “to be X.” The Idea of *entis realissimi* is the Idea of what it is that is to be included as an *essential* characteristic *of a representation* which signifies that the object of that representation can be thought as *thinglike* (e.g. a *human being*).

Now, we must remember that Rational Theology belongs to metaphysics proper, not to transcendental ontology. We therefore do not look to *entis realissimi* to define for us, as a *constitutive* principle, some particular *material* or *empirical* trait, appearance, characteristic, or attribute of “being real.” Instead, the principle designated by the name *entis realissimi* can be nothing else than a *regulative principle* – a principle that legislates the form of Reason’s employment of the power to think. Furthermore, this principle is a *pure* and *a priori* principle of Reason. It cannot, therefore, involve that which is empirical in a representation but only that which is formal in the construct of an object concept.

What is this “essential structure” in the concept of an object? We have already taken the first step in its exposition. To represent *as* a thing, we must have some collection of defining attributes – concepts which as characteristics *ground* the cognition of the object – *combined* under a notion

of *unity in* the object. For want of a better word this notion, which supplies the transcendental identification of the thing, can be called the Quantity of *oneness* (*Einheit* in German). We will see at a later point in this treatise that the notion of oneness (*Einheit*; “unity”) is a primitive element of transcendental ontology – a *notion* of pure understanding. The principle of *entis realissimi* is not identical to this notion of oneness; rather, *entis realissimi* is the principle of pure Reason which dictates that the representation of a *thing* is a representation in which the characteristic concepts of *being that thing* are composed in understanding under the determinant judgment of a notion of the Quantity of oneness (the notion of unity). *Entis realissimi* can in this fashion be seen as the principle of the Ideal in regard to the form of the matter of *all* things.

The Idea of *Ens Originarium*

We next turn to the principle of the Idea in the matter of the matter of Reality. Kant called this principle *ens originarium* (“original being”). All our cognitions are merely the representation of appearances. Why, then, should we think anything other than that all our perceptions are mere mind-play and the world itself merely a phantom of our own making? To think so *in theory* is solipsism and radical idealism. The radical egocentrism of the infant should not properly be called solipsism, for by that word we mean the thoughtful consideration of the possibility of a world external to the self and the judgment that this possibility is not factual. The egocentrism of the newborn is not the rejection of the idea of an external world but, rather, the failure to differentiate the empirical Self from the empirical other.

The symmetry between the representation of things and the functional development of intelligence enables us from now on to glimpse the directional line of the evolution of the concepts of object, space, causality, and time. In general it may be said that during the first months of life, as long as assimilation remains centered on the organic activity of the subject, the universe presents neither permanent objects, nor objective space, nor time interconnecting events as such, nor causality external to the personal actions. If the child really knew himself, we should have to maintain that solipsism exists. At the very least we may designate as radical egocentrism this phenomenalism without self-perception, for the moving pictures perceived by the subject are known to him only in relation to his elementary activity [PIAG2: xii-xiii].

That which is empirical in representation can bring with it no necessity for the phenomenon of the development of empirical Self-awareness and the evolution of a world model in the mind of the child. Such necessity would require a copy of reality hypothesis of perception, an idea we have already utterly rejected. It follows that the development of the empirical idea of the Self and the related idea of the not-Self (the “rest of the world”) can therefore be explained only as an *inference of reason*. However, this explanation must have some transcendental ground as its basis.

Even Berkeley, the author of the most extreme theory of subjective idealism ever to appear as a serious work of philosophy, did not doubt the existence of some underlying “reality” behind the appearances of things. He merely rejected the idea that in its *fundamental matter* this reality was “material” in the corporeal sense of that word.

35. I do not argue against the existence of any one thing that we can apprehend either by sense or reflexion. That the things I see with my eyes and touch with my hands do exist, really exist, I make not the least question. The only thing whose existence we deny is that which *philosophers* call Matter or corporeal substance. And in doing of this there is no damage done to the rest of mankind, who, I dare say, will never miss it. The Atheist indeed will want the color of an empty name to support his impiety; and the Philosophers may possibly find they have lost a great handle for trifling and disputation.

36. If any man thinks this detracts from the existence or reality of things, he is very far from understanding what hath been premised in the plainest terms I could think of. Take here an abstract of what has been said: - There are spiritual substances, minds, or human souls, which will or excite ideas in themselves at pleasure . . . In the sense here given of *reality* it is evident that every vegetable, star, mineral, and in general each part of the mundane system, is as much a *real being* by our principles as by any other. Whether others mean anything by the term *reality* different from what I do, I entreat them to look into their own thoughts and see.

37. It will be urged that thus much at least is true, to wit, that we take away all corporeal substances. To this my answer is, that if the word *substance* be taken in the vulgar sense - for a combination of sensible qualities, such as extension, solidity, weight, and the like - this we cannot be accused of taking away: but if it be taken in a philosophic sense - for the support of accidents or qualities of the mind - then indeed I acknowledge that we take it away, if one may be said to take away that which never had any existence, not even in the imagination [BERK: 419].

What the “original matter” of “reality” might be can indeed be debated endlessly – Plato *vs.* Aristotle, Berkeley *vs.* Hobbes, Hume *vs.* everyone – but what cannot be seriously denied by anyone is that at the core of all our representations of things lies the *notion* of reality. This is the most fundamental transcendental affirmation of the matter of the matter of a thing – the notion of *the real in all appearances of things* (sensation).

This is the principle of *ens originarium*: that in the manifold of cognitions, those representations that are representations of *things* contain somewhere in the cognition this fundamental notion of the real *in* the appearance. *Ens originarium* does not speak to *what* this “real in the appearance” might be; that would be to make *ens originarium* a *constitutive* principle rather than a regulative principle of Reason. *Ens originarium* is, rather, the principle that the “what” of “thing-ness” is a composition of judgment in which the notion of reality is combined with the oneness of the concept of the thing. Fairies become real things by the combination of the idea of fairies with the sensible source of this idea: the fairy tale. The “empirical me” evolves through the joining of my innate sense of *Dasein* with sensation (the real in the appearance of myself). It matters not “what kind” of sensation this be, only that *some* sensation be presented in consciousness. A cognition cannot be the concept of a real thing except this cognition contain the original notion of the real in the appearance; a cognition *must* be thought – in some manner of

Existenz – as a real thing when the oneness of the form of the matter of the cognition *has agreement* with a notion of the real in its appearance, an agreement that provides the original Quality of “thingness.”

The Idea of *Ens Summum*

Entis realissimi and *ens originarium* are principles that tie an Idea – that of the transcendental Ideal – to the making of the concept of a thing. However, the concept of a thing is always a representation conditioned by the empirical matter of experience. Reason in the employment of the power of thinking – which in terms of the organization of the phenomenon of mind we call the faculty of understanding – always strives for the attainment of unconditioned knowledge. The cognition of a thing is never a representation made as a mere aggregate part unconnected with the cognition of other things. As we discussed earlier, the ground of thinking reality of *a* thing necessarily requires a substratum in which the cognition of the particular thing can be viewed as a limitation placed upon the sum total of all possible predicates. The reality of *a* thing must therefore be viewed as a limitation of some greater “thing” that we call the *Reality of Nature*.

Nature, however, is the idea of the unity in the sum total of all things in the manifold of cognitions. The *concept* of Nature is a concept in which are united the “manyness” of the “things in Nature.” Now, because the particular things are conceptualized as real things, it is obvious that the unity all real things must likewise be regarded as somehow real itself. If this were not so we would face the paradox of having to conceptualize things whose reality is necessarily limited by being part of something which is itself *not real*.

However, it is not correct to infer that the Reality of Nature is derived from the reality of the individual things that are its parts, for in this case Nature would be merely an aggregate of derivative things and not a unity of all things. The reality of things is a limitation of the Reality of Nature and not the other way around. The Idea of *ens summum* (“highest being”) is the principle that connects the Idea of the transcendental Ideal to an idea of Nature *as the highest reality*.

Now, as is always the case, cognition is the representation of appearances. The real in *the manifold of appearances* therefore must be a “reality” subsisting in the form of the form of the manifold of appearances – a *notion* of Relation. Beside the notion of unity in the form of the matter of appearance, the Idea of *ens summum* demands that we must have a notion of subsistence in the form of the form of appearances. The oneness of *a* thing must, in other words, be regarded as an inherence of appearances in Relation to a notion of subsistence in Nature. Later in our discussion of transcendental ontology we shall give this notion of Relation the name *substance*. Unlike the idea of material substance (e.g. the atoms of Lucretius, the corpuscles of Boyle) or the idea of immaterial substance (e.g. the monads of Leibniz), the transcendental notion of substance

pertains to Reality in *Existenz* and not to reality in *Dasein*. The Idea of *ens summum* is the regulative principle by which Reason dictates understanding according to a rule that a concept can be thought as the concept of a thing *only* if this concept is connected in the manifold of concepts through a Relation of the transcendental notion of substance & accident.

The Idea of *Ens Entium*

We come at last to the principle of Rational Theology pertaining to Reality in the matter of the form of the manifold of appearances. Kant called the Idea of *ens entium* the object of Reason's Ideal considered as *das Wesen aller Wesen* ("the essence of all essence") [KANT1a: 557 (B: 606-607)].

(The) highest reality would ground the possibility of all things as a *ground* and not as a quintessence; and the manifoldness of the former rests not on the limitation of the primitive essence² itself but on its complete consequences, to which our whole sensibility, including all reality in appearance, would then belong, which cannot belong to the Idea of a highest essence³ as an ingredient [KANT1a: 557 (B: 607)].

Ens entium is the Idea of the *necessity for coherence* in empirical reality in the matter of the form of the manifold of appearances. It provides the ultimate ground upon which the judgment of reality for all empirically contingent things is based. The Idea of *ens entium* is the principle of Reason that demands the reality endowed to things by their concepts in understanding be viewed as *necessarily* real even though the empirically derived appearances are given only contingently. Kant elucidates this Idea in the following manner:

In spite of this urgent need to presuppose something that understanding could take as the complete ground for the thoroughgoing determinations of its concepts, reason notices the idealistic and merely factitious character of such a presupposition much too easily to allow itself to be persuaded by this alone straightway to assume a mere creature of its own thinking to be an actual essence, were it not urged from another source to seek somewhere for a resting place in the regress from the conditioned - which is given - to the unconditioned, which in itself and as regards its mere concept is not indeed actually given, but which alone can complete the series of conditions carried out to their grounds. Now this is the natural process taken by every human reason, even the most common, although not everyone perseveres in it. It begins not with concepts, but with common experience, and thus grounds itself on something existing. But this footing gives way unless it rests on the immovable rock of the absolutely necessary. But this itself floats without a support if there is still only empty space outside it and under it, unless it fills everything, so that no place is left over for any further *Why?* - i.e. unless it is infinite in its reality.

² *Urwesen*. Kant also used *Urwesen* to describe the object of the Idea of *ens originarium*.

³ *Wesen*. Kant defines 'logical essence' (*logisches Wesen*) as the analytical first ground of all logical predicates of a thing; 'real essence' (*reale Wesen*) he defines as the synthetical first ground of all predicates of a thing; 'essence' *per se* he defines as the first inner ground of all that belongs to the possibility of a thing [KANT19: 174 (29: 820)], [KANT19: 318-319 (28: 552-553)].

If something, no matter what, exists, then it must also be conceded that something exists *necessarily*. For the contingent exists only under the condition of something else as its cause, and from this the same inference holds further all the way to a cause not existing contingently and therefore necessarily without condition. That is the argument on which reason grounds its progress to the primitive essence [KANT1a: 559-560 (B: 611-612)].

We can see from Kant's explanation that the Idea of *ens entium* is not the Idea of an "ingredient" of reality but the Idea of the *necessity* for anchoring objects in something real. A man may claim to be a solipsist and perhaps even claim his own reasons for sharing this opinion with the very people whose individual reality he claims to deny, but his own actions will stand in contradiction to the claim. He will eat when hungry, try to avoid unnecessary danger if it threatens, wear a coat when it snows, and see a doctor when he is sick or injured. We may quarrel endlessly with dialectics over "what reality truly is" but we will not dispute the reality of Reality.

§ 5.2 The Objective Reality of Adaptation

The experiential evidence in favor of the idea of adaptation is well established. In the case of biological adaptation, the effects of adaptation are not at all difficult to perceive. For example, it is a relatively common experience to observe that calluses on the hands frequently develop after one has performed even relatively small amounts of manual labor. Evidence favoring the idea of adaptation is less clear-cut for the case of mental adaptation, but nonetheless seems well established by psychological research such as that conducted by Piaget and his collaborators.

We never directly observe adaptation *per se*. In all cases, what we can experience is a *change* which we infer to be the *result* of a process of adaptation. The change – calluses, learning, or whatever – is the phenomenon with which we have our direct experience. The question before us is: do these phenomena justify our positing of a supersensible object we call adaptation?

The answer to this question will clearly depend on what we mean by the idea of adaptation. The *purpose* of postulating the reality of something called adaptation is found in the unification this idea brings to diverse individual phenomena. From Rational Cosmology we see that the positing of a linkage among these diverse phenomena, through a series of conditions, is an innate principle of Reason. However, this principle does not in itself establish the validity of holding adaptation to be objectively *real*. For this, we must turn to Rational Theology.

From the discussions in the previous section, we have seen that the form of *Existenz* is bound up with this idea of a series. What Rational Theology adds to the picture provided us by Rational Cosmology is the matter of the form in the manifold of Nature. That which we call Reality contains the sum total of all possible predicates; objective reality (the reality of objects within the manifold of Nature) is regarded as merely a limitation on Reality in general. The reality of an object takes its exhibition in the representation of the form of the matter from the Idea of *entis realissimi* and of the matter of the matter from the Idea of *ens originarium*. The *context* of this

objective reality is, however, established only by the Ideas of the manifold of Nature, i.e., in *ens summum* which links the individual object to Reality in general by the principle of the series from the given “conditioned” to its “condition” in a regress toward Reason’s transcendental Ideal. That we must hold coherence in such a series to be *necessary* is the Idea of *ens entium*, the transcendental requirement that the reality of the particular must be *grounded in* the substratum of Reality in general (and not the reverse).

When we experience a *change* in the appearance of Organized Being, and when this change appears to be wrought by the Nature of the Organized Being and yet also appears to be an effect that somehow requires something “external” – i.e., something environmental rather than merely something in *soma* – we call this change an effect of adaptation. The objectively *given* phenomenon is the change itself, which we regard as a *real* change. However, we cannot regard this empirical given as a real change (*entis realissimi*) unless we also regard its reality as *necessarily* connected within the substratum (*ens entium*) of the sum total of all possible transcendental affirmations (*ens originarium*) and regard this connection by means of a regress through the series of conditions leading to some possible unconditioned ground (*ens summum*).

The idea of adaptation therefore obtains its objective validity by virtue of it being the representation of the next higher link in this series of conditions leading toward the transcendental Ideal. For the given empirical change to be regarded as a *real* change wrought by the Organized Being *on itself*, we must equally regard this change as being the *effect* of a *real* power of Organized Being: the power of adaptation.

This requirement does not establish for us knowledge of the scope and extent of this power of adaptation. Adaptation is an *empirical* idea and the details of its Nature – in Quantity, Quality, Relation, and Modality – are at all times contingent upon empirical experience. Put another way, the representation of the *appearance* of empirical adaptation is a topic belonging to the empirical division of mental physics – a logical division of the science we may justly call *empirical psychology* insofar as it concerns the logical division of *mental* adaptation, and which we may call *biology* insofar as it concerns the logical division of adaptation of the *soma*. What we can establish rationally, through metaphysics proper, is the necessity of the real objective validity of the power of adaptation.

So it is that Piaget’s analogy, by which he posited the idea of mental adaptation from the experience of biological adaptation, does in fact have a transcendental ground for its objective validity. We need only bear in mind that while the empirical *details* of the idea of adaptation depend upon (and are therefore contingent upon) empirical scientific findings, the reality of the power of adaptation itself has a transcendental ground and is therefore a *real* object (a *noumenon*). Empirical science must provide us with the appearance of the power of adaptation, but the objective reality of this power is grounded in and established by the pure *a priori*

principles of metaphysics proper. As for its appearance, we will deal with this later.

Merely because we have established the real objective validity of the power of adaptation, may we also infer real objective validity for the idea of a *faculty* of adaptation? The argument *for* this proposition is given by the empirical observation that physical (i.e., biological) adaptation appears to be different *in kind* from mental adaptation. But if both “kinds” of adaptation are merely aspects of the *same* power, does not this mean that the power of adaptation must also be a faculty?

Here it is important to note that the phrase “real objective validity” does not imply we can draw a *real* division between two *powers* of adaptation. Rational Psychology tells us that the division between *nous* and *soma* has no *real* validity; it is merely a *logical* division in the Nature of the Organized Being. It follows that, since the argument for a faculty of adaptation is based upon this division, the idea of a divided faculty of adaptation is an idea with merely *logical* validity. In other words, the idea of a faculty of adaptation cannot be regarded as containing a *real* division of this faculty. The division is a *logical principle* for understanding adaptation in terms of specific aspects of appearances, and as such adaptation is merely a character of *psyche*.

This finding is indeed one of general applicability to the idea of faculties in general. A faculty, we recall, is an idea of *organization* in the context of the form of an ability. A *power*, on the other hand, is the idea of the matter of an ability to produce sensible effects. The idea of a power is linked to and grounded in the reality of sensible appearances and we can, through Rational Theology, establish the real validity of the idea of a power. The idea of a faculty, on the other hand, is linked to our doctrine of methods as a means of understanding the *Existenz* of a power. Its validity, therefore, is only a *logical* and never a *thing-like* validity. A “faculty” produces no phenomenal effects and gives no phenomenal implications. Therefore it can never find for itself the *ens originarium* required to “start” the regression of the series of conditions or lead, in principle, to the transcendental Ideal. Rational Psychology grants us the logical validity of the idea of a faculty, but Rational Theology denies it objective validity when this idea is divorced from the ability for which it is the form. The theoretical objects by which we shall describe *nous* have real validity only insofar as they are considered to be abilities; their division into and organization along the lines of faculties has logical but not thing-like objective validity.

§ 6. Transcendental Illusion

In what we have said up to now, the idea of the representation of a series in the manifold of representations has played a role of central importance both in Rational Cosmology and in Rational Theology. Reason, in its primal drive to think the unconditioned that grounds all conditioned empirical experience, sets up the goal of the transcendental Ideal as a “standard of

perfection” for theoretical (speculative) understanding. This property of Reason appears to be a key advantage for the ability of human life to flourish in what appears to be a world capable of the most implacable hostility to individual survival. Be this as it may, this same innate drive of Reason for thinking the unconditioned is also a source of the most confounding errors and paradoxes in the rational employment of one’s power of thinking.

One of Kant’s most enduring contributions was his demonstration that the natural dialectic of pure Reason, in the speculative employment of one’s power of thinking, can and does lead us to speculative errors. We have briefly discussed an instance of this in the section on Rational Psychology. In that discussion we pointed out the error of reification – the thinking that merely logical constructs provide a real *thing-like* ground for the *Dasein* of an object. In that section, we dealt specifically with the impossibility of inferring from the *I* of apperception – the mere awareness of our personal *Dasein* – the actual *Dasein* of a spiritual soul divorced from *soma*. We found that the transcendental *I* does not provide us with any sensible cognition of the Self; the Self of self-awareness is *appearance* only. The *I* becomes “the soul” only through reification, a speculation we find unsupported in the *actual experience* of “myself.”

If by “knowledge of a thing” we mean that we have both an objectively sufficient reason *and* a subjectively sufficient reason “for knowing such-and-such is so” then knowledge can be knowledge only of the phenomena of sensible appearance, for it is only in this case that the “given” for *ens originarium* occurs that can “start” the construction of the regression of the series of conditions leading towards *ens summum*, the objective reality of which is necessary by the Idea of the *ens entium*. Without this real-in-the-appearance we lack the objective ground for knowing the *real validity* of our ideas. We may call a *belief* an idea we hold-to-be-true on grounds of a subjectively sufficient reason only, lacking the accompaniment of an objectively sufficient reason.¹

Logical validity can be a source of belief, but logical validity alone can never be the ground for an objectively sufficient reason. Now, metaphysics proper is a doctrine *for theory*. It is a doctrine for how theory is to be made if we are to avoid making speculative errors by mistaking a belief for objective knowledge. Reason, however, appears not only capable but actually *inclined* to push understanding past the horizon of what can be objectively known. If we may be permitted to anthropomorphize Reason briefly, we could say that Reason is *impatient* to arrive at its goal of the transcendental Ideal. Reification is one of the ways by which speculative Reason carries thinking beyond knowledge of appearances and attempts to regard mere ideas of *noumena* as objectively valid (the thing-in-itself) without an *objectively* sufficient reason. Such ideas are not

¹ We may call an *opinion* an idea we hold-to-be-true despite the lack of *both* an objectively sufficient reason *and* a subjectively sufficient reason. Later we will see that belief (believing) is unquestioned holding-to-be-true.

transcendental; they are *transcendent* – beyond the horizon of possible experience.

As an example, we may think with objective validity the idea of a power provided this idea is firmly anchored to actual experience. But we can never regard a faculty as a “real thing” that “possesses” a power because the idea of a faculty is an idea with merely logical validity; we can have no actual experience *of* a faculty *per se*. In science, where we must always balance the empirically given with the rationally thought, the need for clearly delimiting the boundary between the transcendently necessary and the transcendently speculative is a duty to which every scientist has a responsibility – a social contract freely entered into by every scientist.

The first requirement for fulfilling this duty is to know that dialectic illusion is not merely possible but also can occur in such subtle ways as to be difficult to guard against. The errors in thinking can occur so innocently that by the time the error is discovered (by being contradicted in empirical fact), the original source of the error might easily have been forgotten and buried under the admixture of valid and specious theory built over it. Hegel apparently believed that transcendental illusion could be fixed up (in principle, anyway) through the method of the Hegelian triangle – the process of thesis-antithesis-synthesis. Perhaps this method does have some usefulness in backtracking to uncover the original error, but I find it difficult to see how anything constructive can originate from Hegel’s method, nor do I think Hegel’s method can turn a transcendental illusion into objectively valid knowledge.

The next point we need to recognize is that the invalidity of a transcendent idea does not provide the ground for the validity of its contradictory opposite. If I conclude that the idea of a faculty does not have thing-like objective validity, this does not mean I must conclude that the idea of a faculty is really a *false* idea. If truth is the congruence of a cognition with its object, then falsity must logically be incongruence between a cognition and its object. In both cases, though, we require the object as an appearance in order to make a determination of truth or falsity. For the supersensible objects of ideas (the *noumena*), we can have no direct experience, in an appearance, of the object; we have actual experiences of objects as *phenomena* and the validity of the idea of a *noumenon* – to the extent that the idea *has* any objective validity – is always accredited to the *noumenon* only through its representation in a series.

We can hold an idea to be true without also holding this idea to be *certain*. We can, likewise, hold an idea to be false without also holding that there is “no grain of truth within it” – i.e., without holding the *total falsity* of the idea to be certain. The lack of real objective validity in an idea does not imply the real objective validity of its contradictory opposite. To put it another way, transcendent ideas are *formally undecidable* through reasoning. Experience (through appearances) is the only avenue by which truth and falsity can be ascribed to ideas and where such experience is not possible, there no judgment of truth or falsity can be rendered. There is, as Kant remarked, room for *faith* in the practice of reasoning.

The history of science provides us with some examples. If we take, for instance, the phenomenon of light we find, within the history of science, epochs where light has been taken to be a material corpuscle (Newton's theory), a wave in a luminiferous æther (Huygens' theory), and the current theory of the "photon" (a thing regarded as somehow or other exhibiting *both* "particle-like" properties and "wave-like" properties, the latter describable in terms of yet another idea, namely "probability amplitudes"). One can only wonder what the objects of physics will look like a century from now. *Science admits of dubitability* – as indeed must the bulk of human knowledge.

Kant has left us with a number of examples of transcendental illusion arising from the on-going process of Reason's efforts to attain to the unconditioned in the regress of ideas, i.e., in its effort to achieve *formal perfection of knowledge*. In Rational Psychology, in Rational Cosmology, and in Rational Theology there are planted the seeds of a transcendental dialectic that easily leads human understanding to construct transcendental illusions. In *Critique of Pure Reason* he deals with what one might call *the illusions of rational philosophy*. He mixes the discussion of these illusions in so thoroughly with his discussion of metaphysics proper (which, in comparison to his discussion of the dialectic illusions, receives scant coverage) that at times it is difficult to see where his discussion of rational philosophy leaves off and his discussion of transcendental illusion begins. We will not pursue this discussion in depth in our present treatise, but it is worthwhile to catalog these transcendental illusions. The reader who is interested in seeing Kant's discussion may refer to his three great Critiques for further detail.

For Rational Psychology, we have the *paralogisms* of pure reason [KANT1a: 411-458]. These deal with the illusion that results when we reify the *I* of transcendental apperception to the idea of the soul – i.e., when we take the *subjective conditions of thinking* for the cognition of a *real thing* (the soul) [KANT1a: 439 (A: 396)]. The paralogisms of pure reason are expressed in the representation of the soul as:

- In Relation: As a Soul, I am a substance;
- In Quality: I am a simple substance;
- In Quantity: Because I am conscious of the numerical identity of myself at different times, the soul is *personal* self;
- In Modality: I am certain only of myself; therefore the existence of all outer objects is doubtful (subjective idealism).

Kant discusses the paralogisms of Rational Psychology at length and demonstrates the illusory nature of these ideas of a "doctrine of a soul." Elsewhere [KANT4], he also deals with such dialectic ideas as the immortality of the soul and provides us with an illustration of how Reason can come to drive one's understanding in the construction of such ideas.

For Rational Cosmology we have the *antinomy of pure reason*. Kant provides us with four illusions arising from the speculative use of judgmentation under Reason's drive to complete the regress of the series of conditions. In this case Kant shows us four pairs of assertions – the thesis and the antithesis in each case – and manages to “prove” the truth of *both* the thesis *and* the antithesis. Since these pairs of propositions are contradictorily opposed, “proving” *both* to be “true” sets up a paradox, and the presentation of such a paradox is an unmistakable signifier of a cosmological illusion. The antinomies of pure reason are [KANT1a: 470-495 (B: 455-488)]:

1st Antinomy:

Thesis: The world has a beginning in time, and is of finite extent in space.
Antithesis: The world has no beginning in time and no bounds in space.

2nd Antinomy:

Thesis: Every composite substance in the world consists of simple parts, and nothing exists anywhere except the simple or what is composed of the simple.
Antithesis: No composite thing in the world consists of simple parts, and nowhere in it does there exist anything simple.

3rd Antinomy:

Thesis: Causality in accordance with the laws of nature is not the only one from which all the appearances of the world can be derived. It is also necessary to assume another causality through freedom in order to explain them.
Antithesis: There is no freedom, but everything in the world happens solely in accordance with the laws of nature.

4th Antinomy:

Thesis: To the world there belongs something that, either as a part of it or as its cause, is an absolutely necessary being.
Antithesis: There is no absolutely necessary being existing anywhere, either in the world or outside the world, as its cause.

Kant's “proofs” of these eight propositions make interesting reading and I recommend them to the reader of this treatise. The first three antinomies ought to be especially interesting to physicists inasmuch as there exists in physics today some “philosophical” contention concerning exactly these six propositions. The thesis of the first antinomy is, of course, precisely the position taken by those who hold with the Big Bang theory of the universe, while the antithesis is the position taken by the minority of physicists who prefer a “plasma” model of an eternal Universe.² What metaphysics proper tells us is that these antinomies are formally undecidable – i.e., are transcendental illusions. Insofar as science proper is concerned, these issues are meaningless because undecidable.

² c.f. Eric J. Lerner, *The Big Bang Never Happened*, N.Y.: Vintage Books, 1992.

For Rational Theology, we have the religious theological idea – i.e., the idea of God or gods. The transcendental Ideal involves four Ideas concerning Reality that make up the regulative principles of Reason in this sphere. We have already discussed the significance of Kant’s *entis realissimi* and commented on the distinction between “most real *of* being” and “most real Being” (*ens realissimum*). Now, the “entity” of these “*ens*” terms is left undecided by Rational Theology. However, persistently over the course of 25 centuries¹ philosophical thought has time and time again given in to the drive of Reason and promoted “being” to the rank of a substantive “and most independent” noun, “Being.” The “*ens* ideas” are, however, merely part of the Ideal of pure reason and they are suitable only as principles for regulating the thinking of ideas of the things in Reality.

If, on the other hand, we *personify* the Idea of *ens* into the idea of “supreme Being” or an “Author of the Universe,” this personification invariably becomes a rational idea of God (or gods, depending on how this personification is carried out). I think there is little room to doubt that Kant himself held faith in the *Dasein* of God and the soul. Indeed, Kant’s “pre-critical” (prior to 1770) works include efforts to prove God’s actual existence by rational argument. One can only imagine what Kant’s personal feelings might have been when the results of his own work returned a verdict that such a purely rational proof was impossible to achieve.

Religious theology arose as the effort to apply philosophy to the idea of God. A religion without a theology is mere idolatry. One of the best examples of a thorough treatment of religious theology is the *Summa Theologica* of St. Thomas Aquinas. However, the keystone for most of the important works of religious theology is the admission of divine revelation as a ground. Now, *if* such a revelation has ever *in fact* been actually experienced by a person, that person would have an objectively sufficient ground for *real knowledge* of God. It would also have to be said that such a person would not *have faith* in God for he or she would *know* of God. *Faith* is not required where there is objectively sufficient valid knowledge.

I think it safe to assume that for the rest of us a personal experience of such a divine revelation has not taken place nor, if history is a reliable guide, is such a revelation likely to be forthcoming. Moses might have talked with God, Muhammad might have acted as the reporter of Gabriel in reciting the Koran, and the apostles might have seen Christ in the flesh after the crucifixion; speaking for myself, I have not been so privileged and *if I have faith* in God, I must accept that this can be invested only in that for there is no means of objective *proof*.

Kant discusses the impossibility of such a proof at length in *Critique of Pure Reason*. On the basis of metaphysics proper, there are (Kant shows us) only three possible types of arguments by which one can attempt an objectively valid *real* proof of God’s existence. These are: the physico-

¹ Parmenides (5th and 6th centuries B.C.) is credited with being the first to do so.

theological proof; the cosmological proof; and, the ontological proof. Kant discusses these, each in turn, and demonstrates that behind each of them lies a reification – a transcendental illusion [KANT1a: 563-589 (B: 618-670)]. One can almost sense Kant's amazement over this his own result:

There is something exceedingly remarkable in the fact that when one presupposes something existing, one can find no way around the conclusion that something also exists necessarily. It is on this entirely natural (though not for this reason secure) inference that the cosmological argument rested. On the contrary, if I assume the concept of anything I like, then I find that its existence² can never be represented by me as absolutely necessary, and that whatever exists, nothing hinders me from thinking its non-being; hence although for the existing in general I must assume something necessary, I cannot think any single thing itself as necessary in itself. That means: in going back to the conditions of existing I can never *complete* the existing without assuming a necessary being, but I can never *begin* with this being [KANT1a: 575 (B: 643-644)].

However disappointing St. Anselm would find this conclusion, it stands nonetheless as an absolute boundary for the objectively valid employment of theoretical reasoning. However much of a disappointment this may be to religious theology, unless God should choose to reveal Himself to all of us by actual experience, religion can never be based on anything more than a subjectively sufficient reason and faith can never be taken away from religious doctrine. If one holds-in-faith the *Dasein* of God, one can also then conclude that God apparently places a higher value on faith than on mankind's rational powers. Were God to unequivocally reveal Himself we would require no faith.

But if the transcendental illusion inherent in personifying "being" into "Being" denies to religion any hope of becoming a science, it is equally the case that science *can say nothing about God* with any objective validity whatsoever. This is something that scientists understand (or, at least, that they *ought to* understand), but seems to not be widely understood by non-scientists. Science *as science* does not need the idea of God, and it is fortunate that this is so because if it did science *proper* would be impossible. But, at the same time, "God theory" (theology) lies outside the domain of science and it is not possible for science to expand its borders to include it. Science can return neither a "yea" nor a "nay" on the question of God (although it is certainly capable of debunking – or supporting – religious doctrine on the *temporal* plane of experience). Galileo's famous quote of Cardinal Baronius – "the Holy Spirit intended to teach us in the Bible how to go to Heaven, not how the heavens go" – works both ways.

To summarize the point in this section: Metaphysics proper provides us with both a method for the rational and objectively valid construction of theory *and* with a warning that there are limits beyond which we cannot objectively go. Our appreciation of the dialectical illusion that is

² *Dasein*.

always possible, and towards which our own power of Reason urges us onward, must stand as a brake to speculation in science. This, indeed, is one of the great services (even as a negative doctrine) that metaphysics proper provides to science.

§ 7. The *Verstandes-Actus* and Logic

Having established the real validity of Piaget’s functional invariant of adaptation, we now turn our attention to the examination of Kant’s *Verstandes-Actus* or “acts of understanding”: comparison (*Comparison*), reflexion, and abstraction. Kant described these as “logical” acts in the making of sensuous representations. The question before us is: how are we to view these “logical acts” in the overall description of the phenomenon of mind?

Kant’s description of “the science of logic” has been taken by some commentators to imply Kant thought formal logic – the “logic of the schools” – is an innate power of the mind. However, the phrase “science of logic” should give us pause before we make the assumption that the complex system we call “formal logic” is some kind of “built-in computing device” or power (know-how *a priori*) of *nous*. A *science*, we recall, is a *systematic doctrine*. Shall we make the bold presupposition that mind comes equipped from birth with a full-blown science embedded in it? If so, *why must formal logic be taught?* Would not the juxtaposition of these two ideas constitute a very strange paradox? Since Kant himself was a *teacher* of logic (for some forty years), shall we suppose that Kant would not have recognized this paradox?

Speaking for myself, I think the idea that “a science of formal logic” is somehow an *innate* power ready-made with which mind (or brain) comes equipped is simply too absurd a proposition to entertain, and the idea that Kant might have thought it was so is equally absurd. Rather, when Kant calls logic (or mathematics, or geometry, or some other aspect of science) knowledge *a priori*, he only means that these *constructs of mind* are examples of mind’s exhibited power of making synthetic propositions concerning supersensible objects (i.e. that we *are capable of having ideas*). This is hardly an earth-shaking proposition; it is merely a fact. But, of course, *how this is possible* is one of the central questions of the *Critique of Pure Reason*.

We do not have to rely on opinions such as the one I expressed above. The question “Is logic innate?” is a question of *fact*. As such, it can be asked *empirically*. Piaget has done so, and it is worthwhile to briefly look at how the facts came out in his studies.

§ 7.1 The Various “Definitions” of “Logic”

To gain an appreciation of the psychological findings of Piaget and his co-workers, we need to begin with a description of what is meant by the term “logic.” The *Oxford Dictionary of Philosophy* defines logic as “the general science of inference.” Within this broad definition we

find that several “logics” may be differentiated. *Deductive* logic is a form of logic in which conclusions follow from a set of premises; if the premises are true, the conclusions must likewise be true. Deductive logic is rule based and the aim of the science of deductive logic is “to make explicit the rules by which inferences may be drawn” regardless of whether or not the actual reasoning process a person uses conforms to these rules. Logic in this sense of the word was described by Piaget’s colorful metaphor, “Logic is the morality of thought” [PIAG7: 398], where we can take “morality” in this context as a synonym for “the rules of right and wrong.”

Deductive logic is commonly called *formal*³ logic, to distinguish it from *inductive* logic. Inductive logic denotes a synthetical form of reasoning in which a conclusion is reached on the basis of “evidence” that “points to” this conclusion. Inductive logic is regarded as lacking the rigorous “certainty” of deductive logic and there are some people who deny that inductive logic is a logic at all, although inductive (or “intuitive”) logic seems undeniably to describe at least *some* aspects of human reasoning.

From the time of Aristotle (who is credited with being the father of logic), deductive logic (whether it be called prepositional logic or predicate logic or by some other name) has had a bivalent nature, i.e., its “propositions” or “predications” are viewed as being either true or false.⁴ In more recent years, this bivalent nature of formal logic has come under criticism as being too restrictive to describe “the real world.” Nature, it is argued, does not present itself in black and white terms: true or false, yes or no, hot or cold, etc. This criticism has led to the development of yet another species of logic, generally called *fuzzy* logic, in which propositions are “true to some degree” *and*, at the same time, “false to some degree.” Critics of fuzzy logic have been numerous and vocal, but it is safe to say at this point that a science of fuzzy logic has in fact been formulated and its adherents regard “crisp logic” (i.e., traditional mathematical logic) as a special case of fuzzy logic.⁵

Among positivists – a category which includes a great many mathematicians, engineers, and cognitive scientists – there is a pronounced tendency to view mathematical logic (be it crisp or fuzzy) as an accurate and “real” description of “how thinking works.” One of the more extreme spokesmen for this position is Herbert A. Simon:⁶

My central thesis is that at this level of aggregation conventional computers can be, and have been,

³ In its modern form, deductive logic is also called “mathematical” logic [QUIN] or, synonymously, “symbolic” logic [AMBR].

⁴ For Aristotle, “true” and “false” meant *material* truth or falsity, i.e., “really” true or false. In modern mathematical (or “symbolic”) logic, logical “statements” are merely “formally” true or false, i.e., the statements have a “truth value” (T or F, “1” or “0”). “Truth values” have no connotation for whether or not the logical proposition (or predicate) is “really” true or false.

⁵ c.f. Bart Kosko, *Fuzzy Thinking*, N.Y.: Hyperion, 1993.

⁶ Herbert A. Simon, “Machine as Mind,” in *Android Epistemology*, (eds.) Kenneth M. Ford, Clark Glymour, and Patrick J. Hayes, Menlo Park, CA: AAAI Press/ The MIT Press, 1995.

programmed to represent symbol structures and carry out processes on those structures in a manner that parallels, step by step, the way the human brain does it. The principal evidence for my thesis are programs that do just that. These programs demonstrably think . . .

The conclusion we can draw from the evidence I have sketched is simple: Computers can be programmed, and have been programmed, to simulate at a symbolic level the processes that are used in human thinking. We need not talk about computers thinking in the future tense; they have been thinking (in smaller or bigger ways) for 35 years. They have been thinking "logically" and they have been thinking "intuitively" - even "creatively."

Simon goes on to offer his opinions on "why ... this conclusion has been resisted so fiercely, even in the face of massive evidence." The "resistance" to his thesis comes from a wide range of people: almost all philosophers, most engineers, many psychologists, and many other people. Now seems as good a time as any to add myself to this list. Simon's definition of "thinking" is, in my opinion, too narrow and more than a little self-serving, and it is based on a very *ad hoc* definition of what "thinking" is supposed to be. In his own field Simon has done many fine things, his views are not entirely wrong, and many of them deserve respect; but his "central thesis" is badly flawed, as I will establish in this treatise, and his contention that computers "have been thinking . . . for 35 years" (by now it would be about 50) is positivist hogwash. Simon accuses the "dissenters" from his view of not looking "very hard at the evidence, especially the evidence from psychological laboratories." Well, let us look at the evidence.

§ 7.2 The Growth of Logical Thinking

Whether by deduction or induction, and whether with apodictic certainty or fuzzy degree, the positivist view of logic as a model for brain function (which for positivism typically replaces "mind" as the dominant model for "the thinking function") is one of rule-based inference. In the words of fuzzy logician Bart Kosko⁷:

How do you reason? You want to play golf on Saturday or Sunday and you don't want to get wet when you play. The news says there is a good chance it will rain on Saturday but only a slight chance it will rain on Sunday. You reason that you should play golf on Sunday. But how do you reach this answer?

You reach it with rules. Rules associate ideas. They relate one thing or event or process to another thing or event or process. In natural and computer languages rules have the form of if-then statements. If it rains, you get wet. If you get wet, you can't play golf. It will rain on Saturday. So you can't play golf on Saturday. It won't rain on Sunday. If you can't play golf on Saturday and if it won't rain on Sunday, you can play golf on Sunday. So you play golf on Sunday.

Knowledge as rules goes back to at least Aristotle. Leibniz dreamed of a symbolic logic and *ars combinatoria* or computer system that could put all our rules into symbols and reason from them to reach math truths and daily facts. Today computer scientists have built the field of "artificial intelligence" or AI on the belief that knowledge is rules *and* you can write down rules in the black-and-white language of computers and symbolic logic. After over 30 years of research and billions of dollars in funding AI has not so far produced smart machines or smart products. . . Fuzzy researchers have built hundreds of smart machines and we think we know why the AI folks have

⁷ Kosko, *op. cit.*, pp. 158-159.

failed. Yes, you need rules. . . You need *fuzzy* rules.

Overlooking Kosko's claims regarding "smart" machines⁸, the bottom line in the positivist position is that reasoning processes involve "rules" – rules that dictate specific decisions or even rules that dictate "symbolic transformations" which produce "symbols" that represent other "rules." (Rules for producing rules are sometimes called "meta-rules"). The design of systems that perform functions such as this is called *logic design*. This term, however, falls far short of what the non-engineer and the non-computer scientist usually mean by the word "logic." Let us not engage in the semantic tautologies that technically self-serving and narrow re-definition of the words in our language makes possible. What does "logic" in the *general* use of the word mean? In the view of Piaget,

For what is logic but the art of proof? To reason logically is so to link one's propositions that each should contain the reason for the one succeeding it, and should itself be demonstrated by the one preceding it. Or at any rate, whatever the order adopted in the construction of one's own exposition, it is to demonstrate judgments by each other. Logical reasoning is always a demonstration. If, therefore, the child remains for a long time ignorant of the need for demonstration, this is bound to have an effect upon his manner of reasoning [PIAG11: 2].

The question we have before us at present is simple to state, howsoever difficult it may be to answer: Is the ability to reason logically (in the connotation meant by Simon, Kosko, and others) an innate (and therefore "built-in" *a priori*) power of mind or does "logical thinking" *develop* over time with experience? The psychological *evidence* is that it is the latter which *actually* takes place. Now, what *is* the evidence which points to this conclusion?

Autistic, Intelligent, and Ego-Centric Thought

Psychoanalysts describe the process of thinking in terms of two distinct, yet interacting, modes of thought: "undirected" or *autistic* thought, and "directed" or *intelligent* thought. Piaget provides a clear description of this distinction:

Directed thought is conscious, i.e., it pursues an aim which is present in the mind of the thinker; it is intelligent, which means that it is adapted to reality and tries to influence it; it admits of being true or false (empirically or logically true), and it can be communicated by language. Autistic thought is sub-conscious, which means that the aims it pursues and the problems it tries to solve are not present in consciousness; it is not adapted to reality, but creates for itself a dream world of imagination; it tends, not to establish truths, but to satisfy desires, and it remains strictly individual and incommunicable by means of language. On the contrary, it works chiefly by images, and in

⁸ If by "smart machine" one only means a machine that is to some degree self-tuning or adaptive, Kosko is correct when he says "hundreds of smart machines" have been produced using fuzzy logic. However, under this definition, so has the AI approach and so have many other people, including myself. However, if the adjective "smart" is supposed to mean "intelligent," neither Kosko nor anyone else has ever, up to the time of this writing, produced *any* "smart" machine.

order to express itself, has recourse to indirect methods, evoking by means of symbols and myths the feelings by which it is led [PIAG22: 43].

If autistic thought is “incommunicable” by language, what justification does psychology have for positing this mode of thought? In other words, what makes the psychologist think “autistic” thought is real? The idea of autistic thought can more or less be traced back to Freud’s psychoanalysis of dreams⁹ and is linked with experiences such as daydreaming or free association. More *direct* evidence for autistic thought, however, proves to be difficult to obtain [BENJ: 365-367]. If, however, the psychoanalytic model of autistic thought is too vague and poorly established to be of much use to us *in concreto*, it may nonetheless serve as a useful bit of terminology for distinguishing between *socially directed* behavior (which is, in the sense quoted above, indicative of “intelligent” thought) and individualized or *self-centered* behavior. For example, we may consider the following examples of childish behavior:

Everyone knows how, in the first years of life, a child loves to repeat the words he hears, to imitate syllables and sounds, even those of which he hardly understands the meaning . . . At his most imitative stage, the child mimics with his whole being, identifying himself with his model. But this game, though it seems to imply an essentially social attitude, really indicates one that is essentially ego-centric. The copied movements and behavior have nothing in them to interest the child, there is no adaptation of the I to anyone else; there is a confusion by which the child does not know that he is imitating, but plays his game as though it were his own creation . . .

Jac says to Ez: "Look, Ez, your pants are showing." Pie, who is in another part of the room immediately repeats: "*Look, my pants are showing, and my shirt, too.*"

Now there is not a word of truth in all this. It is simply the joy of repeating for its own sake that makes Pie talk this way, i.e., the pleasure of using words not for the sake of adapting oneself to the conversation, but for the sake of playing with them.

We have seen . . . the example of Pie hearing Lev say: "A funny gentleman," and repeating this remark for his own amusement although he is busy drawing a tram car. This shows how little repetition distracts Pie from his class-work. (Ez. says: "I want to ride on the train up there"), Pie: "*I want to ride on the train up there.*"

There is no need to multiply examples. The process is always the same. The children are occupied with drawing or playing; they all talk intermittently without listening very much to each other; but the words thrown out are caught on the bounce, like balls. Sometimes they are repeated as they are, like the remarks of the present category, sometimes they set in action those dual monologues of which we shall speak later on [PIAG22: 11-13].

Pie, one of the young subjects in these observations, was a 6½ year-old boy observed over a period of about one month as he went about his normal morning activities at school. The behaviors and activities Piaget observed and reported are not indicative of autistic thought but, rather, of what Piaget calls ego-centric thought.

⁹ Sigmund Freud, *The Interpretation of Dreams*, 1900.

Ego-centric thought and intelligence therefore represent two different forms of reasoning, and we may even say, without paradox, two different logics. By logic is meant here the sum of the habits which the mind adopts in the general conduct of its operations - in the general conduct of a game of chess, in contrast, as Poincaré says, to the special rules which govern each separate proposition, each particular move in the game. Ego-centric logic and communicable logic will therefore differ less in their conclusions (except with the child where ego-centric logic often functions) than in the way they work. The main points of divergence are as follows:

1. Ego-centric logic is more intuitive, more 'syncretistic' than deductive, i.e., its reasoning is not made explicit. The mind leaps from premise to conclusion at a single bound, without stopping on the way.
2. Little value is attached to proving, or even checking propositions. The vision of the whole brings about a state of belief and a feeling of security far more rapidly than if each step in the argument were made explicit.
3. Personal schemas of analogy are made use of, likewise memories of earlier reasoning, which control the present course of reasoning without openly manifesting their influence.
4. Visual schemas also play an important part, and can even take the place of proof in supporting the deduction that is made.
5. Finally, judgments of value have far more influence on ego-centric than on communicable thought.

In communicated intelligence, on the other hand, we find 1. far more deduction, more of an attempt to render explicit the relations between propositions by such expressions as *therefore, if . . . then*, etc. 2. Greater emphasis is laid on proof. Indeed, the whole exposition is framed in view of the proof, i.e., in view of the necessity of convincing someone else, and (as a corollary) of convincing oneself whenever one's personal certainty may have been shaken by the process of deductive reasoning. 3. Schemas of analogy tend to be eliminated, and to be replaced by deduction proper. 4. Visual schemas are also done away with, first as incommunicable, and later as useless for the purposes of demonstration. 5. Finally, personal judgments of value are eliminated in favor of collective judgments of value, these being more in keeping with ordinary reason [PIAG22: 46-47].

Piaget and his coworkers find that childish thought, up to about age 7 or 8 years, is predominantly ego-centric. Beyond age 7, there is a gradual trend away from predominantly ego-centric thought to more "intelligent" thought, a process that is essentially completed (although the ego-centric element is never entirely eliminated) by about 15 years of age. The existence of this ego-centric mode of thinking, and its predominance early in life, is a severe blow to the idea of thinking and reasoning as processes founded *essentially* on "logic" in the usual sense of that word. Furthermore, it is not merely the *process* but also the *objective character* of thinking that is affected by this ego-centric mode of thinking. The evidence for this latter fact is demonstrated by two dual characteristics of childish thinking: syncretism and juxtaposition.

Syncretism and Juxtaposition

Syncretism is a term that denotes the tendency for the mind to, as James put it, fuse together everything than *can* be fused together – to create a vast whole out of heterogeneous parts. In the context of our present discussion the significance of syncretism lies in the little word "can": What sort of cognitions "can" be fused together and what sort "can not"? The answer to this question in the case of the child whose thought is predominantly ego-centric is particularly significant for the question of whether thinking and reasoning processes are *at root* "logical" in the "if-then" sense of the "knowledge is rules" model described by Kosko and others.

We laid stress in the first chapters on the ego-centric nature of child thought, and we tried to point out the importance which this phenomenon might assume in the use of reasoning in general. We tried in particular to bring out the three following points in which ego-centric thought differs from socialized thought. 1. It is non-discursive, and goes straight from premises to conclusion in a single intuitive act, without any of the intervening steps of deduction. . . 2. It makes use of schemas of imagery, and 3. of schemas of analogy, both of which are extremely active in the conduct of thought and yet extremely elusive because incommunicable and arbitrary. These three features characterize the very common phenomenon called the syncretism of thought. This syncretism is generally marked by a fourth characteristic to which we have already drawn attention, *viz.*, a certain measure of belief and conviction, enabling the subject to dispense very easily with any attempt at demonstration [PIAG22: 127].

The phenomenon of syncretism gives us the appearance of what seems to be a more or less pre-verbal process of thinking and judgment. It is tempting to view the outcomes of syncretistic thought as a class of primitive empirical *premises* – a class of “thought elements” that *formal* logic (which deals with the form of *connecting* premises with conclusions) requires as *givens*. It is well known that formal (i.e. symbolic) logic cannot establish its own premises; symbolic logic deals with “variables” and not with “premises” as such. Thus, syncretism as such is not at odds with the basic supposition that thinking and reasoning follow “logical” operations. On the other hand, however, the phenomenon of syncretism *does* raise another issue that opposes this supposition, namely, the absence in syncretistic thought of evidence of the *relational* (“if-then”) aspect of symbolic logic.

Syncretism is related to nearly all the phenomena we have been calling to mind. . . Now to say that child thought is syncretistic means precisely this, that childish ideas arise through comprehensive schemes and through subjective schemes, i.e., schemes that do not correspond to analogies or causal relations that can be verified by everybody. If, therefore, the child possesses neither the logic of relations nor the synthetic capacity which would enable him to conceive of things as objectively related to one another, it must be because his way of thinking is syncretistic. For in the mind of the child everything is connected with everything else, everything can be justified by means of unforeseen allusions and implications. But we have no suspicion of this wealth of relations, precisely because this very syncretism which causes it is without the means of expression that would render it communicable.

This last remark leads one to suppose that syncretism, besides being bound up with the phenomenon of juxtaposition and with the inability to handle the logic of relations, is also the direct outcome of childish ego-centrism. To think ego-centrally means on the one hand that one does not adapt oneself to the sayings nor to the view-points of other people, but brings everything back to oneself, and on the other hand, that one takes one's own immediate perception as something absolute, precisely to the extent that one fails to be adapted to the perceptions of other people. Under both these aspects the ego-centric tendency leads to the same result, which is to be ignorant of objective relations in favor of subjective relations, to impose arbitrary schemes upon the world of external objects, to be constantly assimilating new experiences to ancient schemes, in a word, to replace adaptation to the external world by assimilation to the self. Syncretism is the expression of this perpetual assimilation of all things to subjective schemes and to schemes that are comprehensive because they are unadapted [PIAG11: 227-228].

Of course, the mere absence of data supporting a supposition (e.g. the supposition that the

foundation of thinking and reasoning on a “knowledge is rules” model) does not prove the supposition false. For that we turn to the “dual element” in childish thought – juxtaposition.

The present chapter is partly intended to confirm the following conclusion: if the absence or rarity of "whys of logical justification" really has the significance which we have attributed to it, we must expect to find in childish idiom on the one hand a correspondingly rare occurrence of the "because of logical justification," and on the other a persistent difficulty on the part of the child in finding the correct justification for simple propositions which he is asked to demonstrate. This is what we shall try to establish.

Now, if such are the habits of childish thought, childish idiom ought to display a discontinuous and chaotic character in contrast to the deductive style of the adult, logical relations being omitted or taken for granted. In a word, there will be 'juxtaposition' and not relating of propositions. . .

The phenomenon of juxtaposition is very frequent in child thought. A well-known and particularly striking example has been signaled in the case of children's drawings, and has been referred to as 'synthetic incapacity.' M. Luquet has pointed out that one of the most universal characteristics of these children's drawings is the inability shown by their authors to portray the relations existing between different parts of the model. The thing is not there a whole, the details only are given, and then, for lack of synthetic relations, they are simply juxtaposed. Thus an eye will be placed next to a head, an arm next to a leg, and so on.

This synthetic incapacity covers more ground than one would think, for it is really the mark of the whole of childish thought up to a certain age. We have already observed it in connexion with understanding between children . . . [In] three-quarters of such cases, the child who was spoken to did not realize such a connexion was in question, and could therefore see nothing more than two statements which were independent of each other.

Juxtaposition is therefore, in a certain sense, the converse of the process which we studied under the name of 'syncretism.' Syncretism is the spontaneous tendency on the part of children to take things in by a comprehensive act of perception instead of by the detection of details, to find immediately and without analysis analogies between words or objects that have nothing to do with each other, to bring heterogeneous phenomena into relation with each other, to find a reason for every chance event; in a word, it is the tendency to connect everything with everything else. Syncretism is therefore an excess of relating while juxtaposition exhibits a deficiency in the same function [PIAG11: 3-4].

If syncretistic thought illustrates the fusing together of “everything” (not just everything that “can” be fused), juxtaposition illustrates that this “fusing” is most certainly *not* the result of what we would be willing to call logical argumentation. In addition to the evidence given for this in children’s drawings, Piaget also provides some other examples of childish reasoning:

Two of our former studies showed us that the child has a tendency, in connexion with such statements as "I have brothers," to confuse the point of view of inclusion or of the predicative judgment ("We are x brothers") with that of relation. It is to causes such as these that we must attribute the difficulties arising out of the Binet-Simon test of absurd phrases ("I have three brothers, Paul, Ernest, and myself": a 10-11 years' test, according to the district). In addition to this, up to the age of 10, three-quarters of the children are unable to indicate spontaneously both how many brothers and sisters there are in their own family and how many brothers and sisters each brother or sister possesses. The typical answer is as follows. The child says, for example, that there are two brothers in his family, which is correct. "And how many brothers have you got? - *One, Paul.* - And has Paul got a brother? - *No.* - But you are his brother, aren't you? - *Yes.* - Then he has a brother? - *No,* " etc [PIAG11: 216-217].

It is difficult to see *very common examples* such as this one as being anything other than flat contradictions of the supposition that the structure of formal symbolic logic is an innate power or ability of mind. Additional examples are numerous:

[There] is a tendency in childish reasoning to juxtapose classes and propositions rather than to establish their exact hierarchy. . . The child is given, for example, a test of the form: "If this animal has long ears it is a mule or a donkey; if it has a thick tail it is a mule or a horse. Well, this animal has long ears and a thick tail. What is it?" Instead of finding the exact interference of the two classes and saying the animal in question is a mule, boys, even of 10 or 11 years old, add up the conditions and juxtapose the classes instead of excluding the unwanted elements. In this way, they reach the conclusion that the animal might just as well be a horse, a donkey, or a mule. This shows the true nature of the phenomenon of juxtaposition. The child begins by considering the existence of long ears, and concludes that the animal must be a donkey or a mule. He then examines the existence of the thick tail. If this new condition were made to interfere with the preceding one, the child would eliminate the donkey since it has not got a thick tail. But the child considers this new condition separately, he juxtaposes it instead of contrasting it with the former condition, and he concludes that the animal may be a horse or a mule. Each judgment is therefore juxtaposed and not assimilated to the judgment that precedes it. Finally, the child merges these two judgments into a single whole, but this whole constitutes a mere juxtaposition not a hierarchy. For the child comes to the conclusion that all three cases are possible. He therefore eliminates nothing. He juxtaposes without choosing . . .

This feature of childish judgment naturally excludes any kind of syllogistic reasoning. . . The form given to the syllogism in logical text-books is one that is of very little use. We think by enthymemes rather than by syllogisms, and, as the method of induced introspection has shown, we often think by enthymemes that can be formulated [PIAG11: 222-223].

The conclusion therefore seems inescapable that the step-by-step "logical" process by which computers operate on symbols and transform them into other symbols does *not*, as Simon maintains, "parallel step-by-step the way the human brain does it." Inasmuch as the whole of "artificial intelligence" (AI) research (and, for that matter, the research carried out by its more recently developed cousins, fuzzy computing, neuro-fuzzy 'soft' computing, etc.) is predicated on this supposition, the *psychological evidence* cuts the ground out from under any proposition that these machines are models of human thinking *as a real phenomenon*. AI and the other related fields, as they currently are practiced, may produce useful gadgets, but these gadgets are in no *psychological* sense entitled to be called *thinking machines*. Perhaps it might be argued that these machines model how we "ought" to think, but such an argument only favors the view of logic as, in Piaget's words, "the morality of thought" and echoes the Aristotelian view of logic as "rules for *correct* thinking," and not the *actual* thinking processes.

What does this psychological evidence imply for the phenomenon of thinking? The phenomenon of juxtaposition also appears in a second form, namely, "the difficulty which children have in grasping the relation of part to whole and fractional relations in general" [PIAG11: 224].

In short, by the mere fact of his tendency to juxtapose instead of establishing a hierarchy, the child

is led to regard the parts of a whole as discontinuous fragments independent of each other and independent of the whole. . . [The child] has a tendency not to look for the whole but to consider this 'part' simply as a small incomplete whole . . .

All these facts agree in proving a certain synthetic incapacity in the thought of the child, and show that this incapacity bears primarily upon the schematism of judgment or upon the relations existing between judgments. But does this mean that the mind of the child is peopled with a multitude of juxtaposed ideas and judgments unconnected by any bond, as appears to be the case to the outsider? In other words, has the child himself a feeling of chaos and discontinuity? It is obvious that nothing could be farther from the truth, and that for any deficiency in objective relations there is a corresponding excess of subjective relations. This is shown to be the case by the phenomenon of syncretism which seems to be the opposite, but is really the complement of juxtaposition . . .

When there is no occasion, such as drawing or language, for the child to break up objects by analysis, these are, as will be shown in a moment, perceived syncretically. But once they have been broken up and that synthetic incapacity renders their synthesis impossible, what is the relation which gathers the juxtaposed elements into a group? M. Luquet has noted with great truth that it is a relation of membership and not of inclusion, by which he means (no regard being paid to the logical meaning of these terms) that an arm drawn alongside of a manikin is conceived by the child as 'going with' the manikin not as 'forming part of' his body. We have often come across this relation in the ideas of children, and have given it the name of relation of *property*, so as to avoid confusion with the vocabulary of logic [PIAG11: 224-226].

The phenomena of syncretism and juxtaposition demolish the presupposition that the processes of thinking and reasoning have a “logical” infrastructure insofar as by “logical” one means the system of symbolic logic. This has the most profound consequences for how we must view Kant's three “logical” *Verstandes-Actus*. It also leaves us with another important question: If the structure of formal logic, as given in the science of logic, is not an innate power of mind, how does the adult mind come to develop such a skill?

Consideration of these questions is going to lead us to reexamine what we mean by the term 'logic.' What we shall eventually find is that formal logic – be it the tradition that has come to be called 'Aristotelian' or be it the modern day brand called 'mathematical' or 'symbolic' logic – is a mere human invention. If we wish to preserve the term 'logic' in anything like the sense that the logical positivists and semanticists would see it, we shall find that conventional 'logic' must be regarded as a product of a more fundamental ability we shall call Logic in the general sense.

Schemes, Constitutive Functions, and the Logic of Meanings

The observations and findings discussed above were made during the earliest years of Piaget's research. Throughout the remainder of his long career, Piaget and his coworkers continued to gather facts and systematically elaborate a theory of the assimilation / accommodation phenomena inherent in syncretism and juxtaposition. In Chapter 1 we named the four major stages in the development of intelligence that all children pass through, i.e., the sensorimotor stage (0 to 2 years), the stage of pre-operational thought (2 to 7 years), the stage of concrete

operations (7 to 11 years), and the stage of formal operations (11 to 15 years). “Logical” thinking, in the traditional sense of that term, is not established until the fourth stage in this progression.

Yet while the scope of mental capabilities is observed to expand greatly during this process of development, Piaget finds that a common infrastructure exists insofar as the manner in which each successive stage develops is concerned. This common infrastructure displays evidence that there is in fact a kind of *primitive* mental organization at work which is itself invariant but which is capable of producing increasingly more complex mental structures and *applying* these structures in the production of new structures. This primitive organization can be said to constitute a kind of “pre-logic” for thinking and reasoning.

Piaget is careful to confine his theoretical constructs regarding this pre-logic to ideas that have a more or less clear connection to observable actions and behaviors, and he takes pains to examine a variety of different hypotheses which might explain *some* of the observable facts in order to establish what hypothesis appears most capable of explaining *all* the observable facts. The result is a *systematic* doctrine. What we shall do in this section is provide a brief exposition of three of the central themes in this doctrine.

A. Schemes: One of the most central of Piaget’s theoretical ideas is that of the scheme (*schème* in French¹). The most readily observable aspects of a person are the *actions* that person performs. Physical activity is, of course, what we can directly observe; however, we can easily and equally well call *thinking, reasoning, and so on mental activities*. There is, as well, an experimentally observable connection between one’s mental activities and biological activity. For example, it is known from electroencephalogram (EEG) and electromuscular measurements, and from newer techniques as well, that an imagined movement produces the same pattern of brain activity in the motor cortex that is found in the actual execution of that movement [PIAG15: 68], [KANDa: 770-773].

Now, one of Piaget’s central findings is that mental development occurs through the development and elaboration of basic *organized activities*, having their origin in innate sensorimotor reflexes, which become generalized and adapted over time to handle increasingly complex problems. The structure and organization (i.e., the *form*) of these activities *as they are transferred or generalized by repetition in similar or analogous circumstances* [PIAG15: 4fn] is what is meant by the term “scheme.” We must not, however, view a scheme as some sort of static structure or “built-in algorithm.” Schemes are *constructed* organizations of activity and they undergo change and elaboration in response to growing experience.

¹ Prior to 1961, English translations of Piaget’s works usually rendered *schème* as “schema.” Piaget preferred to have this term rendered as “scheme” for reasons discussed in [PIAG20: ix, xi]. In quoting Piaget’s work, this treatise quietly substitutes “scheme” for “schema” in the older translations.

Piaget sometimes refers to the structure constituted by a scheme as an *organ*, e.g., “the working of schemes [is] functionally comparable to that of the organs, whose ‘form’ results from an interaction of the environment and the organism” [PIAG1: 373]. Starting from the most basic schemes acquired during the sensorimotor phase of development, there is a continual progression as schemes become more generalized, differentiated, and interconnected to produce all the intelligent structures of mental activities one comes to know as “mental life.”

From the psychological point of view . . . the acquired schemes form, from the outset, not only a sum of organized elements, but also a global organization, a system of interdependent operations, at first virtually due to their biological roots, then actually due to the mechanism of the reciprocal assimilation of the presenting schemes.

In short, at its point of departure¹, intellectual organization merely extends biological organization. It does not only consist . . . in an ensemble of responses mechanically determined by external stimuli and in a correlative ensemble of conductions connecting the new stimuli with old responses. On the contrary, it constitutes a real activity, based upon an appropriate structure and assimilating the latter to a growing number of external objects [PIAG1: 409].

The similarity between the idea of a scheme and the idea of the form of the matter of a representation (Quantity) is obvious. Indeed, we would not seriously misrepresent Piaget’s theory if we said that a scheme is that which is a form of the composition in organization through activity provided that this idea of the composition of an organizing activity includes some coalition of perception bound up in the overall representation of the matter of the activity (and not merely the representation of what the action does). In so viewing the idea of a scheme as an idea of composition, however, we must not neglect the fact that our ILAR of representation has *two* titles. In the first place, we have composition; but in the second place, we have *nexus*. Piaget does not accept the “reflexology” view that activity is uniquely determined by stimuli. There is, he maintains, a *directed searching* present in assimilatory activity which seeks for *solutions to motivational issues stimulated by an incentive object*.

In short, in every realm, assimilatory activity appears simultaneously as the resultant and the source of organization; that is to say, from the psychological point of view which is necessarily functional and dynamic, it constitutes a veritable primary act [PIAG1: 411].

What might constitute these motivational issues we will take up at a later time. For our present purposes it is enough to point out that assimilatory activity can be simultaneously a “resultant *and* a source of organization” only if we also presuppose a determining factor (a “why”) in the *nexus* of the manifold of organizing activity as the matter of its form (Modality). Piaget tends to discuss this idea in conjunction *with* schemes rather than as something contained *in* the idea of a scheme itself. Provisionally, then, let us reserve for “scheme” the role of Quantity (form of the matter in

¹ That is, departure from biological organization.

organizing activity) and leave to the *nexus* of organizing activity those considerations of such yet-to-be-discussed issues such as ‘motivations’ and ‘incentives.’

B. Constitutive functions: Because schemes are constructed rather than innate mental structures (constructed because a scheme *generalizes* an activity by making the scheme of the action applicable to multiple situations), the phenomenon of schematized behaviors clearly implies the existence of some sort of innate “know-how” that enables the thinking Subject to carry out this construction. We can say that any action is a transformation from some initial state or condition x to some resulting state or condition y . Viewed in the abstract, we can say that x and y constitute an *ordered pair* (x, y) which represents the dependency of y on x . Piaget and his coworkers call such a dependency a *function* [PIAG3: 3-4]. Based upon numerous studies, Piaget *et al.* have proposed the hypothesis that the development of *functional structures* precedes the development of more complex action structures. These functional structures express very simple ordering relationships, or links, by which schemes of actions are put together.

Not every such dependency (i.e., function) can be regarded as an innate dependency. Like schemes in general, functions can be evolved through the processes of assimilation and accommodation. A “function essentially expresses a dependence, whether it occurs between properties of objects which are variable or constant, or whether it is established between elements or characteristics which are inherent in actions or constructions of the subject” [PIAG3: 167]. A functional dependency constructed from previously established action structures is called a *constituted function*.

To understand Piaget’s idea of a function, we need to distinguish the idea of a function from that of an *operation*. In Piaget’s terminology, operations are actions characterized by their very great generality, reversibility, capability of being coordinated into overall systems, and are common to *all* individuals on the same “mental plane.” Operations also have the property of leaving some feature of the system constant or unchanged – i.e., operations always require the idea of *conservation* in addition to the idea of *reversibility*. Experimentally we find that neither conservation nor reversibility is present in very young children. Mental operations appear rather late in childhood, first as “concrete operations” (ages 7 to 11 years) and later as “formal operations” (ages 12 to 15 years).

A function differs from an operation in that the ideas of conservation and reversibility are absent in the function. The experimental evidence shows that the construction of functional schemes always precedes the construction of operational schemes in the child’s mental development (the sensorimotor stage and the stage of pre-operational thought). If, however, early action schemes are functional constructs, are there certain functions that are *primitive*, i.e., that are possessed by the Subject from the earliest stages of life and from which *all other functions* are

constructed? Piaget *et al.* propose that the answer to this question is “yes,” and they call these primitive functions by the name *constitutive functions*.

In *Epistemology and Psychology of Functions* Piaget proposes four such constitutive functions, to which he gives the descriptive name *coordinators* [PIAG3: 29-34, 172-173]. A coordinator function is a function that links “the successive actions deriving from the same scheme” [PIAG3: 172]. While, of course, the coordinator function is a theoretical abstraction, the experimental basis for this hypothesis is provided by a number of simple experiments – for example, an experiment in which the child is asked to place different colored balls in a partitioned box (placing balls in “holes”). The child’s actions during these experiments are analyzed and the coordinator functions are deduced from generalized descriptions of these actions. Piaget’s four coordinator functions are:

- 1) The **associative coordinator** (B) – This is the simplest and apparently a primitive constitutive function. The action it describes is simply the production of an ordered pair of objects. Experimentally, even very young children appear capable of dealing with *pairs* of objects, although they have much more difficulty in dealing with triplets or larger numbers of objects.
- 2) The **repetition coordinator** (W) – Repetition is, simply, the repeating of an action. This behavior is evident from the earliest stages of life when the infant engages in what Piaget elsewhere [PIAG1] calls the *circular reaction*.
- 3) The **identification coordinator** (I) – This coordinator is also a basic coordinator and makes its appearance in *recognitory assimilation*. The infant demonstrates an ability, even in the first few days of life, to “recognize” particular global “situations” – one cannot say “objects” at this stage – that it has previously encountered. The outstanding example of this is the development of the baby’s ability to “recognize” its mother’s nipple from the surrounding teguments during feeding [PIAG1: 25-29].
- 4) The **substitution coordinator** (C)² – It would be impossible to generalize a simple action, by assimilation into a scheme, unless by accommodation that action could come to be applied to other objects than those which were involved in the first formation of that action. Beginning with the hereditary reflexes, the baby gradually develops a number of sensorimotor schemes which it comes to apply, or attempt to apply, to every situation it encounters. In the earliest stages of life, the infant does not differentiate the objects upon which it acts from the action itself; but it does attempt to apply its repertoire of basic schemes to every situation that “seems to go with” (i.e., is “similar enough to”) situations which, in the past, have been “linked” to a given scheme. Now, one could well ask: Is this really a different coordinator? Could it not instead be the case that the baby simply does not recognize the “situation” as being “different”? This might be the case for *very* young infants, but it is also the case in the later stages of sensorimotor intelligence that the infant attempts to apply known schemes to situations that the infant clearly *does* perceive as “different.” Thus, the substitution coordinator merits a place of its own among Piaget’s primitive constitutive functions.

Piaget and his colleagues do not claim that these four coordinators constitute the complete

² Piaget also, somewhat inconsistently, calls this coordinator the “permutator.”

set of elementary constitutive functions. This, of course, is as it should be since these primitive coordinators are deduced empirically and empirical knowledge cannot lay claim to universality and necessity. It is also worthwhile to note that Piaget *et al.* distinguish between functions and “simple relations” that “result only from comparisons” [PIAG3: 168]. Like virtually everyone else, Piaget seems to take the ability to make “comparisons” as a more or less primitive ability and, since the act of “comparing” does not clearly reveal itself in any particularly vivid and observable behavioral act, “comparison” does not receive very much close attention and treatment in Piaget’s work.

C. The Logic of Meanings: Finally we come to what may in some sense be regarded as the culmination of Piaget’s lifetime of work: his theory of the logic of meanings. The logic of meanings is not a completed theory. Piaget died before this could be accomplished. It is, however, perhaps the most significant accomplishment of his long career that Piaget succeeded in gathering the psychological evidence required to raise the existence of a logic of meanings to the status of a well-established empirical *fact*.

The forerunner of Piaget’s logic of meanings is the “logic” of the preoperatory structures discussed above. In the general conclusions of *Epistemology and Psychology of Functions*, Piaget writes:

The two principal accomplishments of the preceding studies are that we were able to realize a dream shared by several of us, i.e., to isolate a logic (or a relatively coherent prelogic) of preoperatory structures; and to account for the unlimited production of 'constituted functions' in contrast to the limited number of operations [PIAG3: 192].

This “prelogic” of “preoperatory” structures is not yet the logic of meanings. The latter would require nearly another twenty years of preparation before Piaget and Garcia could write *Toward a Logic of Meanings*. The earlier work established the elementary coordinators (W,I,C,B) and their role as the “links inherent in schemes of actions”; the prelogic of [PIAG3] is a logic of actions from the viewpoint of what one might call the “mechanics” of constructing schemes and operations:

This logic presents the distinctive characteristics of all logic in that it possesses a structure . . . The most interesting fact about this primitive logic is that it remains essentially qualitative, with a marked dominance of intension³ over extension⁴, since the latter is not yet regulated, i.e. quantified. . . Although such a relatively coherent logic is very valuable, it has a major flaw when compared to the total logic of operations, for it represents, so to speak, only half a logic, due to the fact that it is

³ "Intension" refers to the relationship of parts to the whole while ignoring the relations among the parts themselves [PIAG3: 185fn].

⁴ "Extension" refers to the quantitative relationships between the parts of a single whole or to the relationships between distinct totalities [PIAG3: 185fn].

oriented according to a given order and still lacks reversibility [PIAG3: 192-193].

This prelogic, while valuable in understanding the evolution of mental structures in terms of assimilation and accommodation operations, is nevertheless only one part of an overall problem Piaget had stated years before:

The time therefore seems ripe for raising the question whether child thought, which differentiates itself from every other kind of thought, both by the interests which guide it, and by its means of expression, cannot also be distinguished by its logical structure and method of functioning. This is the view which we shall now attempt to develop, at least schematically, and without renewing any detailed discussion of the phenomena. For the purpose of attempting this synthesis, we have in our possession a certain number of observations made in the course of our own studies on the thought of the child, or in the course of other enquiries, conducted by the method of tests. In addition to this, several works dealing with the language, the drawings, and the perceptions of children have furnished us with first-rate information on the subject of his thought. The material collected in this way can be grouped under a certain number of headings: ego-centrism of thought, intellectual realism, syncretism, inability to understand relations, difficulties in using logical multiplication, etc., etc. The problem can be stated as follows: Do these phenomena form an incoherent whole, that is to say, are they due to a series of accidental and fragmentary causes, unrelated to each other, or do they form a coherent whole, and thus constitute a logic of their own? The truth would seem to lie between the two. The child's mind shows signs of having a structure of its own, but its development is subject to contingent circumstances. The question is, where does the role of the original structure end and that of the contingent circumstances begin? [PIAG11: 199-200].

The prelogic of coordinator functions addresses this question only in part, namely in describing the coherent whole of structures insofar as these structures are manifested in actions. This still leaves the question of "causes" unanswered: Where does the role of structure end and contingent circumstance begin?

The logic of meanings takes the next step toward answering this question. In the theory of Piaget and Garcia, a new "element" appears that makes the logic of meanings fundamentally different from traditional symbolic logic: The *meaning implication*:

Our main purpose in writing this book is to complete and to amend our operatory logic in the direction of a logic of meanings. It is already such a logic in the extensional sense of that term, and it is therefore in the intensional sense that we shall have to specify the use of logical connectives such as "and" and "or," and, above all, the use of "meaning implications" as opposed to "material implications." The difference between the two types of implications is that the latter are defined with respect to truth values of statements, irrespective of their meanings or the meaning of the relation between them. . . Therefore, it is essential to construct a logic of meanings whose major operation we shall call the "meaning implication": p implies q . . . if one meaning m of q is embedded in the meanings of p and if this meaning m is transitive. In this case, the embeddings of various meanings according to their relative comprehensiveness - which we shall call "inherences," correspond to extensional nestings, and therefore to kinds of truth tables. However, such truth tables are partial and are determined by meanings, and negations are relativized according to these nestings taken as frames of reference.

If such a logic of meanings really exists, there is no reason why it should be limited to propositions or statements, for any action or operation also has meanings. As no action, no operation, and above all no meaning is isolated but is bound up with many others, there are implications among the meanings of actions or of operations. Such implications are distinct

although inseparable from the causal aspect, or the actual execution, of actions [PIAG12: 3-4].

There is some degree of validity in the view that fuzzy logic arose as a response to the absence of meaning implications in symbolic logic. If we examine the arguments made by fuzzy logicians, e.g. Kosko, in favor of fuzzy logic, we find numerous examples of propositions such as “X is tall” or “Y is cold”; the proponents of fuzzy logic claim, correctly, that formal symbolic logic – with its “crisp” division of truth values into “true” and “false” – is incapable of dealing with such propositions because “tall” or “cold” are impossible to *crisply* define. In one popular example, we are given a “heap of stones,” told to remove one stone, and are then asked, “Is it still a heap?” The correct answer (we are told) is that yes, it is still a heap. We are then invited to remove another stone, then another, then another, etc., and the same question is put to us each time. Eventually, we will get down to having only a single stone remaining, by which point we no longer have a “heap.” The question then is: When did the heap of stones cease to be a heap of stones? Proponents of fuzzy logic hold that the property of “being a heap” is *fuzzy*; there is no one crisp point where “being a heap” ends and “not being a heap” begins.

Now, it is clear that what is at issue here is a question of *meaning*: what *is it* to be a heap? Symbolic logic cannot deal with this question because, by definition, symbolic logic makes abstraction of the empirical content of premises and considers only the *form* of argumentation. Fuzzy logic attempts to remain a formal logic (and, yes, it uses symbols) by making the transition from a truth value of “true” to a truth value of “false” a gradual transition. It does so by defining so-called “degrees of membership” to which the premise “belongs” to the set of things that “have” a given property (e.g., being a heap) and the set of things that do not. Fuzzy logic, then, can be viewed as a compromise logic system where some empirically-based considerations can be introduced into the purely formal system of symbolic logic while more or less retaining all the useful mathematical features of symbolic logic. It is unremarkable that fuzzy logic was born out of the need to solve practical engineering problems where the *material* implications of propositions have a real connection to “practical, real-world” considerations. Fuzzy logic is indeed proven to be a good approach for some types of problems in engineering and psychology.

But the issue of “meaning” nonetheless remains to be addressed. We will, in due course, have to deal with the question “what does ‘meaning’ *mean*?” For now, it is sufficient to say that one approach to answering this question (and this is the approach taken by Piaget) is that “meanings” can be looked at in terms of *actions* and “*interpretations* of the ‘data’.”⁵ In Garcia’s

⁵ It is worthwhile to note that machines which employ “adaptive” fuzzy logic - i.e., machines which can refine their own “membership functions” (which determine the assigned “degree of membership” value) - can be viewed, in a restricted sense, as machines which employ a limited version of Piaget’s idea of a logic of meanings.

words, “the meaning of an object is ‘what can be done’ with the object” [PIAG12: 159]. This manner of looking at the “meaning of meaning” has profound consequences for the idea of “logic” itself.

“What can be done with the object” is, however, not a complete definition of the idea of “meaning.” Garcia goes on to note that

(Meanings) are also what can be said of objects, i.e., descriptions, as well as what can be thought of them, when classifying or relating them and so on.

As for actions themselves, their meaning is "what they lead to" according to the transformations they produce in the objects or situations on which they bear. Whether predicates, objects, or actions are involved, meanings imply that the subject's activities interact with an external, physical reality, or with a reality the subject himself has previously generated, as in the case of logico-mathematical entities [PIAG12: 159-160].

Recalling the basic findings described in the theory of assimilation, schemes of actions are never isolated; they are “linked” to one another in various ways. Among these links the most *general* is the relation of implication. This, in turn, has two differentiable aspects: causal implications (implications “centered on objects and concerned with the results observed once the action has taken place”) and implicative relations (“relations between meanings and as such they are susceptible of being anticipated”) [PIAG12: 160]. The child begins to establish these links at the very beginning of life, but *all* elaborations of these links are based on meaning implications. Garcia makes a statement that echoes Kant’s metaphysics proper:

Whether they are implicit or explicit, these implications may theoretically (i.e., *from the observer's standpoint*) be reduced to combinations of implications or negations. In other words, at all levels, the foundation of any logic is inferential, which is natural in the case of a logic of meanings [PIAG12: 160-161].

The empirical findings arising from Piaget’s work show that the “evolution” of schemes involves three different kinds of inferences: 1) anticipations limited to observable repetitions of arrangements or modifications previously observed empirically; 2) inferences in anticipations that go beyond what is observable and are based on a kind of “reflective” abstraction; and, 3) inferences based on “reasons” or on *possible* demonstrations [PIAG12: 161]. In addition, meaning implications themselves undergo an “evolution” with regard to their form and degree. Piaget and Garcia find that there are: 1) “local” implications which are data and context bound and determined by observed outcomes; 2) “systemic” implications inserted in a *system of relations* which is built up “step-by-step” over time; and, 3) “structural” implications that bear on the internal composition of previously established structures and schemes [*ibid.*]. Implications may be *amplifications* (which bears on consequences), *conditionings* (which bears on preliminary conditions), or *deepenings* (which pertains to “reasons”).

Among the most profound consequences of the logic of meanings is the finding that the primitive operators of traditional symbolic logic – conjunction, disjunction, negation – are, in fact, subject to *different* possible interpretations. In other words, there are several different types of conjunctions (“ANDs”), disjunctions (“ORs”), and negations. Piaget and Garcia discuss a number of observations that bring out the distinctions actually found in these families of operators. These varieties “depend on contexts and reference frames, i.e., on the nestings involved” [PIAG12: 164]. Put another way, the logic of meanings is a logic in which the *self-organizing nature* of the thinking Subject is ultimately the determiner of an open-ended system of logic which is, in fact, *never* brought to completion but, instead, is an on-going process of the construction of mental structures through meaning implication. Inasmuch as the logic of meanings is the “substratum” of what Garcia and Piaget called “logico-mathematical systems” (such as traditional logic), it lies at or very near the center of the phenomenon of mind.

§ 7.3 Implications for the *Verstandes-Actus*

Let us now examine what consequences all this holds for Kant’s three “logical acts of understanding.” In Chapter 3 we discussed the acts of comparison, reflexion, and abstraction from the viewpoint of the making of representations and from a more or less rationalist and deductive starting point. To that previous discussion we must now “take a step back” and examine the psychological evidence for what it may add to our appreciation of the *Verstandes-Actus*. As we do so, it is wise for us to bear in mind that these acts are purely *mental* acts and our knowledge of them is a theoretical construct because comparison, reflexion, and abstraction – as objects – are *noumena*. What we may know about them is, consequently, only that which we can deduce from appearances and analyze under the condition of their necessity for the possibility of human experience.

Comparison

The idea of comparison is a very old one. We can trace its appearance in philosophy at least as far back as Aristotle’s *Categories* [ARIS1]. Somewhat curiously, however, very little close attention has been paid to the question “what does ‘comparison’ mean?” Even Kant, who in other fundamental matters often tends to split hairs on minutiae, seems not to have thought that the idea of comparison required any particularly close examination. The first thing for us to note is that the term “comparison” can be taken in two fundamentally different ways. The first way is that which we described in Chapter 3, namely, as an apparently primitive logical act in the making of representations. This is comparison as *Comparison*, and is what we shall discuss here.

The second way in which the word comparison is used is to describe actions by which the thinking Subject deliberately brings objects of perception or objects of abstract thought under examination. For example, I might compare two apples in the grocery store to decide which of the two I am going to buy. This sort of *active comparison* is fundamentally distinct from the idea of comparison as a *Verstandes-Actus*. Deliberate active comparison does not appear to be an innate reflex, and Piaget's observation of infants indicates active comparison does not make its first appearance in the behavior of the infant until stage 2 of the sensorimotor phase of mental development [PIAG1: 69, obs. 35]. However, the very possibility of making an active comparison must presuppose some more fundamental ability – the *Verstandes-Actus* of comparison. One of the questions that therefore confronts us is: Is the logical act of comparison an innate ability?

The experimental evidence cited above cannot tell us when the logical act of comparison¹ has its origin since what we are able to observe experimentally is the behavior of active comparison. This does not mean we have no grounds for positing a power of comparison prior to the first observance of behaviors indicative of active comparison. Kant's act of comparison is necessary for the possibility of making mental representations of sensibility, and it is clear from Piaget's behavioral evidence that the ability to begin structuring schemes – which, after all, is a type of representation structure in the Kantian (if not the Piagetian) sense of that word – is present in the infant from at least the second day after birth.²

Nevertheless, our knowledge of the idea of comparison is derived from experience (the experience of active comparison) and we do not have a direct perception of the act of comparison itself. Consequently the metaphysic of Rational Psychology warns us we cannot regard the logical act of comparison other than as a *logical* construct. Put another way, it is permissible for us to logically distinguish between comparison, reflexion, and abstraction but we have no transcendental ground for claiming that comparison is a separate and distinct *real* power of mind independent of reflexion and abstraction. Even in Kant's theory the logical act of comparison is not found other than in the company of reflexion and abstraction. The phenomenon of active comparison does provide us with a real ground for positing the *Verstandes-Actus* of comparison-reflexion-abstraction (as a triplet) is a real power of mind, but we may not project from this (on the basis of what we know from our examination of the phenomenon so far) that comparison by itself is a distinctly real power of the mind.

Consequently, we may regard the *Verstandes-Actus* as a whole (comparison and reflexion and abstraction) as a faculty (that is, as an idea of the organization of a power), but we may not

¹ In this Chapter, from here on we will use the word "comparison" by itself to mean the *Verstandes-Actus*. When we wish to refer to the "higher level" behavior of active comparison, we will use the adjective "active" in conjunction with "comparison."

² This is evidenced by the infant's behavior during nursing, which Piaget documented under the heading of the sucking reflex [PIAG1].

regard comparison by itself as a real faculty. If we speak of comparison as a faculty, we may do so only as a logical faculty – that is, as a principle only of the logical organization of the power of *Verstandes-Actus* – and this we shall do. However, in view of the previous discussion of the nature of “logic,” this immediately raises the issue of *what kind of logical organization* must we ascribe to comparison? Shall we look at comparison as a logical act in the sense of a “logico-mathematical” system, or must we regard comparison only in terms of a logic of meanings?

From what has gone before, it is perhaps obvious what our answer to this question must be. However, the logico-mathematical view of comparison has behind it the weight of many centuries of theory and so it is worth our while to take a look at this view and examine its objective validity. We may begin this examination with Aristotle and his *Organon* of logic. In *Categories* Aristotle presented his famous list of ten fundamental predications: “Of things said without combination, each signifies either substance or quantity or qualification or a relative or where or when or being-in-a-position or having or doing or being affected” [ARIS1: 4 (1^b25)]. The category of substance, he writes, “does not admit of a more or a less. . . For one man is not more a man than another, as one pale thing is more pale than another and one beautiful thing more beautiful than another.” The category of substance, in other words, is “quantitatively” incomparable. Aristotle does, however, divide the idea of substances into primary and secondary substances, and from this perspective substances appear capable of being qualitatively compared.

The category of quantity, he writes, also “does not admit of a more or a less” but can be “called both equal and unequal” [ARIS1: 10 (6^a19-36)]. The category of relatives, on the other hand, does “admit to a more or a less. For a thing is called more similar and less similar, and more unequal and less unequal; and each of these is relative, since what is similar is called similar *to* something and what is unequal is unequal *to* something. But not all admit of a more and less; for what is double, or anything like that, is not called more double or less double” [ARIS1: 11 (6^b20-26)]. As far as the other Aristotelian categories are concerned, qualifications “admit of a more and a less” and can be called “similar and dissimilar.” The categories of doing and being-affected also “admit of a more and a less.” As for being-in-a-position, when, where, and having: these categories are “obvious” (Aristotle tells us) and “nothing further is said about them than what was said at the beginning.”

Other comparative terms used by Aristotle include *same*, *contrary*, and *different*. Aristotle provides no discussion of these comparative terms (more, less, equal, unequal, similar, dissimilar, same, contrary, opposite, and different); rather, he takes it for granted that the meanings of these terms are obvious. Considering the great lengths to which he goes in defining and describing other terms in his philosophy, Aristotle’s lack of any specific treatment of the comparative terms he uses is somewhat surprising. The connection of these comparative terms with their counterparts in formal mathematics and logic is reasonably obvious in the cases of more, less,

equal, unequal, same, and opposite. “Contrary” is a bit less obvious (as we have previously discussed), while similar, dissimilar, and different can be connected with the ideas of set theory, e.g., belonging to the same set, belonging to the intersection of two or more different sets, and belonging to disjoint sets, respectively. Aristotle, of course, makes no set theoretic treatment of these or any other terms; the invention of formal mathematical set theory was to come many centuries later.

Modern mathematics takes set theory as its formal basis. This primacy given to set theory is a relatively modern event in the long history of mathematics, and its roots lie in the re-expression of the traditional “Aristotelian logic” of the Scholastics³ (along with some subtle yet major changes made to it) into symbolic (“mathematical”) logic.

Mathematical logic differs from traditional formal logic so markedly in method, and so far surpasses it in power and subtlety, as to be generally and not unjustifiably regarded as a new science. Its crude beginnings are placed with George Boole, in the middle of the last [19th] century. Fragments foreshadowing mathematical logic date back much farther than Boole - as far back indeed as Leibniz; but it was from Boole onward through Peirce, Schröder, Frege, Peano, Whitehead, Russell, and their successors that mathematical logic underwent continuous development and reached the estate of a reputable department of knowledge.

The traditional formal logic, dating in its essentials from Aristotle, is nevertheless the direct progenitor of mathematical logic. The striking difference between the two must not be allowed to obscure the fact that they are both “logic” in the strictest sense of the word. They both have, vaguely speaking, the same subject matter. Just what the subject matter is, it is not easy to say; the usual characterizations of logic as “the science of necessary inference”, “the science of forms”, etc. are scarcely informative enough to be taken as answers.

But if we shift our attention from subject matter to vocabulary, it is easy to draw a superficial distinction between the truths of logic and true statements of other kinds. A logically true statement has this peculiarity: basic particles such as ‘is’, ‘not’, ‘and’, ‘or’, ‘unless’, ‘if’, ‘then’, ‘neither’, ‘nor’, ‘some’, ‘all’, etc. occur in the statements in such a way that the statement is true independently of its other ingredients . . .

We must thus distinguish two senses of logic, a broader and a narrower; logic in the narrow sense comprises those truths which contain only the so-called logical vocabulary essentially, while logic in the broader sense includes both logic in the narrow sense and discourses about it. Discourse of the latter kind is classifiable, in large part at least, under the head of *formal syntax*. Over the years the term ‘logic’ has of course been applied also to a vast range of other topics, encroaching upon rhetoric, psychology, epistemology, metaphysics; but I shall not attempt to find a unifying principle among these far-flung applications of the term [QUIN: 1-3].

The passage from “mathematical logic” to “mathematics” was, in the view of “the logicians” (i.e., Peano, Whitehead, Russell, etc.), a subtle yet more or less direct route through the idea of “numbers.” So it is that Russell wrote:

All traditional pure mathematics, including analytical geometry, may be regarded as consisting wholly of propositions about the natural numbers. That is to say, the terms which may occur can be defined by means of the natural numbers, and the propositions can be deduced from the properties of the natural numbers - with the addition, in each case, of the ideas and propositions of pure logic.

³ We will see later that “Aristotle’s logic” and “Scholastic logic” are not the same thing.

Having reduced all traditional pure mathematics to the theory of natural numbers, the next step in logical analysis was to reduce this theory itself to the smallest set of premises and undefined terms from which it could be derived. This work was accomplished by Peano. He showed that the entire theory of the natural numbers could be derived from three primitive ideas and five primitive propositions in addition to those of pure logic. These three ideas and five propositions thus became, as it were, hostages for the whole of traditional pure mathematics. If they could be defined and proved in terms of others, so could all pure mathematics . . .

The three primitive ideas in Peano's arithmetic are:

0, number, successor.

By "successor" he means the next number in the natural order. That is to say, the successor of 0 is 1, the successor of 1 is 2, and so on. By "number" he means, in this connection, the class of natural numbers. He is not assuming that we know all the members of this class, but only that we know what we mean when we say that this or that is a number, just as we know what we mean when we say "Jones is a man," though we do not know all men individually.

The five primitive propositions which Peano assumes are:

- (1) 0 is a number.
- (2) The successor of any number is a number.
- (3) No two numbers have the same successor.
- (4) 0 is not the successor of any number.
- (5) Any property which belongs to 0, and also to the successor of every number which has this property, belongs to all numbers.

The last of these is the principle of mathematical induction [RUSS1: 4-6].

Despite of the hopes held by Russell *et al.* that mathematical logic could provide certainty for all mathematical knowledge (if not all knowledge in general), and despite the rather large claims they made on behalf of mathematical logic, not all mathematicians were convinced they were on the right track. Even within the camp of "logicians" we do not find a single united view. For example, David Hilbert broke ranks with Peano, Russell, *et al.* on the question of whether mathematics could be *completely* reduced to logic. In Hilbert's view, the principles of logic *and* arithmetic are co-equal and had to be considered simultaneously. A pseudo-philosophy (logical positivism) grew up along with the development of mathematical logic – a "philosophy" that dared to speak of the "real" functioning of the mind and made claims that in some sense go well beyond what is mathematically provable and, in other senses, makes rather gloomy statements concerning what we are able to "think truly."

The renowned mathematician Henri Poincaré was an outspoken critic of this system:

It is time that these exaggerations were treated as they deserve. I have no hope of convincing these logicians, for they have lived too long in this atmosphere. Besides, when we have refuted one of their demonstrations, we are quite sure to find it cropping up again with insignificant changes, and some of them have already risen several times from their ashes. Such in old times was the Lernaean hydra, with its famous heads that always grew again . . . And so I appeal only to unprejudiced people of common sense [POIN2: 145-146].

What strikes us first of all in the new mathematics is its purely formal character. "Imagine," says

Hilbert, "three kinds of *things*, which we will call points, straight lines, and planes . . ." What these *things* are, not only do we not know, but we must not seek to know. It is unnecessary, and any one who had never seen either a point or a straight line or a plane could do geometry just as well as we can . . . Thus it will be readily understood that, in order to demonstrate a theorem, it is not necessary or even useful to know what it means.

Well, what I want to find out is, whether it is true that once the principles of logic are admitted we can, I will not say discover, but demonstrate all mathematical truths without making a fresh appeal to intuition.

To this question I formerly gave a negative answer. Must our answer be modified by recent works? I said no, because "the principle of complete induction" appeared to me at once necessary to the mathematician, and irreducible to logic [POIN2: 147-149].

Poincaré argued there are conditions that logicians must demonstrate in order to validate the claims of their logical positivism, and that they had failed to do so. Poincaré summarized where he felt this left things in his damning faint praise of Bertrand Russell, who "has succeeded in expressing views on this subject that are original and sometimes true." Hilbert's approach similarly receives no better praise than this from Poincaré.

Under the formalism of mathematical logic⁴ the idea of comparison essentially becomes two mathematical ideas. The first is the idea of the compatibility relation (under which we find the idea of an equivalence relation as a special case). To appreciate how fully mathematical formalism insists that "meaning" play no part in formal mathematics, I shall state the technical definition of a compatibility relation: *A compatibility relation on a set is a relation which has the symmetric and reflexive properties.* The "symmetric property" and the "reflexive property" both have their own technical definitions. If we add a third mathematical definition, the "transitive property", to these two then the compatibility relation becomes an *equivalence* relation. The idea of "comparison" in this first sense merely amounts to a determination of whether or not two members of a set belong to the same "compatibility class."⁵

The second mathematical idea of comparison is given by the idea of a partial ordering. The formal definition of this idea is: *a partial ordering is a reflexive, antisymmetric, and transitive relation on a set.* Examples of this sort of relation include the mathematical relations "greater than" (as in "1 is greater than 0") and "less than" (as in "0 is less than 1"). Peano's "primitive idea" of a "successor" is, in effect, the idea of a partial ordering, and so this idea is built into the

⁴ Historically, Hilbert's view won out over Russell's "pure logic" approach, although Hilbert's "formalism" retains much of the Whitehead-Russell system. Poincaré did not live to see Gödel's theorem (and, later, Cohen's theorem) demolish the reason why mathematics resorted to the positivism of formalism in the first place, but I suspect he would not have been surprised by Gödel's result [DAVI: 223-236, 330-338].

⁵ For the reader who has not been exposed to these ideas of pure mathematics, these terms most likely either hold no meaning (they are too abstract) or suggest (via their names) a meaning that is only partly correct from a mathematical viewpoint. You need not be concerned about this provided you have grasped the main point to my demonstration, namely, that "comparison" is *defined by* given relationships rather than acting *to define* relationships in mathematics.

foundations of the logician's system of pure mathematics. "Comparison" under this second mathematical idea amounts merely to the determination that two members belong to a "partly ordered set" (a "poset"), which is defined as follows: *A partly ordered set consists of a set S and a partial ordering relation on S .* Just as is the case for the idea of "equivalence relation", this second idea of comparison defines the operation of comparing from a mathematical relation that must first be given before "comparison" may be performed. A mathematical relation is defined as a set of ordered pairs and so a "relation" in mathematics expresses the same idea for which Piaget uses the word "function."⁶

Formal mathematics has, consequently, succeeded in accomplishing what Aristotle left undone – namely, providing a set of operational definitions for Aristotle's various types of comparison. Even the mathematically unsophisticated reader, if he or she relies on the ideas the words "compatibility", "equivalence", and the description above of "partial ordering" bring to mind, can find in these terms a connection with Aristotle's "a more or a less", "equal and unequal", "similar and dissimilar", etc. From the logico-mathematical viewpoint we have a formal means of expressing the idea of "comparison" in its various uses. It is true that the logico-mathematical system conveys less than Aristotle undoubtedly meant by his "comparison" terms. Aristotle was, after all, an empiricist and a realist as well as the father of the science of logic. Aristotle's logic had "material" ideas embedded in its very foundations, and it is precisely these "contingent ideas" that later logic expunges. Such is the difference between the philosophy of Aristotle and the pseudo-philosophy of logical positivism. Yet the link through history of the evolution of the "logical idea" of comparison is evident in modern mathematics.

We are now in a position to examine the question which we began the perhaps over-long discussion just completed: Shall we look at "comparison" as a logico-mathematical act or must we view "comparison" in terms of a logic of meanings? Earlier it was perhaps not obvious that this question really does present two disjunctive views – i.e., that viewing comparison in terms of a *formal* logico-mathematical system *necessarily excludes* viewing comparison in terms of a logic of meanings and *vice versa*. Formal mathematics, like formal logic, makes abstraction of all meaningful context in mathematical statements and deals solely with formal operations. This is a direct consequence of the efforts of Hilbert, Russell, and others to secure for mathematics the apodictic certainty that for centuries the science of mathematics was thought to possess. That these efforts failed – a conclusion formal mathematics itself was forced to come to when, by its own methods, it demonstrated that there are mathematical questions which are "formally

⁶ Strictly speaking, mathematicians call this a "binary relation on a set"; they reserve the word "function" to describe a more restricted class of binary relations, and so mathematicians would most likely disapprove of Piaget's terminology.

undecidable” – does not change the fact that a formal logico-mathematical system (i.e., “formalism”) has no place within it for the idea that its formal statements contain “meaning” [DAVI: 318-320].

Kant’s “logical act of comparison” is indeed “functional” in the sense that this act is seen as “acting upon” two “inputs” (compares in sensibility) to produce some sort of determination. Viewed formally, this seems to coincide with the mathematical idea of a relation (or, equivalently, Piaget’s idea of a function). But, if this is indeed the case, does this formal view of comparison require an accompanying material view, namely, that this function either *has* or *produces* “meaning”? To even attempt to answer this question seems to require that we first understand what we mean by the word ‘meaning’. On this point it is interesting to compare Garcia’s description of ‘meaning’ in the sense that he and Piaget use that word, which we saw earlier, with the usual dictionary definitions of that term:

- meaning**, n. 1. that which exists in the mind, view, or contemplation as a settled aim or purpose; that which is meant or intended to be done; intent; purpose; aim; object. [Archaic].
- 2. that which is intended to be, or in fact is, conveyed, denoted, signified, or understood by acts or language; the sense, signification, or import of words; significance; force.
- 3. sense; understanding; knowledge. [Obs.]

In the Piaget/Garcia sense of the word, the ‘meaning’ of an action “is ‘what it leads to’ according to the transformations it produces in the objects on which it bears.” The *Verstandes-Actus* of comparison is certainly an ‘act’ in the general sense. On the other hand, comparison is a mental act, rather than, say, a sensorimotor activity and, furthermore, its *Dasein* as an ‘act’ is inferred on the basis of its necessity for the possibility of making representations as discussed in Chapter 3. The significance of this lies in the distinction between *voluntary activities* – which the Subject can choose to do or not do – and “actions” in the merely descriptive sense of “that which happens.” Thus, the issue of whether the act of comparison necessarily bears upon ‘meaning’ is indeed open to question.

Now let us recall our discussion of this *Verstandes-Actus* from Chapter 3. Referring to Figure 3.4.1 and its accompanying text, the act of comparison takes in representations as compares and produces a determination which, while constituting a representation, is not yet an *objective* representation. Rather, the determination that is the outcome of the act of comparison is a “likening” of the two compares to each other. If there is a ‘meaning’ residing *in* this likening, it cannot be a meaning in any *objective* sense. Any possibility of the determination of comparison being ‘meaningful’ would have to be found in some possible significance in its representation or in its being represented or both. And because comparison is a ‘likening’ of compares, such significance would logically appear to involve the idea of what is meant by the manner in which ‘likening’ is to be regarded as ‘significant.’

What possible significance might this “likening” hold? The subcontrarity represented in the determination of comparison is a representation of affirmation (in the agreement of the comparates) and a representation of negation (in the opposition of the comparates). The question is one of whether this pair constitutes *transcendental* affirmation and negation in the sense we discussed earlier in Rational Theology. Recall that transcendental affirmation signifies “being something” while transcendental negation signifies “not-being”. Does the act of comparison *make* such a signification? No. The determination of comparison is a perception but it is not an *objective* perception. Consequently, it gives no affirmation (and no denial) of its representation as “being something” or “not-being something.” Without such a transcendental assertion, we cannot say that comparison makes a determination of a real likeness or unlikeness.

At the same time, there are factors in the comparates of comparison that *are* objective representations and therefore do logically contain such a real transcendental assertion of “being something” (even if this something is merely an appearance). Thus, on the one side of comparison we have objective representations while on the other side the representation is merely perception without being objective. While comparison as an act *makes* no transcendental affirmation or negation, the *matter* of its representation *has* such a transcendental content by virtue of this content already being present in the comparates. If this transcendental content were not contained in the determination of comparison, this would be tantamount to saying that the act of comparison *removes it* during comparison, which is the same as saying that comparison *makes* a transcendental negation. This would of course be a contradiction.

If the determination of comparison is a perception but is not objective, what purpose could be served by the transformation comparison produces? The representation of the determination by the act of comparison can be viewed as purposive only insofar as it serves as the ground for a synthesis of the possible form of a *manifold* in representation. This synthesis is not carried out by the act of comparison itself; comparison merely “sets the stage” for the possibility of making such a synthesis. Put another way, the act of comparison does not *make* a meaning implication; rather, by “likening” the comparates to each other, comparison *makes possible* the synthesis of a meaning implication insofar as a meaning implication is contained in the form of a manifold in representation. Put another way, comparison *analyzes* the comparates to produce a representational *schema*¹ for the possible synthesis of the manifold.

To better appreciate this role of comparison, let us recall the earlier discussion of the phenomena of syncretism and juxtaposition in childish thought. The phenomenon of juxtaposition is describable (in, for instance, observations of drawings made by a child in the stage of pre-

¹ I use the word *schema* here in a Kantian rather than a Piagetian sense. A Piagetian schema (*schéma*) has a figurative connotation, whereas a Kantian schema is a rule for synthesis. The word Kant uses that corresponds to Piaget’s *schéma* is ‘image’ (*Bild* in German).

operator intelligence) as a kind of determination that something “goes with” something else. In juxtaposition the child perceives individual objects that in some way “go with” each other *in aggregation* but without real unity in the sense of two (or more) objects regarded as really being parts of a single *unified* object. On the other hand, in the phenomenon of syncretism we have a perception on the part of a child of an identification in which “everything” (as an adult might perceive it) is fused together in one undifferentiated representation.

Such, then, is syncretism: immediate fusion of heterogeneous elements, and unquestioning belief in the objective inter-implications of elements condensed in this way. Syncretism is therefore necessarily accompanied by a tendency to justify things at any price. Now this is exactly what the facts show to be the case. The child can always find a reason, whatever may happen to be in question. His fertility in framing hypotheses is disconcerting, and recalls the intellectual vagaries of 'interpreters' rather than the imaginative constructions of normal adults. The experiment in proverbs of which we have just been speaking bears testimony to this. The same tendency appears very clearly in children's ideas about natural phenomena. It partly explains why the idea of chance is absent from the thought of children before the age of 7-8, and this constitutes one of the principal reasons for the phenomenon of precausality [PIAG11: 232].

We are now in a position to better appreciate the nature of the function carried out in the *Verstandes-Actus* of comparison. We have used vague terms such as “likening of representation” and phrased this act in terms of “agreement and opposition” as shown in Figure 3.4.1. The “what” in these terms is tied to the idea of “goes with” that is so evident in juxtaposition and is clearly tied to the ideas of “resemblance” and “difference.”

Claparède has shown in some exceedingly interesting experiments that consciousness of resemblance appears earlier in the child than consciousness of difference. As a matter of fact, the child simply adopts an identical attitude to all objects that lend themselves to assimilation, but does not need to be aware of this identity of attitude. He 'acts' resemblance, in a manner of speaking, before 'thinking it.' Difference between objects on the other hand creates disadaptation, and this disadaptation is what occasions consciousness. Claparède has taken this fact as the foundation of the law which he had called *loi de prise de conscience*: the more we make use of a relation the less conscious we are of it. Or again: We only become conscious in proportion to our disadaptation.

This law seems to us fundamental for establishing relations between the functional factors of childish thought, particularly between ego-centrism and the absence of social needs, and the structural features which define childish logic. For this 'law of conscious realization' is alone in explaining why childish ego-centrism should involve the inability to be conscious of logical relations. For in so far as he is thinking only for himself, the child has no need to be aware of the mechanisms of his reasoning [PIAG11: 212-213].

If two comparates, which taken together before comparison comprise merely an aggregation, are to be united in a manifold of representation, the basis for this uniting must be looked for in some manner of resemblance, either resemblance in the representations themselves or resemblance in terms of something that is necessarily common to all representations. If a particular compare is to be conceptualized in terms of its parts in relationship to its whole, the basis for this conceptualization must be looked for in terms of differences, but such differences can only come

to the fore through some “disadaptation” (i.e., through some difficulty in assimilating the representation into an existing scheme of mental structure). The Piagetian ideas of assimilation and accommodation necessarily assume the possibility of perceiving resemblance and difference, and it is this perception that the act of comparison produces.

The logical act of comparison therefore seems to have much in common with the logico-mathematical compatibility relation. How in detail the idea of comparison differs from the idea of a mathematical compatibility relation is a question we must postpone until we have a formal mathematical treatment for the theory of mental physics because it will not be until then that we fully deal with the ideas of reflexive and symmetric properties that define compatibility relation. However, the name – *compatibility* relation – is sufficiently close in connotation to Kant’s “likening” as to give us some measure of confidence that the idea of the act of comparison and the idea of a compatibility relation must be closely related to each other in some way.

And so we have, at long last, our answer – inasmuch as we can expect to be able to answer the question at this stage of our exposition – as to how we must regard the logical act of comparison. It is not itself a meaning implication but, rather, appears to be part of the pre-logic or “functional basis” of the logic of meanings. The determination of comparison does not “signify” in a meaningful sense, but it is necessary for the possibility of *making* a signification (and hence a meaning implication). Comparison is “logico-mathematical” in the idea of its function but this function *serves as a bridge between non-objective perception and the logic of meanings*. In terms of Piaget’s constitutive functions, comparison involves the associative coordinator found in all constitutive functions, and it also appears to involve the identification coordinator found in recognitory assimilation. To these Piagetian ideas, we must also add the ideas of resemblance and difference to complete (for now) our exposition of the logical act of comparison.

Reflexion

Reflexion is the second of our *Verstandes-Actus*. In Chapter 3 we contrasted reflexion against comparison by noting that comparison (*Comparison*) is “logical reflection” unconcerned with the material significance of representations, and attends to them only in a formal sense (a description the discussion above reinforces), while reflexion is concerned with the material origins of representation.

If the determination of comparison is merely a perception, we must still view this perception as the material from which objective cognition arises. We are speaking here in particular of the synthesis of representations of appearances in the manifold of cognitions that produces the concept of an object. It was said earlier that comparison (*Comparison*) does not make any transcendental affirmations or negations but that the comparates must already contain such

transcendental affirmations. Before the determination of comparison can be regarded as an objective determination, there must be a “likening” of these transcendental affirmations in the comparates to produce a transcendental affirmation in the intuition. In other words, the appearance must be “placed” in the general manifold of Reality if the intuition is to have objective meaning. In the *Lectures on Metaphysics* Kant expressed this in the following fashion:

The maxim of understanding is: everything that happens, happens according to rules, and all cognitions are under a rule . . . All highest principles of understanding *a priori* are general rules which express the conditions of the formative power in all appearances with which we can determine how the appearances are connected among one another; for that which makes cognition possible, which is its condition, that is also the condition of things . . . Objects must conform to the conditions under which they can be recognized; that is the nature of human understanding. Understanding *a priori* is thus the ability for reflecting on objects . . . A judgment is but a representation of the comparison [*Vergleichung*] with a general mark, and a concept is a general mark . . . The senses are a capacity of perception, but understanding of reflexion [KANT19: 57-58 (28: 239-240)].

The intellectual cognitive power is the ability to think or to make one's concepts. It represents only the Objects in general, without looking to the manner of its appearance . . . Here the question arises: whether we can come to general representations only through comparison [*Vergleichung*]? But on the contrary, with us the opposite, that comparison [*Vergleichung*] originates concepts, is correct . . . A concept is the consciousness that the same is contained in one representation as in another, or that in multiple representations one and the same marks are contained . . . Without consciousness of the sameness of a representation in many representations, no general rule would be possible [KANT19: 256-257 (29: 888-889)].

Unlike the logical act of comparison (*Comparison*), which is a function in the Piagetian sense of that word, the act of reflexion *makes a transcendental affirmation* on the determination of comparison. To put it another way, reflexion produces the matter of a *meaning implication* and therefore the act of reflexion must be regarded in the context of a logic of meanings. Reflexion is an *act* rather than a power or a faculty; but to so regard reflexion as an act we must presuppose the power to perform such an act. Functionally, reflexion does not make a determination of a rule, but rather we could say it makes a *ruling*. In this sense, reflexion is not an act of *judgment* but merely an implication of the way and manner in which the cognition being formulated is to come under the rules by which concepts are constructed.²

In this we see the fundamental difference between the logical act of comparison and the act of reflexion. As we saw above, comparison must be viewed in the logico-mathematical context of belonging to the “logical mechanics” of representation. Reflexion, on the other hand, lies firmly within the province of a logic of meanings and the meaning implication it produces – i.e., the

² In symbolic logic, the question of how ‘implication’ is to be defined is an issue of some controversy, e.g. [AMBR: 75-77], [QUIN: 28-33], particularly in regard to ‘material implication.’ We use ‘implication’ here in the older connotation of the verb ‘implicate’: to enfold, to intertwine, to entangle. Our usage is thus somewhat in the spirit of ‘entailment’ in symbolic logic, but is not to be regarded as a mere truth-function connective.

transcendental affirmation it makes – clearly bespeaks of a function of assimilation. Before we can go farther than this conclusion, there is a great deal we must discuss concerning the “nature of the rules” upon which reflexion passes its “ruling.” This discussion, however, will take us deep into Kant’s transcendental ontology and so we must wait awhile longer before continuing with our exposition of the idea of the logical act of reflexion.

Abstraction

The last of our *Verstandes-Actus* is the idea of the act of abstraction. In Chapter 3 it was argued that the “segregation” involved in abstraction is a segregation predicated upon the “unlikeness” of the representation of comparison and reflexion with respect to the idea of the *purpose* of representation. In Kant’s *Lectures*, we find the statement

Consciousness according to choice is attention - the replay of that is abstraction . . . Abstraction is the actualization of Attention, whereby only a single representation is made clear and all the remaining are obscured. Attention does not stop with abstraction, but rather it is only directed from one or several Objects to one, and all the remaining representations obscured and the one clear [KANT19: 247-248 (29: 878)].

The act of abstraction makes a transcendental *negation*; in this it can be regarded more or less as the dual of the act of reflexion. Recall from our discussion of Rational Theology that the particular “real thing” is represented by limitations placed, metaphysically speaking, on the sum total of all possible predications. When we say we “know” a thing, the cognition of what that thing is *not* is often as vital as the cognition of what we think that thing *is*. Furthermore, the process of discovery and of learning often proceeds from “what it is not” to “what it is.”

Thus we can say the act of abstraction produces the matter of a meaning implication – via a negative ruling in this case. Now, “meaning” is not something that “objects” present to us from themselves. Every connotation of meaning is a creation of mind. This conclusion is inevitable once we have examined and rejected the copy of reality hypothesis. In the case of the act of abstraction, the link between this act and Piagetian accommodation is quite clear. Piaget wrote, as we quoted earlier, that “difference between objects . . . creates disadaptation”; under the Copernican hypothesis, we will have to say this is not correct. Such a view would be indicative of the copy of reality hypothesis sneaking back into our thinking.³ Rather, we must hold that *disadaptation creates distinction among objects*. Objects conform to our representations of them rather than the other way around.

But in order to say “disadaptation creates distinction”, and with it accommodation, we must

³ Piaget himself rejects the copy of reality hypothesis elsewhere in his numerous works.

presuppose that this “disadaptation” must originate from subjective, not objective, perception. This is possible if the perception of “difference” in the *Verstandes-Actus* is a difference between the constructed representation and “the reason for its construction” – i.e. between the representation and a *purpose*. That which could *possibly* be included in a representation but which is not expedient for the purpose of that representation (Kant’s word was *Zweckmäßigkeit*) is “segregated from” the representation by the act of abstraction. Abstraction, like reflexion, makes a ruling. This ruling, while still not a judgment, produces matter for a meaning implication, and is a *transcendental ground* for the phenomenon of Piagetian accommodation.

Of what nature are the acts of reflexion and abstraction? From what we have already said, it is clear these acts cannot be viewed as having strictly objective grounds. Rather, let us say that they have grounds *from which objectivity springs* in the making of representations.

If I am to make distinct to myself the concepts of a thing, then my representation of it must first be clear. Then I must attend to the various marks of the thing; after that I must take many marks in a thing together, or compare [*Compariren*] - hold them up to one another and compare [*vergleichen*] them with one another. In this comparison [*Comparison*] there occurs not only a mere collection of its marks, but rather a placing next to one another, a coordination of them.

Finally, however, comes *abstractio notarum*, or that act in which, in making distinct the representation, I ignore all such marks of a thing as could hinder and disturb me, or are not of use to me and thus are superfluous [KANT8a: 107 (24: 136-137)].

As acts in the production of meaning implications, and as acts that already appear to us as being in some way necessarily bound up with the idea of a subjective purpose, we will not be surprised later to find the ideas of reflexion and abstraction bound up with the idea of a class of non-objective representations we shall call *affective perceptions*.

§ 8. Transformations and the Synthesis of Experience

In the organization of the mental constructs we have been considering, we may identify two main powers: the power of adaptation and the power of the *Verstandes-Actus*. As we have seen, the power of adaptation is expressed in terms of actions dealing with the construction of the manifold of representation. This structuring is expressed by way of schemes. The idea of a scheme is the idea of an organized action, which we may view as an empirical rule embodied in the Subject’s self-organization of the manifold of representation insofar as this organization pertains to actions. The power of the *Verstandes-Actus*, on the other hand, is the power to make individual representations which, figuratively speaking, supply the “bricks” out of which the objective structure of a scheme is built. If the idea of a scheme is most closely linked to the idea of action, we may say that the idea of the *Verstandes-Actus* is, in essence, the idea of an act. The distinction

here is somewhat like the distinction we make in language between a verb (to act) and a noun (act), and is a distinction we will later elaborate upon in more detail (Chapter 15).

It would be quite wrong, and contrary to the facts that Piaget presents in such marvelous detail and variety, to think of adaptation as somehow “waiting for” representations, like a construction crew might wait upon the delivery of a load of bricks, before “springing into action” with the construction of schemes. When simple perception passes to intuition and onward to concepts, we say *learning* has taken place. But Piaget’s findings show clearly what any good teacher already knows: learning requires *activity* on the part of the learner. And yet without representations from which to build schemes, adaptation is an empty idea. We can, of course, suppose that this apparently circular process can somehow be “kick started” by means of the Organized Being’s innate hereditary reflexes, but this does not really solve the problem. Adaptation belongs to the division of Organized Being we call *psyche*; the *Verstandes-Actus* belong to *nous*. The former is the faculty of animating principles; the latter is the faculty of knowledge. We must regard adaptation – with its phenomena of assimilation, accommodation, and equilibration – and the *Verstandes-Actus* as coordinate ideas, rather than trying to subordinate one of these to the other.

In the discussion above, we pointed out some of the “links” that appear to exist between the acts of understanding and the ideas of assimilation and accommodation. Perhaps more accurately, what we have pointed out is we have reason to think such linkages exist. If our ideas of adaptation and *Verstandes-Actus* are to be more than a pair of ideas in aggregation with one another, we must have something more than merely the possibility of a connection between them; we must have a principle that *does* connect them. If adaptation is seen as *action*, this principle must speak to the *act* performed; if *Verstandes-Actus* is seen as an *act*, this principle must speak to the *action* that realizes it.

And it is here where we find the “place” occupied in our theory by Kant’s threefold synthesis of experience. In Chapter 3 our discussion of the principle of the synthesis of apprehension in the intuition, the principle of the synthesis of reproduction in imagination, and the principle of the synthesis of re-cognition in a concept had clear ties to the ideas of the *Verstandes-Actus*. The threefold synthesis was seen there to deal with the issue of producing comparates for the *Verstandes-Actus* to act *on* and the issue of what sort of representation the final outcome of the *Verstandes-Actus* was. The latter, we saw, consists of intuitions, while the former consists of concepts. The combination of these powers is in the service of making experience possible.

And yet our discussion of the threefold synthesis of experience in Chapter 3 did not come to grips with a very fundamental issue: the issue of what or how particular concepts come to “feed” the *Verstandes-Actus* by way of the synthesis of reproduction. Likewise, in our discussion in this

chapter of the idea of meaning implication in reflexion and abstraction, we did not address the issue of what it is that establishes or promotes the “purpose” and “meaning” we must presuppose for this idea of a meaning implication. These are vital issues and we must not ignore them.

If we examine these questions functionally, it is at once clear that the synthesis of reproduction and the synthesis of re-cognition both contain the idea of a relationship between these synthetic *actions* and the idea of the manifold of representation. This is because the reproduction of intuitions draws the *rules* for this reproduction from the manifold of concepts (the rules are none other than concepts), while the synthesis of re-cognition *places* new rules *in* the manifold. But, viewed this way, we can see that the “full circle” from reproduction to re-cognition begins and ends with the representation of a *global mental structure* (i.e. the manifold or some submanifold within it). This global structure is constituted *as a system according to rules*, but a system that must be regarded as an *open* rather than a closed system.

Just as we can view the threefold synthesis of experience as the *transforming* of one representation into another, we can likewise view this threefold synthesis as the *transform* by which the system of representation, including constructed schemes of representation, undergoes adaptation. In the first viewpoint we see the synthesis as a ‘what’; in the second we see it as a ‘how’. It is one thing to say the power of adaptation is a power to construct schemes; it is another thing to say how this construction takes place. Piaget’s doctrine carefully confines itself to observable facts and to rational empirical deductions that appear to be capable of hypothetically explaining these facts. There is, of course, nothing wrong with this insofar as an experimental and observational science is concerned. The nature of his method is why Piaget insisted that his *schème* be translated as “scheme” and not “schema.”

It is, however, also quite clear that the phenomenon of mind can and should be expressed in terms of Kantian “representation” as well. Piaget’s “genetic epistemology” is predicated on a biological model – viewing mental phenomena as “extensions” of “organic” phenomena. It proved to be a clever and fruitful model for the guidance of his scientific work; but it is also, at its core, a philosophy as tainted by empiricism as Hegel’s is a philosophy overrun by a prejudice inclining towards pure rationalism.

In Kant’s threefold synthesis of experience, we catch a glimpse of an idea which, at this point, appears capable of being made to “bridge” the gap where the idea of adaptation ends and the idea of the *Verstandes-Actus* begins. We have already established the transcendental ground for the necessity of the threefold synthesis – as necessary for the possibility of experience from a rational perspective. It remains for us to likewise establish the relationship between the threefold synthesis and the idea of adaptation. All we have at this point in our treatise is the establishment that such a relationship is objectively valid.

§ 9. Concluding Remarks

We finally come to the end of this first epilegomenon. Looking back at what we have done in this chapter, our task has been one in which we have taken the ideas developed for representation and examined these ideas in terms of *other* facts and considerations we did not consider in the earlier chapters but with which the theoretical constructs of Chapter 3 *must* be placed in accord if our theory is to square with the facts. In carrying on with this task we have paid heed to Bacon's advice to add ballast and lead to our understanding to prevent it from flying too rapidly to roost in rationalist excess.

We have also prepared ourselves somewhat for the long journey that still lies ahead of us by introducing certain ideas and considerations that will form key parts of the architectonic of the theory. Among these ideas are the ideas of *powers* and *faculties*. The former pertains to abilities manifested in the phenomenon of mind; the latter pertains to principles of organization that bring unity and structure to the theory. In what lies ahead, we must bear in mind Locke's admonishment that we not confuse the idea of a faculty with some materialist prejudice that faculty implies some fictitious entity – an homunculus – or particular specialized “brain function” which directly “embodies” the principle of organization a faculty represents.

In this chapter we have also examined in more detail Kant's doctrine of method contained in metaphysics proper. Metaphysics proper is the rational guideline for the *development* of objectively valid theory. Within metaphysics proper, we have examined Rational Cosmology (which guides the theory of Nature), Rational Psychology (which we found to contain principles for what we *cannot* presume without going beyond the borders of transcendental considerations into the domain of transcendent speculation), and Rational Theology (which deals with the perplexing and centuries-old puzzle of what we mean by Reality). All we have neglected from metaphysics proper is Rational Physics – the metaphysical doctrine of appearances. This division of metaphysics proper we shall deal with in due course.

We have also enriched our store of facts by examining various observable phenomena in the behavior of young children. Syncretism, juxtaposition, ego-centrism – these and other phenomena provide us with the empirical signposts we require when rational deduction comes to a fork in the road, where it is presented with many logical possibilities but insufficient objective ground for choosing from among them. Most important of all, we have seen “logic” is an idea of much greater scope than is found in mathematical logic, and that the strict formal logic upon which logical positivism sets such store is indeed inadequate for the exposition of the phenomenon of mind. There is, in addition, a “pre-logic” of adaptation and a “logic of meanings” we must explore and develop if a science of mental physics is to become a successful doctrine.

Mathematical logic will, of course, have its proper place in our theory; but this place is far from being the driver's seat.

Now that we have come through the discussions in this chapter, perhaps it can be better understood why I called this an "epilegomenon." The scientific method is indeed, as Simon correctly points out, *practically* dependent on a process of reductionism. However, in practicing reductionism, we must not think reductionism takes place in a closed system. There is some truth that the phenomena at some particular "level" are described in terms considered "primitive" at that level, and that these "primitives" become phenomena to be explained and described at the next level "below"; the reductionist trap, however, lies in thinking that these primitives are "the" phenomena – i.e., the *sole and exclusive* phenomena – that constitute the business of reductionism at the next lower level. For every success that "closed" reductionism has enjoyed in science, one can point to spectacular speculative failures – monads, "proofs" of God, the luminiferous æther – that have equally been brought about through closed reductionism. As Bacon wrote at the dawn of modern science, we "must not learn too much from too little." It is to heed this warning that, from time to time, we shall temper our reductionism by the use of epilegomena.