Chapter 9

The Ontology of Speculative Reason

Wisdom increases in men according to their present state

Empedocles

§ 1. The Phenomenon of Reason

In everyday language we use the word "reason" in three distinct ways. As a verb, "to reason" denotes acting to analyze, to think or present arguments logically or systematically, or to draw inferences and conclusions from premises that we either assume or hold to be true. As a noun, we use the word "reason" in one sense to denote an explanation, motive, or justification. In a second sense, "reason" denotes the ability to reason. Thus, everyday usage views "reason" in terms of either: 1) a mental activity; 2) a ground or condition for something else; or 3) the ability to perform the mental activity.

In this treatise, we use the term "power of reason" (which we abbreviate as 'Reason') to mean, in part, the third of the above usages. However, as will become clear shortly, restricting this idea of Reason to simply the ability to perform acts of thinking, judgment, inference, and conclusion will prove to be too restrictive when we consider the Organized Being as a whole. First of all, we have distinguished "judgment" as a mental ability in its own right, even to the extent of classifying the phenomenon of judgment into three types – determining, reflective, and practical – in the faculty of consciousness. Second, thinking is cognition through concepts and while it is true that Reason plays a part in this process, it is equally true that the process of thinking we have described in the previous chapters also involves processes contributing to understanding that we choose to distinguish from the power of reason in our mental anatomy. Finally, there must come into our theory at some point the fact that not all of our mental acts are represented in objective perceptions (e.g. the feeling of *Lust* or *Unlust*) and some are not presented in conscious representation at all (e.g. a voluntary motor act[1]).

---

[1] I can be aware of "willing" my fingers to type this sentence, but the representation of the motor act is not presented to my consciousness so far as the efferent motor schemes are concerned. My perception of motor activity is *ex post facto* through kinaesthetic feedback.

Our theory must, of course, take all these into account since, as we have said several times already, our 'anatomical divisions' of the mental faculty are merely logical divisions and, furthermore, we are not permitted to introduce any real division between mind and body. This presents the need for a broader *Realerklärung* of Reason than is contained in the dictionary definitions of everyday language. At the same time, there seems at this point no "reason" to make our description so broad as to include phenomena such as the autonomic somatic functions which, although factually related to brain activity, are not properly regarded as activities of *nous*. Let us therefore agree to the following explanation: ***Reason is the power to direct and regulate the spontaneity of an Organized Being insofar as this spontaneity is not autonomic***. With this description of Reason we take in all mental acts related to directing and regulating the processes which bring us understanding through thinking as well as all 'voluntary' and 'motivated' acts of spontaneity involving the motoregulatory powers.

Under this umbrella we can retain a useful logical division of the faculty of Reason, namely one division that is manifested in the process of employing determining judgment in thinking, and another division that is manifested in behaviors for which we must infer the existence of pre-conscious or unconscious mental acts. The former division we will call *speculative Reason*; the latter we will call *practical Reason*. Our descriptions of "what goes on" in the process of thinking in terms of the making of inferences, the drawing of conclusions and the general employment of the powers of understanding *in concreto* – i.e., the know-how of reasoning – we will place under speculative Reason. Acts that we say *determine the spontaneity* of the Organized Being will belong to practical Reason. The mark by which these two divisions are distinguished is this: speculative Reason always has *cognition* as an outcome; practical Reason always has *an activity* as an outcome. In objective terms, we can say with Kant that speculative Reason goes to *determining* an object and its concept while practical Reason is concerned with *making its object actual* [KANT1a: 107 (B: ix-x)].

The adjective 'pure' in the Critical Philosophy always denotes something that takes in no element of experience or sensation and, therefore, is *a priori*. Insofar as knowledge is concerned, we may then describe *pure Reason* as the faculty (organization) of *a priori principles of knowledge* [KANT1a: 132 (B: 24)]. Those of such principles that pertain to determining an object would belong to a faculty of pure speculative Reason; those that pertain to the acts by which some object is *made actual* would belong to a pure practical Reason. Now, whether we are talking about speculative Reason or about practical Reason, in either case Reason stands aloof from immediate relationship to cognitions. This is because the making of cognitions, as we have seen in the previous chapters, is the direct concern of the process of determining judgment – a faculty of *nous* we have logically set apart from Reason. Speculative Reason stands in an immediate relationship only with the phenomenon of understanding as required by the principle

of the unity of apperception (which is an acroamatic principle for pure Reason).

The immediate consequence of this is that the idea of the power of reason has for its Object a *noumenon*. Thus, we must base any exposition of the idea of pure Reason on transcendental grounds where the appearance of Reason as an object is deduced as that which is necessary for the possibility of experience. By now this is nothing new to us since imagination, judgment, and the entire catalog of our mental anatomy and physiology have been subject to this same requirement. But the more removed our theory becomes from the immediate data of the senses, the greater care we must take in our exposition because we can reach the more 'remote' parts of the theory only through our deductions of those ideas that stand closer to factual experience and thus are "clearer to us" than "clearer in nature." Every science proceeds in this fashion as it "peels back" appearances to discover its more fundamental principles; yet in this process of discovery we will still bear in mind Bacon's dictum and add lead weights to our ideas so they will not fly away to become transcendent rather than transcendental.

Our objective in this Chapter is therefore a relatively modest one, namely to explore the ontology of speculative Reason and complete our *Realdefinition* of the categories of understanding. As notions, the categories are the rules for the making of those rules we call concepts. In Chapter 8 we dealt with these rules as they pertain to conceptualization of sensible objects – the constituents of the matter of Nature and Reality. In this Chapter, we turn our attention to the form of Nature and Reality[2] and, because Nature and Reality are *noumenal* ideas, our exposition of this form must turn to consider the supersensible *objects of Reason*. In our doctrine of method this means we must call upon the metaphysics proper of Rational Cosmology (for Nature) and Rational Theology (for Reality).

Now since we have said that the categories 'belong' to determining judgment in the faculty of our understanding, why is our present task called the ontology of speculative *Reason*? The answer to this question is simple. Ideas – concepts of *noumenal* objects – involve, by their very definition, inferences in which we find representations that contain constructions that are not given in sensation. Such constructions have their origin in the power of Reason rather than the data of the senses. Yet these representations still refer, through the representation *in concreto* of appearances, to objects "of" or "in" Nature and which are thought in some sense as "real." The categories are the rules under which such representations are made, but in the case of *noumena* it is reasoning rather than immediate experience which determines the object. The 'thing in itself' cannot be *given* to us through receptivity and so it is the *regulation* of the employment of the

---

[2] Reality in this context does not refer to the category of reality, which is a notion, but rather to the Idea of "reality in general" as the "quintessence of all that is real." Unfortunately, neither English nor German supplies us with different words by which we might distinguish these two homonyms. In this treatise the word Reality refers to "reality in general"; when we refer to the category, we will write it as "the category of reality" or simply as reality. Nontechnical usage is indicated by placing it in quotes, e.g. "reality."

categories that makes the determination. By the phrase "ontology of speculative Reason" we mean nothing other than the *Realdefinition* of the categories under principles of pure Reason that provide the ground of *objective validity* in ideas and which delimit the horizon beyond which the employment of the categories cannot be pushed without the ideas becoming transcendent. It is precisely at this horizon where we draw the distinction between *knowing* in the strict sense (which expresses *objective sufficiency* in one's holding-to-be-true) and *believing* (which expresses merely *subjective sufficiency* in one's holding-to-be-true).[3]

But although the objective for this Chapter is limited to this relatively modest aim, we obviously cannot expect to make an exposition of the relationship of the categories and Reason without first understanding a little bit about the phenomenon of Reason. Since this is the first time we have had to come to grips with the *details* of the appearance of Reason, let us begin with what is known from experience about the process of reasoning.

§ 2.   The Empirical Development of Thought

We have described Reason as the power to direct and regulate the spontaneity of the Organized Being. In doing so we have placed a logical dividing line in our mental anatomy by which the power of judgment and the organization of understanding are placed in the role of acting as patient to the agency of Reason. This means, metaphorically speaking, that the processes of reflective and determining judgment are in the role of employees whose employer is pure Reason. The categories are the workforce of our understanding and, as such, the source of objective validity in our concepts and of the meaning that thinking invests in cognition *a priori*. But 'meaning' is not a direct object of sense and so the idea of 'meaning' has for its object a *noumenon*. We have said earlier that an intuition is vested with a symbolism by the interplay of the categories and the reflective judgment of the *Zweckmäßigkeit* of its representation. But this idea of the *Zweckmäßigkeit* of a representation necessarily presupposes a role for Reason (namely

---

[3] Some people, including some rather famous philosophers such as Bergson, have taken Kant's simple statement, that we cannot know the thing in itself *completely* and with objective *certainty*, to imply that we cannot know *anything* about things. Personally, I find myself unable to understand how these otherwise astute people could come to hold such an opinion. If this opinion was a correct interpretation of the Critical Philosophy, Kant would be the most famous blunderer in the history of philosophy. What we can know about the thing in itself is precisely, and no more than, what we can know of its *appearance*, i.e. from the representations of its accidents of *Existenz* that judgment attaches to its concept under the category of substance and accident. This is not a difficult doctrine to understand, although I suppose that, if one were a committed realist, a Lockean representationalist, or an absolutely insistent Platonist and therefore unwilling to adopt the Copernican hypothesis, it could be the case that the doctrine might feel uncomfortable. I might not know "what gravity is made of" (and even doubt if that question can be objectively valid), but I do know "gravity exists in fact" because I infer its *Dasein* from experience, where its *Existenz* is evidenced in appearances such as, among other things, my feeling of a "force" holding me in my chair.

the establishment of a "purpose of Reason") and so there must enter in to our theory this aspect of the phenomenon of Reason.

The idea of a 'purpose,' in turn, likewise has for its object a *noumenon* and so we are faced with the question of how it is possible for Reason, which has only a mediate standing with regard to cognitions, to invest in these cognitions that which we call their "meaning." Are we to suppose, with the rationalists, that the mind is endowed with innate ideas of meaning, fully preformed and prior to all experience, and lends these ideas to the power of cognition like a banker making a construction loan? If such a supposition were true, it would have observable consequences and empirical psychology finds against these consequences. We must look elsewhere for our answer.

Objective knowledge, insofar as it is the product of spontaneity, is understanding. While Reason may direct and regulate the process by which we come to have understanding, Reason "itself" is not "the" power of understanding. It is, rather, in the role of a method of the mind that yields, as an outcome, that which we call understanding. What we know of the appearance of the power of reason we know only in terms the appearance of *activities* (e.g., the *making* of a logical deduction) and this is true even of that which we are calling speculative Reason. It follows that the relationship between Reason and knowledge is one that is mediated through *actions*. If we are to hold that it is possible for Reason to invest representations with meaning, we must look for this possibility in the appearance of these actions. This has the dual advantages of, first, giving us a place to start looking at the phenomenon of speculative Reason and, second, of making available to us experimentally reachable facts of experience that provide our Baconian lead weights and focus our attention on the central issue of *how* we appear to come to construct the world model we call Nature.

While Kant was, without doubt, a proponent of this unified theme in which the empirical and the rational are melded together, his great works nonetheless record in the main only the rational aspects of this problem. It is consequently no great surprise that many philosophers, e.g. Joad, have labeled the Critical Philosophy a philosophy of "objective idealism." To examine the empirical aspects of the problem, we therefore turn to the work of Piaget who, like Kant, followed a unified theme in his philosophy of "genetic epistemology" and worked to put the rational elements of his theory in accord with empirical facts.[4] As Piaget says of himself and his work,

I am no empiricist, and it may therefore seem strange that I should begin by appealing to the great

---

[4] Piaget himself was not a supporter of Kant's Critical Philosophy, as his philosophy of genetic epistemology makes evident. His work bears strong evidence of the influence of Bergson and he shares with Bergson two important attitudes. First, we find in Piaget's work a strong connection between the science of biology and philosophy. Second, while Piaget comes close to adopting the Copernican perspective, he nevertheless maintains the naturalist's "external" view in the description of his findings.

traditions inaugurated by the founders of classical empiricism, from Locke and Hume to Herbert Spencer. Their intention was to base the analysis of knowledge on a study of its psychological development, and in this they seem to us to have initiated a fruitful approach. Unfortunately, they accepted a speculative psychology, whereas they should have undertaken detailed experiments; and so their psychology as well as, incidentally, their logic, remained inadequate . . . Nevertheless, it remains true in a sense that genetic epistemology is itself a development of the work of the founders of empiricism; and that is why we are able to claim a shared tradition [PIAG27: 10-11].

I gladly seized the opportunity of writing this little book on genetic epistemology, for it seemed to me that greater prominence needed to be given to an important idea which, though confirmed by my own and my collaborators' work in this field, is nevertheless too rarely taken into account: knowledge cannot be conceived as predetermined either in the internal structures of the subject[5] - they are due to an effective and continuous construction; or in the pre-existing characteristics of objects, since they are only known through the mediation of these structures and the latter enrich them by incorporating them (even if only by placing them within a system of possibilities). In other words, all knowledge involves an aspect of novel elaboration, and the important problem for epistemology is to reconcile this creation of new material with the twofold fact that on a formal level the novel items are linked by necessary relationships as soon as they are elaborated; and on the level of reality they make objectivity possible, and they alone do this.

Underlying our concern with this question is the twofold intention of (1) constituting a method capable of providing empirical tests, and (2) reaching back to the very origins of knowledge; traditional epistemology being only concerned with the higher levels or, in other words, with certain resultants. Genetic epistemology, then, aims to study the origins of various kinds of knowledge, starting with their most elementary forms, and to follow their development to later levels up to and including scientific thought. But though this kind of analysis involves an essential element of psychological experimentation, it must not be confused with a study of pure psychology.

In short, these pages contain an account of an epistemology that is naturalist without being positivist; that draws attention to the activity of the subject without being idealist; that equally bases itself on the object, which it considers as a limit (therefore existing independently of us, but never completely reached); and that above all sees knowledge as a continuous construction [PIAG27: 14-17].

For the purposes of this Chapter, our interest in Piaget's work is focused on his theory that the development of knowledge occurs from following a ***central process of equilibration***. We will later see how the idea of such a process can be tied to our idea of a faculty of pure Reason, but for now our interest lies in the descriptive power of Piaget's findings. In *The Development of Thought* Piaget presents his theory in which all the experimental facts pertaining to cognitive development in children, gathered through years of experimental work, are brought together and subsumed under the general description of a rational idea of a systematic *process* by which all reasoning activities appear to take place. Piaget describes for us the dynamical nature of this idea:

By this we do not mean we can identify a single general structure of equilibrium which can be stated once and for all, and applied to every situation and to every level as Gestalt theorists . . . use their hypothesis for the psychology of form, but rather we can observe a process (hence the term "equilibration") leading from certain states of equilibrium to others, qualitatively different, and passing through multiple "nonbalances" and reequilibrations. Thus the problems to be solved involve various forms of equilibrium, the reasons for nonbalance, and above all the causal

---

[5] Here Piaget is referring to *biological* structures - i.e. what we call *soma*.

mechanisms, or methods, of equilibrations and reequilibrations. It is especially important to stress from the very beginning the fact that, in certain cases, the reequilibrations merely form returns to previous equilibriums; however, those that are fundamental for development consist, on the contrary, in the formation not only of new equilibriums but also in general better equilibriums. We can, therefore, speak of "increasing equilibrations," and raise the question of self-organization [PIAG19: 3-4].

Our task for the remainder of this section is to summarize the essential points of this theory, with some modifications necessary to make sure that Piaget's theory can be viewed with objective validity under the Copernican hypothesis despite Piaget's own tendency to drift into realist descriptions. This model will then serve us as a partial description of the appearance of the phenomenon of Reason in our later work.

§ 2.1 Structures, Compensations, and Regulations

Like Kant, Piaget had an unfortunate tendency of failing to provide clear summary descriptions or definitions of many of his technical terms. Also like Kant, he tended to rely on the reader's having read his other works to gain familiarity with these terms as they get used in any one of his particular works. This has, of course, the advantage of keeping his books manageably short but it also has the disadvantages, in terms of the time investment required, inherent in any system of prerequisites – as anyone who has aspired to a general liberal education is well aware. Nowhere is this more in evidence than in *The Development of Thought*, which stands near the summit of many years of research findings. Three key ideas in particular – structure, compensation, and regulation – are central to the theory of equilibration and so let us begin with them.

The fundamental idea of a **structure** runs throughout all of Piaget's works. Three attributes, taken together, constitute this idea [PIAG17: 22-23], [PIAG28: 7, 15]:

> 1) a structure is a totality, i.e. anything governed by laws which apply to it as a whole, and not merely to the elements it contains, and for which these laws define its properties and characteristics *as a system*;

> 2) the laws of this system are always *self-regulating transformations* in the sense that to be able to carry out these transformations nothing outside the system is required and the result of the transformation is itself contained in the transformed system;

> 3) the system may contain differentiable sub-structures such that during a transformation it is possible for some of these sub-structures to remain unaffected, or for a transformation to be limited in effect to some transformation from one sub-system to another; these sub-structures inherit the characteristics of the total structure but may also exhibit their own individual characteristics.

The second property of a structure means that the "laws" of the structure, from which it takes its properties, are exclusively dynamical. Since these laws define the properties of the structure, a

structure cannot be viewed as something which has a static form but, rather, must be viewed as something which is inherently adaptive. That these transformations are self-regulating means that the laws of transformation are at the same time the laws of the *organization* of the structure. That the structure is not a static structure means, among other things, that this structure is able to *integrate* itself into other 'larger' structures as a sub-structure without either losing its own unique properties nor altering the properties of the totality of the larger structure into which it becomes integrated. It also means, as per attribute (3), that the structure can divide itself into sub-structures without destroying the character of itself as a totality. Therefore, the nature of its transformations are found in the *functional invariants* of adaptation, namely assimilation and accommodation.

A structure, therefore, makes a system. Piaget uses the word "system" to mean *a complex of elements in non-contingent interaction* [PIAG28: 37-38], which is more or less the same description of the idea of a "system" used by mathematically-oriented system theorists.[6] If we take for a system something such as, say, "the system of logic" in Whitehead's and Russell's *Principia*, we have what is called a **closed system** – one which is taken to have achieved a final form and, in a manner of speaking, occupies itself only with its own internal Relations and not with any external or transitive Relations. Such systems are, for the most part, of little concern to us in this treatise. On the other hand, an **open system** – one which cannot be said to have achieved a final form – is of central interest to us. In particular, such a system must call our attention to this idea of "non-contingent interaction" in a system and presents us with the question of how to regard this "non-contingency" in the context of a structure whose properties are contingent upon its laws of transformations. Here we come to face the distinction between a structure and the **functioning** of a structure.

> Generally speaking one may . . . consider functioning as the structuring activity whose structure constitutes the result or the organized event. In the case of a completed structure functioning is identical with those transformations which are real among all those which are possible, and which characterize the system as such. . . But in the case of a structure in the process of formation or of development, or generally not 'closed', where for that reason self-adjustment so far consists only in regulations and where exchanges are open to the exterior, functioning is formative and not merely transformative and functions correspond to utilities (or values) of various kinds depending on the role of conservation, reinforcement or perturbation which the functioning of sub-systems may play in relation to the total system or vice versa [PIAG28: 37].

Transformations in an open system (whether biological or cognitive) can be expressed in terms of the elements *A, B, C,* etc. of the system and elements *x, y, z,* etc. of the 'exterior' environment with which the structure undergoes 'exchanges' that 'feed' the system. We can represent the overall structure in terms of transformations of the form

---

[6] Piaget's definition of a system can be regarded as an appearance of the Critical idea of a system viewed from the practical Standpoint of Critical ontology. See the Glossary for the Critical definition.

$$(A \times x) \rightarrow B .$$

Experimentally we find that biological organisms exhibit a structure that is **cyclic**, e.g.,

$$(A \times x) \rightarrow B, (B \times y) \rightarrow C, (C \times z) \rightarrow A, etc.$$

One of Piaget's most fundamental findings is that *cognitive* systems likewise exhibit cyclic structures. The relationship between an element A and its "aliment" x is one of *assimilation* by which the functioning of the system incorporates x into the cycle that gives the system its structure.

Now suppose that something effects a transformation on the factor x which changes it to some x'. If this x' does not contain in its characteristics whatever served A as its aliment, we say that x' is a **disturbance**. In this case one of two results is possible. The first possibility is that x' can no longer be assimilated into A and the cycle is **ruptured**. In the case of a biological cycle this can lead to the death of the organism. In the case of a cognitive system the substitution x' is rejected. The second possibility is that *structure* may be modified, e.g. through an adaptation

$$B' = B + \Delta B$$

so that the cycle

$$(A \times x') \rightarrow B', (B' \times y) \rightarrow C, (C \times z) \rightarrow A, etc.$$

is preserved.

The modification ΔB is called a **compensation**. The effect of a compensation is to cancel or neutralize the disturbance x', i.e., to adapt the *cycle* such that this structure now *accommodates* the element x' of the "milieu" in which the system exists. A new equilibrium is thereby achieved for the structure.

Compensation is constrained by the organization of the structure. In particular, if the structure is to be preserved then the compensation transforming B to B' must be such that the resulting structure still assimilates the original element x. Symbolically, we then have

$$(A \times x) \rightarrow B', (B' \times y) \rightarrow C, (C \times z) \rightarrow A, etc.$$

This property of accommodation, in which the original cycle of assimilation is preserved under the transformation that accommodates x', is called a **regulation**.

In speaking of regulations and compensations, it is important to note that it is the structure, Γ, as a whole which is preserved under assimilation and accommodation. If we let $\Gamma = \Gamma_1$ denote the original cyclic structure above, the accommodation of this structure (i.e., the modification of B into B') to the structure Γ_2 of the second formula for the cycle given above must be viewed as a transformation

$$\Gamma = \Gamma_1 \Rightarrow \Gamma = \Gamma_1 + \Gamma_2 \ .$$

The structure Γ is a structure in *equilibrium*. The process that transforms Γ according to the above formula is called a process of *equilibration* since the 'new' structure Γ is a 'higher' equilibrium in that it preserves the 'original' equilibrium and 'improves' this equilibrium by virtue of this new structure being able to assimilate more than the original could. The regulation of this structure must therefore be viewed as something in which we have both (1) the differentiation of the structure Γ into substructures Γ_1 and Γ_2 and (2) the integration of these substructures in the totality Γ. Obviously, this is an anasynthesis of Quantity in the act of regulation.

It is important to understand quite clearly that the idea of a regulation (or, more specifically, the idea of a *system* of regulations) must be viewed hierarchically in terms of the totality Γ rather than in terms of the substructures Γ_1 and Γ_2 . This is because all regulation is constrained by the property of preserving the integrity of the whole. This is the very nature of the phenomenon of assimilation. The idea of 'regulations' implies the idea of a 'regulator' and such a regulator must be assigned to the Organized Being as a whole since there is no other objectively valid "place" to "put" this regulator.[1]

> Thus the only regulator we could assign to the cognitive regulations is an internal one. As their program is not hereditary, their existence can be attributed to the mutual conservations inherent in the functional process of the assimilation. This interpretation might appear as a disturbing vicious circle, since the cycle of interactions would thus be both the cause and the result of regulations. But in dealing with any biological or cognitive systems, we must characterize the whole as primordial and not proceed from the assembled parts or the differentiations based on the assembling. Hence the whole possesses a force of cohesion and therefore characteristics of self-conservation which distinguish it from nonorganic physical-chemical totalities. . .
>
> It is a significant fact that in all vital and cognitive fields the total form appears more stable than its components. Not only does an organism maintain its own form despite a continual metabolism, but, as P. Weiss has noted in discussing the cell, the total behavior "is infinitely less variable from one

---

[1] Leibniz, for instance, would make the "pre-established harmony" of the monads the "regulator." Bergson made the entire universe the "regulator" since, in his theory, one cannot "really" regard "individuals" as anything but a trick of the mind in "cutting up" the "flux of pure duration." For Descartes, God is the regulator. Locke and the empiricists who followed him (as well as the materialists, scientific or otherwise) make "nature itself" the regulator via the "mechanism" of the "laws of nature." It is obvious that all such "externally-based" philosophies violate our Copernican hypothesis and, therefore, lack objective validity.

instant to another than the momentary activity of its elements." In any cognitive system the laws governing the whole override the changing characteristics of the components . . .

    Thus there is no circle (or more precisely it exists but has nothing vicious about it) predicated when we admit that a whole system plays the role of regulator for the subsystems, for it imposes on them an extremely restrained standard: to submit themselves to the conservation of the whole, i.e., to the closing of an interaction cycle, or be carried off in a general dislocation comparable to the death of an organism. Just as the continual play of assimilations and accommodations constantly causes reinforcements and corrections, so both take the form of regulations or feedback the moment they extend (and the assimilating method forces them) into "retroactive" and "proactive" processes, but they remain under the permanent dynamical control of the whole which requires its own conservation. Certainly this is merely a functional programming yet it adapts itself to every situation [PIAG19: 22-24].

We see from this that Piaget's empirical theory, like Kant's rational arguments, posits this idea of a regulation of a process and places the regulator for it 'in' the Organized Being as a whole. For Kant the regulation is grounded in regulative principles *a priori*. Piaget, who denies himself recourse to such principles because he cannot establish them empirically from observations of behavior, describes regulation in terms of a *process* deducible from observable facts. Such a process he terms an **interaction**.

§ 2.2   Equilibration as Regulation via Interactions

Piaget states his theory from the viewpoint of what an "observer" (i.e., the psychologist) would observe and deduce from the behavior of an experimental "subject." This is, of course, the way of the naturalist in making the exposition of a theory that derives fundamentally from empirical studies. We will follow him in this method in our summary – initially – because this method of explanation has the virtue of making it easier to grasp the large ideas of Piaget's theory. However, the time will come swiftly upon us where we will have to re-cast these ideas in accordance with the Copernican hypothesis, both to establish the their objective validity and to "assimilate" his findings into the larger body of our theory.

    We begin by introducing two more ideas central to the theory of interactions. These are the ideas of 'observables' and 'coordinations.' Piaget defines an observable as *that which experience makes it possible to identify by an immediate reading of the given events themselves* [PIAG19: 43]. His point of reference for this is the thinking Subject, i.e. an observable is something the Subject observes (rather than something the psychologist observes). An "event" is "anything that happens" and the "reading" of this event refers to a conscious perception of "something *in* the event." This "reading" is not limited to sensational perceptions, intuitions, etc. but instead is a broad term capable of taking in the entire complex of cognition and affective apperception.

    A coordination, Piaget says, "includes inferences and thus involves more than observables" [PIAG19: 43]. In other words, a coordination includes the cognition of something that is not given in immediate experience and which, using the terminology of Piaget's theory of cognizance

from Chapter 5 (§4.3), the Subject "makes for himself" by "reflection." A coordination is, therefore, a "cognitive element" of which the Subject is aware. This "cognitive element" in Piaget's theory may be regarded by us as a concept which either is or is capable of becoming an empirical idea.

In addition to being cognitions, observables and coordinations play a functional role in interactions that Piaget describes metaphorically as a "recording instrument."

> It is insufficient . . . to define the observable merely by its perceived characteristics, since the subject often believes that he perceives what actually he does not perceive and characterizes the coordinations by verbal formulation, adequate or riddled with errors. It is evident that the implicit inferences play a role as great, if not greater, than the partial perceptions. The observables must therefore be defined by what the subject believes he perceives and not simply by what is perceivable.
>   In other words, an identification is never independent of the recording instruments (hence of an assimilation) available to the subject, and these instruments are never solely perceptive but are influenced by preoperational or operational schemes capable of modifying or distorting the perceived entity. But as these schemes are, moreover, those used by the coordinations, the observables themselves are most often conditioned by previous coordinations . . . Even at the elementary levels, apparent close to the birth of the subject, observables are part of a network of coordinations, but these are partly innate (involving reflexes, etc.) and are not only progressively inferred [PIAG19: 43-44].

We can easily detect in this quote the presence of the psychologist-observer in Piaget's description. What is important here is that this "instrumentality" in observables and coordinations is part and parcel with the construction of the cognitive structure. Furthermore, since new constructions build upon previous ones, we can see the possibility here for equilibration to structure 'higher' regulatory interactions – i.e. to produce a hierarchy of regulations – in which earlier regulations ('in' the interactions) are subsumed under "larger" regulative structures, hence leading to "increasing levels" of equilibrium in the cognitive structure.

Now, what kind of "things" are "observed" and "recorded" by the Subject? Piaget makes a logical division of the observables and the coordinations into two classes: (1) observables and coordinations of the Subject's own activities; and (2) observables and coordinations assigned to Piagetian objects that the Subject is observing and interacting with. We will follow Piaget's notation and denote elements of the first class by *Obs.S* and *Coord.S*. Those of the second class admit to a further subdivision depending on whether the Subject is interacting with an object or merely observing the object. In the first subdivision, we denote the elements as *Obs.O* and *Coord.O*. In the second subdivision, Piaget divides the observation of the object into observables dealing with variations of presumed "factors in the object," *Obs.X*, and observables related to the *results* observed in "whatever is going on" in the event being observed, *Obs.Y*. Inferred coordinations involving the presumed factors are denoted by *Coord.S* (here Piaget declined to introduce a new variable since he regards the coordinations of "factors" as analogous to

coordinations in the activities of the Subject, only applied to "objective circumstances"). Inferred coordinations involving the observed "results" (here the Piagetian object is "what is happening") are denoted by *Coord.O*.

Bearing in mind Piaget's injunction given above that observables must be viewed in terms of "what the Subject perceives" rather than "what is perceivable" (from the viewpoint of the psychologist-observer), the classification just described only 'makes sense' when the Subject has a sufficiently developed cognitive structure to allow him to mark the distinction between "his own" activities and those of a Piagetian object. In the early stages of life the infant does not yet draw such a distinction. For this reason early observables in which the cognition of a subject-object distinction is missing are given the notation *Obs.OS*. With these notational conventions in mind we are now ready to examine the interaction structures of Piaget's theory.

Interactions of Type I

In the early stages of mental development there is an absence of Piagetian inferences (coordinations) in the mental structures involved in regulative interactions. Put simply, the Subject must first perceive observables before he can "interiorize" events by inferential coordinations (Chapter 5, §4.3). Piaget called interactions in which coordinations are absent Type I interactions.

Piaget's model of Type I interactions contains four kinds of observables. The first two of these are the *Obs.S* and *Obs.O* observables described above. The remaining two types he did not give specific names, but we will call them *the awareness observable* and the *anticipatory observable*. These observables can be viewed as *functional relations* between *Obs.S* and *Obs.O*, and we will denote them by the letters *a* and *b*. Our next task is to understand what these elements of Piaget's model represent in theory.

A. *Obs.S*: Piaget distinguishes two types of observables pertaining to the activity of the Subject. In both cases these observables correspond to schemes.

> Whatever is repeatable and generalizable in an action is what I have called a scheme, and I maintain that there is a logic of schemes. Any given scheme in itself does not have a logical component, but schemes can be coordinated with one another, thus implying the general coordination of actions. These coordinations form a logic of actions that are the point of departure for the logical mathematical structure . . . At the sensorimotor stage a scheme is a sort of practical concept [PIAG17: 42].

The two classes of schemes for *Obs.S* are: (1) *physical* schemes and (2) *intellective* schemes.

Any particular scheme constitutes a unit observable. By this we mean that the scheme enters

into the interaction as a single 'element' and, in the course of the interaction, the scheme is not consciously subdivided. Nonetheless, Piaget finds it convenient to make a logical division of the scheme for explanation purposes. Beginning with the physical scheme, we can logically distinguish two components. First, there is the *movement* of the Subject, which we denote by *Ms*. *Ms* is perceivable from the data of the senses in what neuroscience terms the sensory feedback, e.g. by what muscle contraction, etc., is sensed as well as from other sensory cues such as the visual perception of the motion of, say, one's arm. Second, there is the "feeling of the effort" that the Subject exerts during a movement. Piaget calls this the sensation of a "thrust" or "push" involved in making the movement, and it is denoted by *Ps*. Logically speaking, then, *Obs.S* is the total complex of these two perceptions, symbolized by $Ms \rightarrow Ps$.

In an intellective scheme we are no longer dealing with the perception of a physical movement but, rather, with the Subject's perception of the form of a "mental activity" or "operation" (*As*) and the "application" of this activity (*Fs*) to some Piagetian object. Piaget describes this observable as that which is observable "in the actions of logico-mathematical forms." This observable is not an observation of "what I am thinking" but, rather, the mere consciousness that I *am* thinking in a particular way. This is a somewhat vague point in Piaget's theory since the existence of this scheme is inferred by the psychologist from observing the Subject's behavior, e.g. when a child arranges Piagetian objects in some particular alignment.

> OBS. 109a. At 1;3 (6) Lucienne aligns four bowls very regularly side by side in a straight line. She then disarranges the series and begins again.
> The following days she does the same thing with pebbles and blocks but keeps to a rectilinear alignment [PIAG2: 191].

Piaget says of such behavior that the child is "establishing relationships" among objects. While this behavior obviously involves physical schemes, the regularity and repeatability of the arrangement of the objects that the child produces clearly implies that the physical activity is being directed by an intellective scheme (in the case above, that of "arranging things in a row"). It is highly unlikely, in view of other aspects of the child's behavior at age fifteen months, that she is thinking to herself, "I'll arrange these bowls in a straight row"; to Lucienne this is merely an interesting game that can be played with bowls, pebbles, or blocks. But, at the same time, it is also very clear that this game has *rules* (since she always arranges the objects in more or less the same arrangement) and these rules can come from nowhere but her own intellective activity, i.e. from an intellective scheme. The observable scheme $As \rightarrow Fs$ can therefore be regarded as a complex of concepts in which is represented the 'rules of the game.' Lucienne's observation is almost certainly not an observation of what these rules are but only a cognition of the schema of these rules.

B. *Obs.O*: With regard to observables concerning Piagetian objects there is likewise a two-way classification of the observable, depending on whether *Obs.S* is a physical or an intellective scheme. Piaget recognizes this distinction, although he uses the same symbolic notation in both cases. Likewise, he makes a logical division of *Obs.O* in terms of two factors. The first factor, *Mo*, is called the *movement* of the object. In the case of a physical scheme, *Mo* corresponds to some physical movement of the object, i.e. what we must view under the Copernican hypothesis as the perception of a change of state in the *Existenz* of the appearance of the object. This case seems obvious enough for how we are to regard factor *Mo*.

The situation is somewhat more abstract in the case where *Obs.S* is an intellective scheme. For this case the movement *Mo* does not correspond to a physical movement but rather, as Piaget puts it, "the modification of the collection of objects, enriched (owing to $As \rightarrow Fs$) by a new form" [PIAG19: 50]. The object in this case need not even be a physical object "presented" to the Subject through the data of the senses. Instead, the object can be "imaginary" and, indeed, we must infer that some imaginary content is always present in this observable. Let us take as an example Lucienne's arrangement of bowls, pebbles, etc. Obviously in the playing of this game the bowls (or, rather, the appearance of the individual bowls) constitute a physical observable of the first class. However, the objective of this game was not vested in the bowls themselves but, instead, *in the observable of their arrangement*. The movement *Mo* with regard to the intellective scheme consists in the perception of a progression from the initially disordered form in which the bowls were placed *to* a desired final form. The observable Piagetian object paired with the intellective scheme, in other words, was an "object of form" (or, in our Copernican terminology, an appearance of an abstract idea of a rectilinear form). The movement in this case is strictly a 'formal movement' from an initial appearance of a form to a final appearance of another form in which the Piagetian objects (e.g. the bowls) are only incidental matter 'shaped' by this objective form. Put another way, the object in this case is only "the object of the game" and not "the tokens in the game."

The *Mo* factor in *Obs.O* is 'concrete enough' in the sense that we can easily enough attach an objective meaning to *Mo* in terms of a sensible appearance of some sort. The second factor in *Obs.O* is considerably less 'concrete' because it is essentially an idea that is inferred by the psychologist. This factor, symbolized by *Ro*, is the idea of *the resistance of the object to the movement in the scheme*. A scheme of action always aims at effecting some change in *Obs.O*. We can say that the movement *Ms* is *intended* to produce some corollary movement *Mo* in the object. This is, after all, why we call the Type I structure an *interaction*. However, the scheme when applied to the Piagetian object may not succeed in producing the desired effect and might in fact produce some different effect. The idea that the object is in some way "resistant" to the scheme is

called the factor of *resistance*, *Ro*. Piaget's theory vests this "resistance" in the Piagetian object.

Now this "resistance" is not a 'thing' that is observable separately from the movement *Mo*. What is "immediately perceptible from the given event" is the appearance of the movement *and the perception of whether or not this movement is "going according to expectations."* If it is not, we say that there is some "resistance met with in the interaction." This resistance constitutes one type of what Piaget calls a *disturbance* in the attempted scheme of assimilation.

> We must distinguish two important categories of disturbances. The first includes those which are opposed to accommodations: resistance of objects, obstacles to reciprocal assimilations of schemes or subsystems, etc. In short, these are the reasons for failures and errors of which the subject becomes more or less aware; the corresponding regulations include negative feedback. The second category of disturbances, the source of nonbalance, consists of gaps which leave requirements unfulfilled and are expressed by the insufficiency of a scheme. But it is worth stressing - and this is essential - that all gaps do not constitute disturbances; for example, a scientist is by no means motivated by the considerable field of his ignorance (gap in his knowledge) because most questions do not concern him. On the other hand, a gap becomes a disturbance when it indicates the absence of an object, or want of knowledge that is indispensable in solving a problem. The gap, functioning as a disturbance, is therefore always defined by an already activated scheme of assimilation, and the corresponding regulation then includes a positive feedback which prolongs the assimilating activity of this scheme [PIAG19: 18-19].

This idea of the resistance *Ro* is the idea that if some scheme is failing to produce the desired result then "there must be a reason" for this failure or error. Now, from the Copernican perspective it is obviously ungrounded for us to say that this "reason" is *in* the object because its ground is the thwarting of an anticipation. However, the *Dasein* of this "reason" *first becomes known through the observability of the object*.[2] In other words, "things are not going as they should" and it is the ability to *perceive* this from *Obs.O* that we must regard as the meaning of Piaget's *Ro* factor. Thus he represents *Obs.O* symbolically as the unit $Ro \rightarrow Mo$.

In the case of a physical scheme, $Ms \rightarrow Ps$, *Ro* is perceivable as a "force" or "reaction" that opposes the action of the scheme. In an intellective scheme, $As \rightarrow Fs$, *Ro* has the connotation of lack of "acceptance" of the outcome, i.e. a perception of "wrongness" in *Obs.O*. And it is without doubt that the ability to perceive "wrongness" is a fact of phenomenal experience.

> OBS. 109. Lucienne, at 1;3 (4) and the next day, puts a metal bowl on a wooden pail (smaller than the bowl) and lets go of it. The bowl falls and she begins again, indefinitely. At 1;3 (6) she plays the same game but does not let go of the bowl until it is in equilibrium [PIAG2: 190].

It took two days, but little Lucienne finally succeeded in making the bowl "stay put" on the pail.

---

[2] Cognition of the *Dasein* of a cause comes prior to recognition of its *Existenz*. This is because an effect must first be recognized before an object is sought to stand as the cause in accordance with the category of causality and dependency. In history perhaps the most popular idea of *Existenz* assigned to the *Dasein* of causes has been "magic."

C. Equilibration in Type I Interactions: We now have identified two of the four observables in Type I interactions. We still have two observables left and to explain these we must look at the *structure* we call a Type I interaction.

The experiments described in *The Grasp of Consciousness* [PIAG25] show that young children are, in the course of their cognitive development, initially unconscious of the details of their own actions ($Ms{\to}Ps$). The proof of this lies in their inability to describe the details of an action that they have just successfully performed (e.g. "walking on all fours" [PIAG25: 1-11]). Such an inability is even exhibited by adults in some cases, as witnessed by Professor Henriques [PIAG25: 5, fn 1]. Other examples of this are common in athletics. When baseball great Yogi Berra was working as a hitting coach – a job in which he was responsible for teaching younger players how to improve their batting – it is reported that he had difficulty explaining how to hit verbally and would instead tell his players, "just watch me do it." Piaget's work finds that the process of cognizing the details of physical schemes begins with observations made on the object and "moves" from there *to* cognition of the details of what's going on in the scheme. This is what Piaget means when he says cognizance "moves from the periphery to the center."

For the case of intellective schemes ($As{\to}Fs$) it is more difficult to experimentally obtain a similar proof of "cognizance moving from the periphery to the center" since "what's actually going on in the Subject's head" is not accessible to observation by the psychologist. Nevertheless, it does seem, judging from the behaviors reported by Piaget in *The Language and Thought of the Child* [PIAG22] and *Judgment and Reasoning in the Child* [PIAG11], that this is the case.

> Mi (7½): A brother is "*a boy. - Are all boys brothers? - Yes - Is a boy who is the only one in the family a brother? - No. - Why are you a brother? - Because I have sisters. - Am I a brother? - No. - How do you know? - Because you are a man. - Has your father got brothers? - Yes. - Is he a brother? - Yes. - Why? - Because he had a brother when he was little. - Tell me what a brother is. - When there are several children in a family.*"

> Fal (age 7): "Are all boys brothers? - *Yes. - All of them? - No, there are some who have no sisters. To be a brother you must have a sister*" [PIAG11: 106].

We have described the resistance *Ro* in *Obs.O* as the perception of "things not going the way they should." Now, one reason for this might be that the scheme itself is inadequate to produce the desired outcome in *Obs.O*. But in order for the possibility of comprehending that there is a connection between the scheme *Obs.S* and the outcome *Obs.O* and that the "resistance in" *Obs.O* might be overcome by adapting the scheme, we must posit a function, *a*, that connects *Obs.O* back to the scheme *Obs.S* such that *Ro* gives rise to an "awareness" of the scheme. In other words, the function *a* serves *to bring the Subject's conscious attention to the scheme*. Recalling that in general an observable is defined as anything that is possible to identify by an immediate reading of given events, we call this function *a* the *awareness observable*.

To this we must add another factor. In the very idea of a resistance *Ro* we must necessarily suppose that the perception of "things not going as they should" implies that we have some comparate – "the way things are expected to go" – against which *Obs.O* may be evaluated. If we are willing to concede that every scheme of action initiated by the Subject is an action taken in service of some purpose – whatever this purpose may be is irrelevant for the present discussion – then some representation of it in some form must be presumed to be presented "in the mind of the Subject." Here we have two possibilities.

The first is that the action (scheme) is undertaken "for its own sake." In other words, it could be possible that there might be no reason for the Subject to take action other than just because it is "in the Subject's nature to take this action." This in fact does appear to be the case for the reflex actions observed in an infant during Stage I of the sensorimotor development period.[1] Right from the day of its birth, if something touches the baby's lips, the baby will attempt to suck this object. The preponderance of evidence proves that the infant is totally unaware that "what he is sucking" is an object; Piaget calls it "merely the aliment of the sucking reflex." It would be absurd to propose the baby consciously knows that it "sucks in order to eat." We have no choice but to conclude that the sucking reflex is an action scheme undertaken "for its own sake" and with "no *objective* purpose in mind" (which does not preclude a *subjective* purpose). This phenomenon of behavior accords somewhat with what Bergson calls *instinct*.

> Now, if we look at intelligence from the same point of view, we find that it also knows certain things without having learned them. But the knowledge in the two cases[2] is of a very different order. We must be careful not to revive again the old philosophical dispute on the subject of innate ideas. So we will confine ourselves to the point on which everyone is agreed, to wit, that the young child understands immediately things that the animal will never understand, and that in this sense intelligence, like instinct, is an inherited function. But this innate intelligence, although it is a faculty of knowing, knows no object in particular. When the new-born babe seeks for the first time its mother's breast, so showing that it has knowledge (unconscious, no doubt) of a thing it has never seen, we say, just because the innate knowledge is in this case of a definite object, that it belongs to *instinct* and not to *intelligence* . . . Let us say, therefore, that *whatever, in instinct and intelligence, is innate knowledge, bears in the first case on* things *and in the second on* relations.
>
> Philosophers distinguish between the matter of our knowledge and its form. The matter is what is given by the perceptive faculties taken in the elementary state. The form is the totality of the relations set up between these materials in order to constitute a systematic knowledge. Can the form, without matter, be an object of knowledge? Yes, without doubt, provided that this knowledge is not like a thing we possess so much as like a habit we have contracted, - a direction rather than a state: it is, if we will, a certain bent of attention . . . *Intelligence, in so far as it is innate, is the knowledge of a* form; *instinct implies the knowledge of a* matter [BERG2: 147-149].

There are some difficulties on the whole with Bergson's view of instinct, which is perhaps why Piaget preferred the term "reflex," but the phenomena Bergson described as evidencing instinctive behavior and the phenomena observable during Stage I are of the same sort, so if we

---

[1] see *The Origins of Intelligence in Children* [PIAG1].
[2] The "two cases" are instinct and intelligence.

wish to give a name to the "innate knowledge" subsisting in reflex schemes, "instinct" is as good a word as any. Put another way, the know-how to perform a scheme under the condition of a given perceptive state is what we will call an instinct. Instinctive actions are actions undertaken "for their own sake." The central process of equilibration "gets its start" from such instinctive behaviors and this is one reason why Piaget views intelligence as a phenomenon that "extends" biologically innate schemes.

The second possibility is that an action is undertaken "for the sake of something else"; this "something else" is generally an objective result we call an *end*. The action in this case is what we call the *means*. There is no doubt[3] that this kind of action actually occurs, and we typically distinguish 'instinctive behavior' from 'intelligent behavior' precisely because of this difference between actions taken without a conscious objective result "in mind" vs. actions taken consciously as a means to an end. Piagetian psychology is a systematic doctrine that seeks for an objectively valid *Realerklärung* of intelligence.

Now, actions that fall into this second class are objectively purposive. What I mean by this is that the end is instantiated in an observable objective outcome, a "desired" *Obs.O*. If we accept that actions of this class actually exist, it follows that we must also presuppose that the acting Subject is conscious of what this desired end *should* appear to be. However, the cognition of a "desired" *Obs.O* is a representation quite distinct from that of an actual *Obs.O*. Even if we go back one more step, to where the representation of an end is only presented through a subjective aesthetic Idea and not in a cognition, a presentation in an affective perception is a representation quite distinct from the perception of an undifferentiated but actual *Obs.OS*.

The possibility of a regulation, in terms of either the accommodation of a scheme to overcome resistance or the assimilation of an outcome in a scheme, requires necessarily the possibility of making a comparison of the actual outcome with the desired outcome and noting their accord or discord. This, in turn, requires that the Subject is able to observe a relationship between the two representations and combine them within an act determining the overall activity. Such a combination is a function, *b*, and the observation need only consist of a perception of accord or discord between the representations. (It is not necessary for the Subject to be objectively conscious of *what* the discord "is").

We have called the knowledge by which anything can be recognized and determined *a priori*

---

[3] Perhaps I ought to say "there *should* be no doubt" here. A committed materialist will tend to take the view that *all* actions are "really" nothing other than complex responses to given stimuli coupled with a given biological state. In this view, there can be no "willful" act because "will" is regarded as "something in the mind" and, having insisted on a *real* mind-body division, the materialist then goes on to deny the existence of "a thing called mind." Recognizing that it is not objectively valid to posit a real mind-body division is the first step to resolving this problem. The second step will require a discussion of what is involved in the idea of a "will" and whether such a thing as a "free will" is an objectively valid idea. We will take this second step later.

an anticipation. If "cognizance" indeed "moves from the periphery to the center" – and the findings of fact from Piaget's research indicate that this is true – then we must regard function *b* in terms of an observable perception of accord or discord (between the desired and actual *Obs.O*) which we will call *the anticipatory observable*. As we must suppose that perception of the desired precedes perception of the actual (since we have posited that the desire precedes the action), the "direction" of function *b* is, logically, from the scheme to the object. In contrast, the awareness observable, function *a*, logically is directed from the object back to the scheme. Considering the roles these functions play in the regulation of a Type I interaction, we can say that function *b* is a kind of "valuation function" (the "value" being accordance in perception between the desired and the actual) while function *a* is a kind of "energizing function" in the sense that it grounds the *act* of accommodating a scheme in response to the disturbance set up by a discord "instrumented by" function *b*.

Taking all this together, we are now able to illustrate the structure in the Type I interaction. This is shown in Figure 9.2.1 below for the two cases of Type I interactions. In this figure the double-headed arrow symbolizes the equilibration between *Obs.S* and *Obs.O*. As for the single-headed arrows, these do not represent 'implication' (in the logical sense) but, rather, the "direction" in which the function or action "moves" (in Piaget's terminology).

There are several things we need to note in these diagrams. First, the feedback from *Obs.O* to *Obs.S* is to be viewed as acting upon the entire scheme of *Obs.S*. This is what is implied by the brackets on the $Ms \rightarrow Ps$ and $As \rightarrow Fs$ terms. While the movement and the push terms in the Type IA interactions (or the operation and application terms in Type IB) are logically distinguished by Piaget, the acting Subject does not perceive these terms separately. The distinction is only made by the psychologist-observer-theorist.
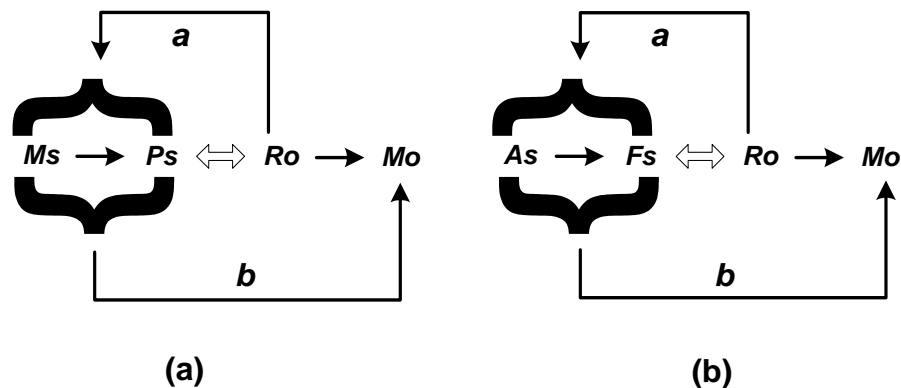

Figure 9.2.1: Type I Interactions. (a): "physical" scheme; (b): "intellective" scheme.

Next, we should not attempt to read too much into the $Ro \rightarrow Mo$ notation. *Obs.O* must, from the view of the acting Subject, be taken as a unit. We should not, therefore, take this notation to imply that the scheme acts mediately on the movement *Mo* through the agency of the resistance *Ro*. The same is true for the arrows in the notation of the schemes. In some ways, it might have been better if Piaget had used the ":" symbol rather than the "→" symbol to show connection inside these units because, from the Copernican perspective, the perception of *Obs.S* and *Obs.O* can not be viewed as having these terms be explicitly separate.

Third, the arrowheads in functions *a* and *b* should not be taken to imply an input-output relationship between the terms connected by the lines. All Piaget is attempting to indicate with this symbolism is a kind of logical priority, e.g. that which in perception corresponds to *Ro* gives rise to an "observable link *a*" from the Piagetian object to the scheme.

Fourth, what is symbolized in the figure is *dynamic*. There is much more "going on" in the interaction than a static diagram visually conveys. The interaction is, before all else, an *active process*, namely the process of equilibration, that "moves" from an initially "unbalanced" condition (a disturbance that "upsets" the equilibrium between the scheme and the Piagetian object) *to* a condition of equilibrium. In this process we can expect an adaptation of the scheme, the "re-application" of the scheme to the object, a consequential "movement" of the object, which is "observed" and feeds a new adaptation of the scheme, etc. So long as the acting Subject "experiences failure" or "perceives wrongness" in the activity, this feedback loop of adaptation continues. The adaptation itself is regulated by means of the functions *a* and *b*; thus these "paths" can be viewed as "regulation paths." However, the regulation must be taken as the *totality* of the figure – that is to say, the figure represents *regulation via interaction*.

Finally, the interaction *taken in its totality* is a structure in the Piagetian sense of that word. Piaget even gives this structure a name; he calls it a "precategory" [PIAG19: 48, fn 1]. Here is a term we must use with some caution, for Piaget is in no way attempting to imply a connection with Kant's categories of understanding (Piaget was not a Kantian philosopher). Rather, Piaget uses the term "category" to mean structures that "combine with all the others and are found again in every psychic operation" [PIAG1: 8-13]. For Type I interactions the structure lacks the coordination factor that will be present in Type II interactions, and perhaps it is to call attention to this that Piaget calls the Type I interaction a precategory rather than a category. In this context we might think of an interaction structure as a sort of "functional category" that gives an "identity" to a particular type of activity.

Interactions of Type II A and B

The next higher level of regulation by interaction recognized by Piaget is the Type II interaction.

We will find in this interaction the inclusion of two new factors: coordinations and "processes" that "link" the observables and the coordinations. Within this level Piaget distinguishes three subtypes of interaction, namely A, B, and C. We will examine the first two in this section; the third we will discuss in the following section.

Interactions of Type IIA and Type IIB have the same diagrammatic form, which is illustrated in Figure 9.2.2 below. To *Obs.S* (i.e. *Ms→Ps* or *As→Fs*) there is now added a coordination, *Coord.S*, in the overall structure of the Subject's action. Likewise, to the observable of the object, *Obs.O*, there is added the coordination *Coord.O*. These coordinations represent *inferences* – i.e., constructions of thought which are themselves *not* directly perceivable from the data of the senses. *Coord.S* denotes the Subject's "inferential coordinations of actions or operations" while *Coord.O* denotes "inferential coordinations between [Piagetian] objects" [PIAG19: 52]. Thus the fundamental cognitive factors of the Type I structure are enriched at the level of Type II by the addition of a rational component that augments the "experiential" component of the observables. If *Obs.S* and *Obs.O* are the observables of a Type IA interaction, the resulting Type II structure is Type IIA; if these observables are those of a Type IB interaction, the Type II structure is Type IIB.

The coordinations *Coord.S* always arise from what Piaget calls a "reflection" or a "reflexive abstraction" on their corresponding observables. Therefore, the logical "direction of thinking" in Type II structures "flows" from *Obs.S* to *Coord.S*, as indicated by the "→" symbol in the figure. On the other hand, *Obs.O* in a Type II interaction involves *several* Piagetian objects and *Coord.O* consists of inferences made concerning "objective coordinations" among them when observation of *Obs.O* is taken as the totality of these objects. Thus, the Type II interaction inherently involves both a plurality of objects and, in addition, temporal ordering relations (at least *Obs.S* must consist of a succession of movements if we are to speak of the action as being coordinated).

The other major difference between interactions of Type II and those of Type I lies in regulatory paths *OS* and *SO*. Whereas in Type I interactions these paths were observables, in Type II interactions they are "processes." This is an "enrichment" we must now discuss.
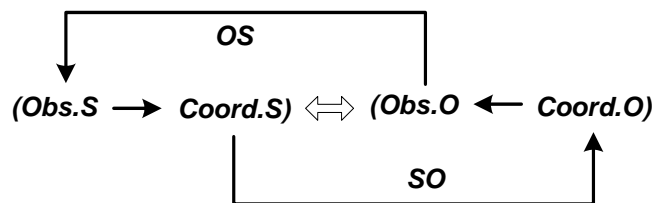

Figure 9.2.2: Type II (A or B) Interaction

Piaget's description of these process in *The Development of Thought* is understandably but still disappointingly vague. Like the functions *a* and *b* of the Type I interaction, these paths have to do with "linking" the two sides of the equilibrium structure and concern the arising of the awareness and conceptualization of *Obs.S* due to the perception of *Obs.O*. Additionally, in the Type II structure they pertain to the "discovery" of the relationships among objects (*Coord.O*) arising from the Subject's understanding of his own actions (*Coord.S*). However, at the level of Type II interactions we now have to deal with constructions of understanding and hence we face a departure from the immediate "givens" of experience (empiricism) and an arrival of the rationally inferred (rationalism). This is a great step forward for the acting *and* thinking Subject, and is not one that a mere process of observation alone is sufficient to explain.

Piaget's experimental studies of cognizance led him to a very fundamental and important conclusion: *Inferential coordinations . . . must originate in the Subject's logic – the logic that derives more or less directly from the general coordinations of his own actions* [PIAG25: 345]. This logic is not a formal logic in the sense of either traditional or mathematical logic. Its roots are found in what Piaget called the logic of actions which begins its development right from the earliest sensorimotor intelligence stages of life.

> I should like now to make a distinction between two types of actions. On the one hand, there are individual actions such as throwing, pushing, touching, rubbing. It is these individual actions that give rise most of the time to abstraction from objects. This is the simple type of abstraction . . . Reflexive abstraction, however, is based not upon individual actions but on coordinated actions. Actions can be coordinated in a number of different ways. They can be joined together, for instance; we call this an additive coordination. Or they can succeed each other in a temporal order; we can call this an ordinal or sequential coordination. There is a before and an after, for instance, in organizing actions to attain a goal when certain actions are essential as means to attainment for this goal. Another type of coordination among actions is setting up a correspondence between one action and another. A fourth form is the establishment of intersections among actions. Now all these forms of coordination have parallels in logical structures, and it is such coordination at the level of action that seems to me to be the basis of logical structures as they develop later in thought. This, in fact, is our hypothesis: that the roots of logical thought are not to be found in language alone, even though language coordinations are important, but are to be found more generally in the coordinations of actions, which are the basis of reflexive abstraction [PIAG17: 18-19].

This "coordination of actions" constitutes the logic of schemes to which we referred earlier in our introduction of *Obs.S* in Type I interactions.

What this means for the Type II interactions is this: rather than mere observation alone, the regulatory paths involved in Type II regulations themselves consist of regulations, interactions, and equilibria that were established previously by the Subject at an earlier point in his development. The construction of a new structure, $(Obs.S \rightarrow Coord.S) \Leftrightarrow (Obs.O \leftarrow Coord.O)$, is itself regulated by previous structures and these regulations are always instantiated in the form of *fundamental interactions of the Subject and objects within any cognitive step* [PIAG19: 53].

Process *OS* in Figure 9.2.2 is related to the Subject's awareness of the action. Taking the case of the Type IIA interaction, in which the activity is a "physical" (i.e., somatic motoregulatory) activity, "the awareness of a physical action consists of its internalization in the form of representations" which "include a conceptualization due to the necessity of constructing on a consciousness level what has been achieved on a physical level . . . Thus this process *OS* includes an interaction of Type I in its causal (IA) or operational (IB) forms or in the two combined" [PIAG19: 53]. The same can be said for Type IIB interactions except that in this case it is not the awareness of a "physical" action that is involved but, rather, the awareness of an intellective scheme – i.e. what we could call a "pattern of reasoning."

It is important to understand that the object of this activity of equilibration is the *making* of the Type II structure with its *Obs.S*, *Coord.S*, *Obs.O*, and *Coord.O* factors. The process *OS* (and, likewise, the process *SO*) has already been previously structured and, unless some disturbance is encountered in applying this structure to the regulation of the new interaction, the Subject is not focused, so to speak, on *OS* (or *SO*). Rather, the Subject merely *employs* these structures as part of the process of equilibration. Seen in this way, *OS* is a law of transformation within the totality of the regulated structure.

Note also that *OS* does not have to consist merely of some basic Type I interaction (although it may). Piaget places no bounds on how many coordinated interactions made up of Types I A and B – or even structures of Type II – might be present in process *OS*. All we can say in general of process *OS* is that it is a structure, elaborated through the same central process of equilibration responsible for all such structures, and that this structure, by virtue of its role in the construction of the Type II interaction for which it is a regulatory path, is made a *substructure* of the new Type II structure. We can put this in other words quite well by saying *process* OS *is a process of reasoning from* Obs.O *to* Obs.S *by which the Subject becomes cognizant of* Obs.S.

The "direction" of *OS* is primarily from *Obs.O* to *Obs.S*, but it is important also for us to note that its direction is not *exclusively* from the object to the scheme. Let us recall function *b* in the Type I interaction. This is the anticipatory function needed to regulate the accommodation of the scheme *Obs.S* in the adaptation. This same function is present also in the Type II interaction, embedded in *OS*, where it is now a feedback factor. Piaget tells us this process of assimilating *Obs.O* into the scheme *Obs.S* while accommodating *Obs.S* to *Obs.O* leads to the making of the inferential coordination *Coord.S* in the Type II interaction.

As for process *SO*, its regulatory role in the Type II interaction is analogous in some ways to the role of function *b* in the Type I interaction with this difference: *SO* leads from *Coord.S* to *Coord.O* and therefore is concerned with the making of inferential coordinations applied to the objects. Process *SO* "actually expresses the fundamental fact that to understand, or even to discover, the causal relations between the objects, the Subject has to pass through the

intermediary of his own operations" [PIAG19: 54]. Another major difference is that in the case of process *SO* we are dealing with a regulatory path that links *inferences* (coordinations). Consequently, whereas function *b* is an observable, process *SO* involves only mental constructs that are *not* "instrumented" by the Subject directly from "reading" what is "given in events." Put another way, *SO* is a *comprehension transformation* arising from a process of reasoning.

Thus, what we have in process *SO* is a structure which, by virtue of its employment as a law of transformation in the new Type II interaction, becomes a substructure of this new structure. However, as Piaget argues, this regulatory path involves "operations" rather than "physical" actions – that is, *SO* employs mental constructs that pass beyond the immediate data of receptivity – because the relationships *Coord.S* and *Coord.O* both "overreach the boundaries of the observable" [PIAG19: 54-55]. This at once raises a rather important question. If interactions of Type II require these noetic structures as laws of transformation, *where do the structures* that compose a process *SO* come from in the first place? It is clear that such structures are not contained in interactions of Type I because these interactions contain no inferential coordinations whatsoever. How, then, is a structure of Type II possible? We will give Piaget's answer to this question in §2.3, but first we will finish the discussion of this section by examining Piaget's third Type II structure.

Interactions of Type IIC

Piaget introduced the Type IIC interaction merely to "show that model IIA can be generalized to cover interactions between objects" [PIAG19: 64]. The interactions we have considered up to this point all address what Piaget called the "grasp of consciousness," in which the Subject "interiorizes" (comes to conceptualize) his actions and "exteriorizes" (comes to conceptualize) the Piagetian object during this process of "moving from the periphery" (unexamined experiences grasped only in apprehension) "to the center" (comprehended experiences). In these interactions the acting Subject makes himself an object of intellection, and the active structuring of the consciousness of his own *Existenz* proceeds hand in hand with the structuring of the *Existenz* of 'external' Nature. If we examine the previous two Type II structures dynamically in terms of the processes of assimilation and accommodation, we find a cycle of structuring

$$Obs.O \rightarrow Obs.S \rightarrow Coord.S \rightarrow Coord.O \rightarrow Obs.O, \text{ etc.}$$

executed until a state of equilibrium is achieved.

However, we must also require of any theory of the phenomenon of mind that it be capable of offering an explanation of the fact that we also construct objective relationships among objects

that are represented without the Subject placing *himself* "in" the representations of these relationships. How does Piaget's theory of equilibration account for this?

Because the Subject is no longer one of the observed observables in such a construction, *Obs.S* no longer plays an explicit part in this structuring. Our focus is now on the structure of object cognitions and these we can distinguish in a twofold fashion. First, we can talk about observable *factors* (constructed in thinking) in the objective relationships. These we call *Obs.X*. Second, we can talk about observable *results* of interactions involving Piagetian objects. These we call *Obs.Y*. These take their places in the Type IIC structure as shown in Figure 9.2.3 below.

Now, the making of an inferential coordination involving the functional relationships of the factors in *Obs.X* is a construction by means of the Subject's "logico-mathematical operations"; therefore these coordinations are constructions of the same sort as we find in the other Type II interactions. They are schemes made "mobile" and conferred upon the object *X* by the thinking Subject. Thus these coordinations are denoted by *Coord.S* in the Type IIC interaction. Similarly, inferential coordinations involving the observable "results," *Obs.Y*, are of the same sort as found in the previous Type II interactions and therefore are denoted *Coord.O* as before.

In place of process *OS* the Type IIC structure has a process *YX* that structures the awareness of relationships between the observed results and observable factors that the Subject has conceived as being involved in the relationships among the objects. Like the earlier process *OS*, this regulatory path is a substructure of previously established regulations and, except for the fact that it is not aimed at an awareness of the Subject's own actions, it is otherwise quite like *OS*.

As for process *SO*, this regulatory path is in all respects of the same sort as in the previous Type II interactions. Provided the relationship it obtains from *Coord.S* to *Coord.O* remains congruent with the observables, the structure is in equilibrium. Otherwise there is a disturbance that will induce a cycle of adaptation until an equilibrium is achieved. One thing worth noting in the Type IIC interaction is the reversal of the direction of the process with regard to *Obs.Y* and *Coord.O*. In Types II A and B, *Coord.O* was a coordination between the actions of the Subject and the objects. Here *Coord.O* is an "exteriorized" causal explanation of *Obs.Y* [PIAG19: 63].
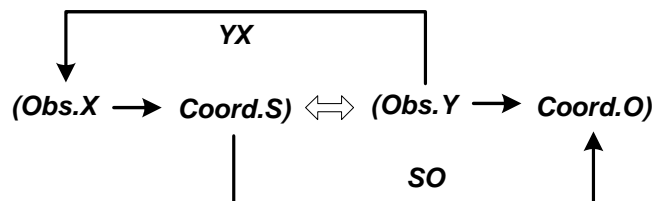

Figure 9.2.3: Type IIC Interaction

§ 2.3 The Hierarchy of Regulations

We have dealt so far with regulation via interactions that take place, so to speak, "on the same level." However, as we saw in the previous section, the model when viewed only from this one level presents to us the seeming paradox of the possibility of the origin of the "operational" interactions of the sort involved in process *SO*. We must now settle this issue. The solution will be found in Piaget's idea of the *hierarchy of increasing equilibrations*.

The idea of this hierarchy is a direct outgrowth of Piaget's discovery of a remarkable functional invariant that is presented in experimental observation throughout all the stages of the sensorimotor development in the infant. This invariant is none other than the process of adaptation which, as Piaget puts it, is "a basic fact of psychic life" [PIAG1: 42-46]. It is indeed Piaget's central finding that all the rich variety of mental phenomena within our power as adults grows from a root structure of elementary sensorimotor skills and a remarkable central process of increasing equilibrations which, over the long apprenticeship of childhood, extends the earliest abilities of the child from a wholly *practical* sensorimotor logic to the richly intellectual structure of mature intelligence. Each new "level" of equilibration produces new structures that expand what it is possible for the child *to do*, and this enrichment of possibilities in turn feeds the growth of still higher levels of equilibration. Thus, to examine the question before us we must examine the earliest stages of mental life.

The First Stage of Sensorimotor Intelligence

Let us start at the most basic of all equilibrations, namely, those that take place at the primitive level of sensorimotor schemes in Stage I of sensorimotor development. At this level the infant recognizes no subject-object distinction and does not differentiate between his sensorimotor schemes and the objects which serve as aliments to these schemes. Indeed, the infant at this stage, and the next few that follow, is radically ego-centric and lives in an unelaborated universe without "objects" in the Piagetian sense of this word. In our Kantian terminology, this is a universe of *Dasein* without Self-*Existenz* (no division of Nature into Self and not-Self). Yet, from the point of view of the psychologist-observer, the infant enters the world already possessing a set of basic skills (innate reflexes) that provide the infant with a practical *a priori* foundation from which all that follows in mental life takes its start, even though the newborn child is completely unaware of these skills in cognitive consciousness.

The *practical power* to use these skills is knowledge *a priori* – know-how – of the most basic kind. To the biologist the innate sensorimotor reflexes are a manifestation of processes which, in terms of our model of Organized Being, first appear to the theorist to be vested in *soma*. Yet the remarkable fact that these somatic processes lead to the emergence of intellective

phenomena points to a connection between *soma* and *nous* from the very start. Piaget's experimental program gives empirical support to an otherwise unsupported claim Bergson put forth casually as a presupposed matter of fact:

> The most essential of the primary instincts are really . . . vital processes. The potential consciousness that accompanies them is generally actualized only at the outset of the act, and leaves the rest of the process to go on by itself [BERG2: 166].

We spoke in Chapter 5 of the idea of the potential for perception in the 2LAR of the faculty of pure consciousness. Recalling that we use the word "perception" to mean representation *with consciousness*, the idea of innate sensorimotor schemes underlying the phenomena of early infantile behavior can be seen as a correspondent Piagetian structure to this Kantian idea of a Modality in the 2LAR of the faculty of pure consciousness.

Without claiming to present a complete catalog of innate sensorimotor schemes, Piaget lists several easily observed behaviors that exhibit the appearance of these innate schemes: sucking, grasping, looking, listening, crying and vocalization, movements of the arms, legs, trunk, etc. These reflex schemes are generally complicated, as the example which follows will illustrate, and they are exhibited in normal healthy children from birth. As an example let us look at some of Piaget's observations of the sucking reflex.

> *Observation 1.* - From birth sucking-like movements may be observed: impulsive movement and protrusion of the lips accompanied by displacements of the tongue, while the arms engage in unruly and more or less rhythmical gestures and the head moves laterally, etc.
> As soon as the hands rub the lips the sucking reflex is released. The child sucks his fingers for a moment but of course does not know either how to keep them in his mouth or pursue them with his lips. Lucienne and Laurent, a quarter of an hour and a half hour after birth, respectively, had already sucked their hand like this: Lucienne, whose hand had been immobilized due to its position, sucked her fingers for more than ten minutes.
> A few hours after birth, first nippleful of collostrum. It is known how greatly children differ from each other with respect to adaptation to this first meal. For some children like Lucienne and Laurent, contact of the lips and probably the tongue suffices to produce sucking and swallowing. Other children, such as Jacqueline, have slower coordination: the child lets go of the breast every moment without taking it back again by himself or applying himself to it as vigorously when the nipple is replaced in his mouth. There are some children who need real forcing: holding their head, forcibly putting the nipple between the lips and in contact with the tongue, etc. [PIAG1: 25].

This observation points to a couple of items worth noting. First, notice how complex is the totality of this reflex. It involves movements of not only the lips but also the tongue and even lateral movements the head. Next, the activity involved in the scheme is not fleeting, as evidenced by Lucienne's ten minute exercise in finger sucking. Third, the sucking reflex is not initially coordinated with other reflexes. For instance, the child's arm and hand motions, by which the fingers come into contact with the lips triggering the sucking reflex, are not coordinated with the sucking reflex. If the child's hand moves away from the mouth, the child does not know how to

bring the hand deliberately back to the mouth, even though the attempt to suck continues.

Now, by itself this observation does not necessarily suggest any mental connection, that is, any *deliberate* behavior on the part of the child. It would not be all that difficult to design a machine to do precisely the same thing as observed above in response to a similar kind of stimulus. However, as the following observation shows, there appears to be more to it than we find in spinal cord reflexes, e.g. the reflex motion that accompanies having one's knee gently tapped with a mallet.

> *Observation 2.* - The day after birth Laurent seized the nipple with his lips without having to have it held in his mouth. He immediately seeks the breast when it escapes him as the result of some movement.
>   During the second day also Laurent again begins to make sucking-like movements between meals while thus repeating the impulsive movements of the first day: His lips open and close as if to receive a real nippleful, but without having an object. This behavior subsequently became more frequent and we shall not take it up again.
>   The same day the beginning of a sort of reflex searching may be observed in Laurent, which will develop on the following days and which probably constitutes the functional equivalent of the groping characteristics of the later stages (acquisition of habits and empirical intelligence). Laurent is lying on his back with his mouth open, his lips and tongue moving slightly in imitation of the mechanism of sucking, and his head moving from left to right and back again, as though seeking an object. These gestures are either silent or interrupted by grunts with an expression of impatience and of hunger [PIAG1: 25-26].

It is difficult to see in this behavior a simple stimulus-response explanation. There is in the first place the "seeking the breast when it escapes him" behavior. This does not, of course, imply that Laurent was conscious of the breast as such or that it had "escaped" him. It *does* however indicate some degree of awareness that "something has changed" and there has been added to the previous day's behavior a new factor, namely a "searching scheme" that continues until the breast has been reacquired [PIAG1: 26, Obs. 3]. Piaget records how, in the days that follow, this searching behavior rapidly improves in both accuracy and efficiency. Finally, the child's vocalizations and expressions suggest consciousness of a perceptive discord between the actual "state of affairs" and a desired "state of affairs" when the sucking movements fail to find an aliment. This does not imply that the child has any cognition of "what is wrong" (e.g. "where is that breast?") but only that "something in the perceptual state" is not "as it should be."

This observation supplies us with some initial evidence that suggests a mental connection beyond that of the simple stimulus-response of an automaton. This evidence is reinforced by observations of behaviors in the days that follow.

> *Observation 5.* - As soon as his cheek comes in contact with the breast Laurent at 0;0 (12) applies himself to seeking until he finds drink. His search takes its bearings: immediately from the correct side, that is to say, the side where he experienced contact.
>   At 0;0 (20) he bites the breast which is given him, 5 cm. from the nipple. For a moment he sucks the skin which he then lets go in order to move his mouth about 2 cm. As soon as he begins sucking again he stops. In one of his attempts he touches the nipple with the outside of his lips and he does

not recognize it. But, when his search subsequently leads him accidentally to touch the nipple with the mucosa of the upper lip (his mouth being wide open), he at once adjusts his lips and begins to suck.

The same day, same experiment: after having sucked the skin for several seconds, he withdraws and begins to cry. Then he begins again, withdraws again, but without crying, and takes it again 1 cm. away; he keeps this up until he discovers the nipple [PIAG1: 26].

It is difficult to see in this observation any other explanation for Laurent's behavior than one that includes the supposition that he is conscious of a goal and is deliberately acting to achieve it. Again, this does not mean Laurent possesses an objective representation of "what he is doing" or of the existence of the breast as an object. It is not necessary to presume such a clearly elaborated cognition. It is enough that he recognizes some perceptual "picture" that he can distinguish from other perceptions (e.g. the perception of sucking the skin vs. that of sucking the nipple) without having to have obtained a cognition that differentiates *things* "within" that perceptual "picture."

Indeed, Piaget's research establishes that Stage I behaviors are *practical* behaviors in the sense that the infant gives every appearance of having no established cognitions of objects distinct from the actions that realize the sensorimotor schemes. In other words, the observables at work are *Obs.OS* – the scheme and its aliment perceived together in an undifferentiated cognition. We have used sucking behavior for our examples, but Piaget documents that the same is true of the other sensorimotor reflex schemes as well.

Furthermore, the schemes *improve* with practice. The early searching behaviors, for instance, "lack bearings." The child does not initially know which direction to turn his head in search for the nipple. (On the first day, the child does not necessarily even know enough to make the search; this he seems to discover "by accident"). But this situation changes quickly in the days that follow – an unmistakable sign of *accommodation* of the basic sensorimotor scheme to different aliments in experience. Piaget writes:

Only practice will lead to normal functioning. That is the first aspect of accommodation: contact with the object modifies, in a way, the activity of the reflex, and, even if this activity was oriented hereditarily to such contact, the latter is no less necessary to the consolidation of the former. This is how certain instincts are lost or certain reflexes cease to function normally, due to the lack of a suitable environment. Moreover, contact with the environment not only results in developing the reflexes, but also in coordinating them in some way [PIAG1: 30].

While, on the one hand, the reflex scheme is changing by accommodation to different situations presented in the child's milieu, on the other hand it is also evident that the data of the senses conveyed to perception is also being assimilated into the scheme. Put another way, the scheme is being structured by assimilating the *"O"* component of *Obs.OS* even as the *"S"* component is being adapted by accommodation to the data of the senses. In terms of the process of equilibration, assimilation and accommodation are both necessary and integrated functions of the regulation of equilibration.

> In a general way, one can say that the reflex is consolidated and strengthened by virtue of its own functioning. Such a fact is the most direct expression of the mechanism of assimilation. Assimilation is revealed, in the first place, by a growing need for the repetition which characterizes the use of the reflex (functional assimilation) and, in the second place, by this sort of entirely practical or sensorimotor recognition which enables the child to adapt himself to the different objects with which his lips come in contact (recognitory and generalizing assimilations) [PIAG1: 32].

In *The Development of Thought* Piaget calls this a level 1 equilibration. Since it appears that the Piagetian object and the scheme are not differentiated in observation, and the acting Subject remains unaware of the details of his practical scheme, the theoretical relationship between the innate scheme and the observable is one of reciprocal adaptation. Symbolically, Piaget writes this as

$$\text{innate scheme} \Leftrightarrow Obs.OS \, .$$

Thus we have both the beginnings of elementary cognitions, *Obs.OS*, and the elaboration of the practical structure of the sensorimotor scheme itself. (This latter idea is sometimes referred to in athletics as "muscle memory" although neuroscience tells us that there is much more than just the muscles involved here; brain structures, e.g. the cerebellum, basal ganglia, and the motor cortex are also involved). The sensorimotor scheme is, of course, a representation that is not consciously elaborated.[1] The *partial* cognition of this scheme is possibly only from the sensory feedback that accompanies the movements (kinaesthetic feedback). Such a cognition merely conveys the appearance of the action to sensibility.

The Second Stage of Sensorimotor Intelligence

The innate schemes of Stage I are uncoordinated with one another. While these schemes are undergoing elaboration of their structures in Stage I, there is as yet no "cooperation" between schemes nor does there even appear to be any consciousness of the possibility of coordinating these schemes evident in the child's behaviors. This situation, however, does not last and the onset of elementary coordinations among the schemes marks Stage II of the sensorimotor period. The first coordinations appear to occur pair-wise and different coordinations between schemes appear to develop at different rates. These coordinations go beyond the innate sensorimotor abilities and constitute what Piaget calls the first acquired *habits*.

---

[1] In the later chapters, beginning with Chapter 15, we will see that the idea of a scheme-in-general encompasses a wide horizon of considerations. The division of *psyche* is involved, as is the process of reflective judgment. The manifold of a scheme-in-general contains representational matter that can never become a perception, and our understanding of scheme-in-general must call upon the judicial Standpoint.

Piaget lists several of the earliest coordinations: (1) sticking out the tongue and licking the lips (either with or without sucking); (2) thumb sucking, which involves the coordination of the sucking scheme with arm motions; (3) coordination of the scheme of looking with that of sucking; (4) coordination of phonations (vocalizations) with listening; (5) coordination of looking with hand movements; (6) coordination of prehension (grasping) and sucking; (7) coordination of looking with hearing. Of these, (7) is the most precocious of the coordinations, followed by (2).

These coordinations take place through activities that Piaget calls **circular reactions**. The behaviors characteristic of Stage II can no longer be characterized as innate reflex actions in response to stimulus. As Piaget wryly observed, there is no *instinct* to suck one's thumb. During Stage I the child's play of exercising the innate schemes seems to be undertaken for no other purpose than merely the exercise of the scheme itself (e.g. sucking the fingers when the child is not hungry and when the child's own movements accidentally brings the fingers into contact with the mouth). The circular reactions during Stage II likewise seem to be performed "for their own sake."

> Putting out the tongue and finger sucking thus constitute the first two examples of a behavior pattern which prolongs the functional use of the reflex (sucking-like movements), but with the acquisition of some element external to the hereditary mechanisms. The new use of the tongue seems to go beyond the simple reflex play involved in sucking. With regard to the thumb, let us repeat that no instinct to suck the fingers exists and, even if the act of bringing food to the mouth were a hereditary behavior pattern, it is evident that the late appearance of this act indicates the interdiction of acquired associations, superimposed on ultimate reflex coordination. In characterizing these acquisitions it must also be noted that they imply an active element. It is not a question of associations imposed by the environment, but rather of relationships discovered and even created in the course of the child's own searchings. It is this twofold aspect of acquisition and activity which characterizes what we shall henceforth call "circular reactions" . . . the functional use leading to the preservation or the rediscovery of a new result [PIAG1: 55].

Let us take a look at some examples of this behavior. We will begin with an observation that provides an example of the slow emergence of the first signs of the pending coordination between arm motion and sucking:

> *Observation 17.* - At 0;1 (2) Laurent in his crib cries with hunger. He is lifted to an almost vertical position. His behavior then goes through four sequential phases quite distinct from one another. He begins by calming himself and tries to suck while turning his head from left to right and back again while his arms flourish without direction. Then (second phase) the arms, instead of describing movements of maximum breadth, seem to approach his mouth. Several times each hand brushes his lips; the right hand presses against the child's cheek and clamps it for a few seconds. Meanwhile the mouth is wide open and unceasingly attempts to grasp something. The left thumb is then caught and the two arms become rigid, the right arm against the chest under the left arm which is held by the mouth. During a third phase, the arms again wave about in space without direction, the left thumb leaving the mouth after a few minutes. During this time the child becomes angry, his head thrown back and his cries alternating with attempts to suck. Finally a fourth phase begins during which the hands again approach the mouth which tries to seize the fingers which touch it. These last attempts meet with no success and crying ensues.
> Can coordination be mentioned this time? Each of these phases finds its parallel in the behavior of

the preceding weeks: from the first days of life babies are seen slashing their faces with their fingers while the mouth seems to try to grasp something. Nevertheless the sequence of the four phases seems to indicate a beginning of a connection between the movements of the arms and the sucking attempts [PIAG1: 51-52].

Whether or not there really is some kind of connection in the mind of the child regarding arm movement and sucking attempts is problematic based only on this observation. However, in the days that followed Laurent was observed to successfully accomplish a coordination of arm movement with sucking. In the following observation, note carefully the orders in which hand and mouth movements take place relative to each other:

Observation 18. - At 0;1 (3) Laurent (same position) does not seem to reveal any coordination between the hands and mouth before nursing. On the other hand, after a meal when he was still wide awake and trying to suck, his arms, instead of gesticulating aimlessly, constantly move toward his mouth. To be more precise, it has occurred to me several times that the chance contact of hand and mouth set in motion the directing of the latter toward the former and that then (but only then), the hand tried to return to the mouth. Laurent succeeded in sucking his fingers four times, his hand and arms immediately becoming immobilized. But that has never lasted more than a few seconds. - The evening of the same day Laurent, after nursing, remained wide awake and continued to try to suck, interspersing his attempts with vigorous cries. I then grasped his right arm and held it until his mouth began to suck his hand. As soon as the lips were in contact with the hand, the arms stopped resisting and remained still for several moments. This phenomenon has been confirmed since I made the experiment - since 0:0 (15) - but as a rule the position is not maintained. Only when the thumb is sucked does immobility result (see Obs. 7 and 16). This time, on the contrary, the arm remained immobile for a moment, although the back of the hand only was in contact with the lips; the latter obviously tried to explore the whole hand. After a moment, the hand lost the contact but rediscovered it. It is no longer the mouth that seeks the hand, but the hand which reaches for the mouth. Thirteen times in succession I have been able to observe the hand go back into the mouth. There is no longer any doubt that coordination exists. The mouth may be seen opening and the hand directing itself toward it simultaneously. Even the failures are significant. It thus happens that the fingers are planted on the cheek while the mouth is ready to receive them [PIAG1: 52-53].

There seems to be little room to doubt that this behavior is goal-directed. At the least it appears to be so to the observer. In Stage I the finger sucking appears to result as an accident when "aimless" arm motion happens to bring the fingers into contact with the mouth. In Stage II behavior it no longer seems to be the case that the arm motion is "aimless." This does not mean that the mouth is perceived as a mouth or the arms as arms; indeed, other observations during Stage II appear to decisively contradict such an assumption. But, again, it is not necessary that the child possess a distinct cognition of these objects. It is enough that the child can represent unity of a perceptive state and deliberately rediscover this state through groping. (The groping behavior is made up from earlier sensorimotor schemes).

There is also in this evidence that the child seems to have a practical awareness of temporal sequences. In observation 17, for example, Laurent quits crying when he is lifted from his crib. Since he is hungry, and since we can presume that being lifted has preceded being fed in his earlier experiences, it is reasonable to suppose that Laurent's act of "calming himself" bespeaks

an anticipation that "the nursing experience" is about to follow. Piaget, of course, commits himself to no such explicit speculation, but the supposition is easy enough to draw as a hypothesis.[1] Likewise, the subsequent improvements in his skill at bringing the hand to the mouth seems to indicate a growing mental elaboration of the newly acquired scheme. This does not, of course, indicate that Laurent is thinking anything like "Ok, this feels more right; I'll keep going some more." Quite the opposite appears to be the case, namely that the child is elaborating the perception of the *totality* of the sensorimotor activity and not breaking it down into consciously-distinct "pieces." In other words, it is a cognition of the *practice* of the sensorimotor scheme (*Obs.OS*) that is being developed through perception and not a conceptualization of the scheme as an objectified action with inferences. (Such an understanding requires a Type IIA regulation, and the child has not yet evidenced Type IA interaction in his behavior, much less Type IIA).

In addition to improvements in the skill with which acquired habits are executed, there also seems to be an interesting phenomenon of specialization taking place. This is illustrated in the following observation:

> *Observation 22.* - During the third month thumb sucking grew less important to Laurent due to the pressure of new interests, visual, auditory, etc. From 0;2 (15) I note that Laurent now sucks his thumb only to assuage his hunger and chiefly to put himself to sleep. This is an interesting example of specialization of the habit, also observable in Jacqueline. When Laurent cries his thumb goes to the rescue. At 0;2 (19) I note that he even closes his eyes and turns on his right side to go to sleep at the moment the thumb touched his lips. - During the third month the thumb is opposite the fingers at the moment sucking takes place. At the end of the second month Laurent began by sucking the back of his hand and of his fingers, or several fingers together, or the thumb and index finger, before finding the thumb alone. During the third month, on the contrary, the thumb gradually placed itself opposite the other fingers and Laurent managed to grasp it on the first attempt and suck it alone [PIAG1: 54].

This observation gives evidence that the thumb-sucking scheme has acquired a more specialized purpose beyond that of "sucking the thumb for its own sake." It appears as though the scheme has become subordinated to a particular end (either to assuage hunger or as a ritual for going to sleep). Again, this does not mean that the child is objectively cognizant of the "what" that he is doing, but if he is not he *does* still seem to be aware of a "how-to-do-it tactic" for reaching a goal – even if this goal is merely affective and the cognition practical and objectively syncretic.

What is the explanation for the equilibrations taking place in these behaviors? The experimental data taken as a whole does not justify any conclusion that goes beyond that of saying the child's observable is nothing more differentiated than *Obs.OS*. However, here we need to remember that although the schemes during Stage I are not coordinated, the actualization of co-active schemes does take place coincidentally – e.g. sucking-like motions *and* "aimless" arm

---

[1] Practical awareness of a temporal sequence does not imply cognitive awareness of time. It merely implies cognitive anticipation under the category of causality & dependency.

movements. Furthermore, the data of the senses, if it is being apprehended merely as sensuous appearance, must be viewed as a singular representation. Thus we should represent the uncoordinated but co-active schemes symbolically as making a connection to the observable in something like the following form:

$$\text{Innate scheme } A \Leftrightarrow Obs.OS \Leftrightarrow \text{Innate scheme } B \text{ (equilibration level 1).}$$

Co-active schemes at equilibration level 1 "intersect" in the perception of *Obs.OS*. Since each scheme affects *Obs.OS*, we can easily see that the execution of one of these schemes has the possibility of mediately affecting the other. Moreover, it is also possible for the uncoordinated executions of the two schemes to fortuitously produce in *Obs.OS* some characteristic with which the Subject may become familiar and perhaps even come to desire. The presence of such affective perceptions – which the psychologist infers from the phenomenon of emotive reaction to familiar and unfamiliar perceptions – is born out in Piaget's studies.

> *Observation 37.* - Laurent smiled for the first time at 0;1 (15) at 6 o'clock, 10 o'clock and 11:30 while looking at his nurse who is wagging her head and singing. Apparently there is a global impression involving visual recognition, perception of a rhythmic movement, and hearing. The following days the voice remains necessary to produce the smile but at 0:1 (25) merely seeing the nurse suffices. Same observation at 0;1 (30). On the other hand, it is not until 0;2 (2) that he smiles at his parents when they do not make noises. At 0;2 (3) he refuses to smile at his grandmother and an aunt despite all their advances, but he finally smiles at the latter when she removes her hat. At 0;2 (4) he smiles a lot at his mother (while she remains silent) but a few moments later refuses to smile at a woman of the same age. During the third month I do not succeed in making him smile only on seeing me if I remain immobile (without head movements) or if I appear at a distance (of 1 meter or more). On the other hand, during the fourth month these conditions are no longer inhibiting. At 0;2 (6) Laurent does not recognize me in the morning before I am groomed.[2] He looks at me with a frightened expression and drooping mouth, then he suddenly rediscovers me and smiles. Seeing his sisters does not cause him to smile as quickly as seeing his parents, but the reaction became identical after the middle of the third month. During the fourth month he even seems already to prefer children to adults when his acquaintance with both is equally slight. Thus at 0;3 (7) Laurent is afraid of a neighbor but reveals great interest, with smiling eyes, in the man's 12-year-old son (blond with a very youthful appearance comparable to Laurent's sisters) [PIAG1: 72].

Besides demonstrating that by age 2 months Laurent is capable of recognizing objects (although for him these objects have not yet acquired any idea of permanency with regard to objective time), this observation demonstrates the presence of affective perceptions (displays of happiness and preference when the object is familiar or similar enough to something else that is familiar, displays of astonishment or fright when the object is new and unfamiliar). These reactions extend to inanimate objects as well as to people (observation 38 of [PIAG1]).

Going beyond such patient emotive reactions, the child also clearly exhibits in behavior evidence of *desires* when confronted with familiar or interesting observables. This is illustrated in

---

2 Piaget is Laurent's father.

the following two observations made by Piaget on the development of hand-eye coordination.

> *Observation 65.* - At 0;4 (10) Lucienne is lying on her back. I put a doll in front of her mouth. She manages to suck it while moving her head but with difficulty. She then moves her hands but without bringing them together appreciably. A moment later, on the other hand, I place the rattle in her mouth, the handle lying on her chest; she immediately brings her hand to it and grasps it. The experiment is repeated three times: same reactions. At 0;4 (15) as soon as the rattle is in contact with the mouth the hand moves in this direction. But Lucienne does not persevere. That evening, however, she grasps it immediately. This behavior seems to be definitely acquired and coordinated. To accomplish this Lucienne does not look at her hands at all and as soon as she touches the rattle she succeeds in grasping it. From this observation on, Lucienne begins to coordinate her grasping movements with vision, and thus enters the fourth stage[3] [PIAG1: 100].

> *Observation 80.* - The same day progress is revealed after the facts related in Observation 65 (taking the rattle placed against the mouth). I place the rattle above Lucienne's face. The immediate reaction consists in trying to suck it; she opens her mouth, makes sucking-like movements, pulls her tongue, pants with desire. Thereupon her hands approach her mouth and even seem to stretch toward the object. As soon as the right hand is seen, it directs itself toward the rattle and grasps it. It is therefore the desire to suck the object which set the hand in motion; therein is progress toward the fifth stage. - I then place the rattle higher up. Same expression of buccal drive. The hand tries to grasp in space. As soon as Lucienne perceives her hand she looks alternately at the rattle and at her hand, then tries to grasp, which she achieves after some groping. At 0;4 (19) same reactions with my finger: she makes sucking-like movements while looking at it, then moves her hand toward her mouth and when she sees the hand, grasps [PIAG1: 111-112].

Although these observations implicate Type IIA regulation in the child's behavior, the point I wish to emphasize now is this: It is evident that the child has become capable of marking distinctions among features or characteristics – call them x and y – within an observable *Obs.OS*. It is also obvious that there appears to be a linkage combining this ability, affective reactions, and the initiation of sensorimotor schemes. With this in mind, we are in a position to appreciate Piaget's generalizing explanation of the coordination of schemes.[4]

Let us suppose that within some *Obs.OS* the child perceives characteristics x and y in conjunction (xy) and let us further assume that this conjunction has become familiar and desirable to the child. Now let us suppose a contrary situation arises where an *Obs.OS* is perceived as containing an x without the y or vice versa, but in which we have a conjunction xy' that is similar enough to xy that the child can recognize a disturbance arising from this *Obs.OS*. The child, says Piaget, may *compensate* this disturbance by a movement that "links" x and y (replacing the "disturbing" conjunction xy' with the "desirable" conjunction xy). This act of compensation constitutes "the source of new schemes xy, which are available in addition to schemes of characteristic x or y" [PIAG19: 90].

---

[3] Piaget distinguishes five stages characteristic of and devoted to the development of grasping.

[4] In English translations there is introduced a bit of ambiguity in Piaget's terminology inasmuch as he uses a phrase that translates as "coordination of schemes" to describe cooperative practical relationships among them, but he is also translated as using "coordination" to refer to inferences (*Coord.S, Coord.O*).

innate schemes (1) ⟷ *Obs.OS (1)*
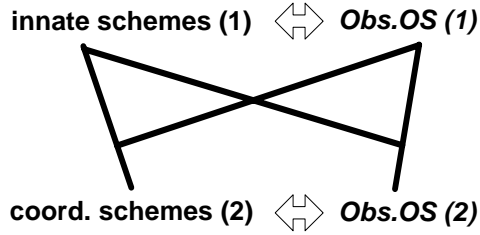
coord. schemes (2) ⟷ *Obs.OS (2)*

Figure 9.2.4: Increasing Equilibration from Level 1 to Level 2

Now such an act of compensation amounts to a coordination of schemes in which both original schemes are accommodated to result in a new and higher level of equilibrium with observables *Obs.OS* in Stage II. Going back to our earlier notation involving innate schemes *A* and *B*, let us lump these two schemes together under the symbol "innate schemes (1)" where the "1" indicates equilibration level 1. The production of new *coordinated* schemes results in a higher level of equilibration (equilibration level 2), the production of which can be viewed as an assimilating function of innate schemes (1) and *Obs.OS* (1). This is depicted by Figure 9.2.4 above. The heavy solid lines in this figure depict the functional transformation, by equilibration through the processes of assimilation and accommodation, in which the new sensorimotor coordination is achieved and, concurrently, a new equilibrium is established between the scheme and the observable.

Coordination at level 2 consists merely of reciprocal assimilations among sensorimotor schemes. The child is developing his own practice of motoregulatory actions and is still not yet aware in the execution of these schemes of the differentiation between the scheme and the Piagetian object (which still serves on this level merely as an aliment of the scheme). Piaget's findings consistently demonstrate the development of this undifferentiated sensorimotor structure prior to differentiation between the perception of the scheme as an action and the Piagetian object to which it is applied. (This differentiation comes at a later stage of sensorimotor intelligence). The development of this sensorimotor logic sets the stage for all that follows.

The Action - Object Separation in the Hierarchy of Equilibration

If the intersection of schemes in *Obs.OS* leads to the coordination of schemes during the primary circular reactions of Stage II, the infant takes an even bigger step beginning in Stage III of sensorimotor intelligence. This is the separation of the action, *Obs.S*, from the object, *Obs.O*, leading to Type I and higher interactions. If we say that the activities by which the infant achieves coordination of sensorimotor schemes in Stage II make the innate schemes give up something of the character of being "ends in themselves," we must also say the end served by the coordinated scheme is still an activity for the sake of that activity (e.g. sucking a rattle) but not a mere reflex.

The child still does not draw any observable distinction between the Piagetian object and the action during Stage II and the coordinations merely serve to develop sensorimotor skills through the acquisition of habits. However, concurrently with the development of these skills we may also observe behaviors that are indicative of the child's possession of a growing recognitory repertoire. As the schemes are applied to various different Piagetian objects (these objects still serving merely as aliments to the scheme itself), the need to accommodate the schemes to assimilate new Piagetian objects seems to lead to a growing ability to conceptualize distinctions among the object observables in perceptions. For instance, toys of different sizes require different grasping techniques and different sucking movements once the toy has been brought to the mouth. In addition, new Piagetian objects – e.g. a new toy placed in the crib – provide new experiences, and eventually new experiential situations seem to be perceived *as* new and as something to be assimilated. There is, in other words, the appearance of a new behavior – the secondary circular reaction – the purpose of which seems to be, as Piaget put it, "to make interesting sights [situations] *last*." This is the beginning of a long process of "decentration" in which the child slowly moves from his initial radical egocentrism to a "Copernican revolution" (in Piaget's words) in which the Self comes to be distinguished from the not-Self. Stage III is when the first observable evidence of the beginning of this evolution in thinking is found.

> How does such a reversal work? Due to the progressive complication of the schemes: by constantly renewing his acts through reproductive and generalizing assimilation, the child surpasses simple reflex use, discovers circular reaction and thus forms his first habits. Such a process is obviously capable of unlimited extension. After applying it to his own body, the subject will utilize it sooner or later in order to adapt himself to the unforeseen phenomena of the external world, whence the behavior patterns of exploration, experimentation, etc. Wherefore the possibility, subsequently, of decomposing and recomposing the same schemes: gradually as the schemes apply themselves to more varied external situations the subject is, in effect, led to dissociate their elements and consider them as means to ends, while at the same time regrouping them among themselves in all sorts of ways. It is this distinction between means and ends which sets intention free and so reverses the act's direction. Instead of being turned toward the past - that is to say, toward repetition - the action is directed toward new combinations and actual invention.
>
> Now the stage which we are about to describe forms exactly the transition between the behavior patterns of the first type and those of the second. The "secondary circular reactions" prolong, in effect, without adding anything to, the circular reactions under examination hitherto; that is to say, they essentially tend toward repetition. After reproducing the interesting results discovered by chance on his own body, the child tries sooner or later to conserve also those which he obtains when his action bears on the external environment. It is this very simple transition which determines the appearance of the "secondary" reactions . . . But it is necessary to immediately add that, the more the effort of reproduction bears upon results removed from the reflex activity, the clearer becomes the distinction between means and ends . . . [As] soon as the result to be reproduced is connected with the external environment - that is to say, with independent objects (even if their mutual relationships and their permanence are still unknown to the child) - the effort to rediscover a propitious gesture will lead the subject, after the event, to distinguish in his action the transitive term or "means" and a final term or "end" [PIAG1: 153-155].
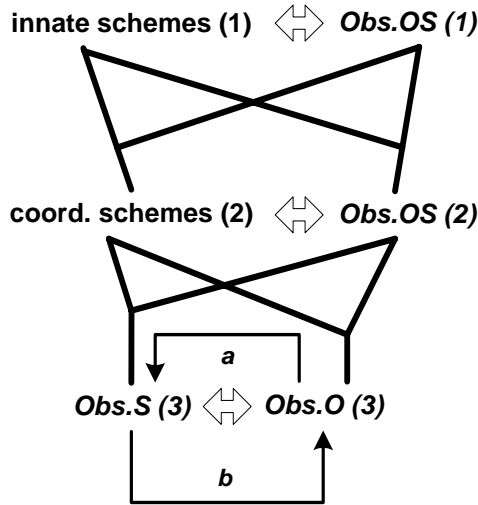
Figure 9.2.5: Increasing Equilibration to Level 3

This distinction, made "after the fact," can be viewed as a cognition that the object observable is different from the action observable. The mental *act* that makes this distinction can therefore be viewed as a function of the coordinated schemes (which, as the event has already taken place, give rise to the perception of the event) and the previous observables *Obs.OS* that had been 'built up' in cognition. This evolution is illustrated in Figure 9.2.5. The equilibration at level 3 in this picture is of Type I (since clearly no inferential coordinations can precede the structuring of the observables *Obs.S* (3) and *Obs.O* (3) upon which such inferences are made). However, once this Type I structure is constructed, and owing to the already large number of structures at level 2 (as well as other structures generated at level 3), further acts of equilibration at level 3 are capable of extending this level 3 structure from a Type I structure to a Type II structure through the making of inferential coordinations *Coord.S* (3) and *Coord.O* (3) as discussed previously.

This same process of equilibration is extendible to still higher levels of equilibration, each building on the previous level. The principal difference between this structuring and that shown in Figure 9.2.5 concerns the factors in the function (dark lines in the figure) that take the structure from one level to a higher level. Once the structure at level 3 has been equilibrated as a Type II structure, progress to level 4 takes place by means of pairing up the *S* terms to structure the next higher *S* term and pairing up the *O* terms to structure the next higher *O* term. Symbolically, this is to say the functional progress from one level to the next proceeds as

$$[Obs.S(\text{n}), Coord.S(\text{n})] \rightarrow Obs.S(\text{n+1})$$
$$[Obs.O(\text{n}), Coord.O(\text{n})] \rightarrow Obs.O(\text{n+1}) \ .$$

This, of course, produces a new Type I equilibration at level n+1 which, in turn, can be further equilibrated as a Type II structure once the coordinations at this level have been structured. We must also note that interactions on the same level are coordinated in a manner similar to the "intersection method" previously illustrated for equilibration level 1.[1]

We are still left with the question of the nature of these functions that take us from one level to the next in the hierarchy of increasing equilibrations. In going from level 1 to level 2 we were able to invoke the idea of reciprocal assimilations among sensorimotor schemes at the intuitive level. In passing from level 2 to level 3 and beyond, however, we are now dealing with *cognitive* structuring. We have passed from the dominance of *soma* in this process to the dominance of *nous* insofar as the act that takes us to higher levels is concerned. (This act is an act of *psyche*, which we will treat in Chapters 15-16). What do we know, empirically-speaking, about this act?

§ 2.4   Functions and Equilibration

We have dealt briefly with Piagetian functions in Chapter 4 (§7.2). What we now need is a less abstract description of this idea and Piaget provides three:

> 1) functions are considered, from a psychological standpoint, as the expression of schemes of assimilation of actions [PIAG3: 3];
>
> 2) functions express the links proper to schemes of actions [PIAG3: 12]; and,
>
> 3) a function essentially expresses a dependence, whether it occurs between properties of objects . . . or whether it is established between elements or characteristics which are inherent in actions or constructions [PIAG3: 167].

These descriptions illustrate the three main ideas embodied in the idea of a 'function' as Piaget employs this word. Functions can further be divided into *constitutive* functions, which are regarded by Piaget as primitive functions, and *constituted* functions, which are constructed (as schemes) and exhibited in various "operations" of thinking.

The three constitutive functions (excluding the associative coordinator, B) we introduced in Chapter 4 were: the repetition coordinator (W); the identification coordinator (I) and; the substitution coordinator or "permutator" (C). There is a close relationship between these three types of constitutive functions and what Piaget calls the three *forms* of assimilation. This relationship stems from the character of functions, particularly constitutive functions, as schemes that express "the links inherent in schemes of action and are thus organized according to the common forms of these actions" [PIAG3: 192]. Let us therefore begin by examining the three Piagetian forms of assimilation.

---

[1] see [PIAG19: 56, 87].

The first form is the *functional* assimilation. This is merely the process of the simple *repetition* of an action by which equilibration is established between the assimilation in schemes of action and the accommodation of these schemes to the things to which they are applied. To consolidate a scheme and bring it to a state of equilibrium, the scheme must be *exercised*. Experimentally, we find that this exercise takes the form of *cycles* in which the same action is repeated over and over again. Cyclic exercises are observed in infants from birth, and the acquisition of habits during sensorimotor Stage II is carried out exclusively in the form of primary circular reactions as we discussed earlier. This repetition is precisely what the repetition coordinator function W does; it is, in effect, a scheme for consolidating schemes and bringing the scheme into equilibrium with the things to which it is applied. If functions could have mottos, the motto of coordinator W would be *practice makes perfect*.

The second form of assimilation is the *recognitory* assimilation. This form of assimilation makes it possible to distinguish and identify objects. As we saw earlier, observables in the early stages of life (*Obs.OS*) do not distinguish the action from the Piagetian object. However, these undifferentiated observables do serve as a "point of intersection" among different schemes, and this intersection leads to the coordination of schemes or, using another favorite Piagetian phrase, the *reciprocal assimilation* of schemes. Now in order to "tie together" different schemes by reciprocal assimilation, there must be something that, so to speak, serves as the knot. It is the common Piagetian object to which these different schemes can be applied that does this. However, in order for the object to "function" in this role, one must be able to *identify* this object. This means the object must be established as the common factor to which the schemes are commonly referred. The Piagetian function that does this is the identification coordinator I, which we may regard as the function for establishing the dependence on the object of the schemes undergoing reciprocal assimilation.

The third and last fundamental form of assimilation is the *generalizing* assimilation. This form makes possible the extension of a scheme to new situations. In effect, this assimilation takes place through the substitution of the new situation or object into the scheme in place of the previous situation or object, thus establishing a new dependence between an action and the object to which the action is applied. The function that makes this substitution is the substitution coordinator C. Piaget notes that this function has a distinguishable hierarchy of three levels. First, there is what he calls "simple substitution" (*B* is chosen in place of *A* in the application of the scheme). Next we have "permutation proper" or "reciprocal substitution" (*B* can be substituted for *A* and vice versa). Finally, we have what Piaget calls the "inversal substitution" which deals with more complex structures of applications. In this case, a complex *BA* can be substituted for a complex *AB* and vice versa.

In summary, then, the constitutive functions W, I, and C are schemes for the construction of

the forms of assimilation. Coordinator W gives rise to the functional form of assimilation and enables the structuring of particular schemes of interaction. Coordinator I gives rise to the recognitory form of assimilation in which different schemes undergo reciprocal assimilation with each other. Coordinator C gives rise to the generalizing form of assimilation and makes possible the application of a scheme to new situations and objects for which the scheme was not originally structured. These three coordinator functions are regarded as the three forms of "formatory[2]" assimilation in the *functioning* of schemes. They are, in this sense, operational descriptions of the process of assimilation inasmuch as they express particular regularities that are observed in the manner in which schemes appear to operate. (see [PIAG3: 32-33, 172-173, 176-177]).

As schemes for structuring schemes, the constitutive functions are obviously a step farther removed from the data of direct observation by the psychologist. The explanation of these coordinators can rightly be viewed as a logical deduction. This at once raises the question of what can be seen in observable behavior that lends support to these more abstract ideas. To find this support, we must take a look at *compensation behaviors* observable in interactions.

The Compensation Behaviors

The three forms of assimilation discussed above correspond to three kinds of equilibrations that are observable in the study of children. These are [PIAG19: 8-10]:

> 1) equilibration between the assimilation of schemes of action and the accommodation of these to objects;

> 2) equilibration resulting from the interactions between subsystems; and,

> 3) progressive equilibrium between the differentiations (which produce subsystems) and the integrations (which unite these subsystems in the totality of the structure).

(2) differs from (3) in that equilibration (2) concerns collateral relationships between subsystems while (3) forms a hierarchy of equilibration levels.

The process of equilibration is a process that leads to a state of equilibrium. This presumes that a previous state of equilibrium has been perturbed by some disturbance or gap of some sort, thus necessitating an equilibrating response to this disturbance that results in a new regulation structure. We call the reaction (whether physical or intellective) to such a disturbance a **compensation**. Piaget's experimental studies led him to distinguish three general types of behaviors by which the Subject compensates disturbances. Since any compensation can be viewed as a kind of 'inverse operation' that gets rid of the disturbance, these three compensation behaviors are distinguished by the kinds of 'inversions' they produce.

---

[2] having the nature of a formation.

The first compensation behavior, called **type α**, is the simplest and is the first behavior exhibited in the course of the child's mental development. It consists of *canceling* the disturbance either through some movement opposite to the disturbance (a physical scheme) or by simply *ignoring* whatever has produced the disturbance. An example of the first sort is seen when a child simply pushes aside an obstacle that prevents him from grasping some desired object. Behavior of the second sub-type arises when the disturbance is incompatible with some previous "discernment" (perceptual or conceptive). In this case, the Subject will either *ignore* or *avoid* the disturbing element, or he may simply distort his perception of it (e.g. "see only what he wants to see").

Regardless of which of these forms of compensation is elected by the Subject, the end result – the compensation – is cancellation of the disturbance. If we represent the disturbance as *A*, type α behavior results in some form of -*A* so that we can symbolize the regulation in play by the mathematical notation $A - A = 0$ (where 0 represents the perceptive negation of the disturbance). In terms of the overall cycle of interaction, this basically amounts to a behavior in which the Subject focuses only on the "positive" elements of the structure without considering contradictory factors. For example, suppose a young child (let's say age 4 years) is shown a glass full of water, and that we then pour the water into a second (wider) glass so that the water level in the second glass is lower than it was in the first. The child will ignore the difference in the widths of the glasses, focus only on the height of the column of water, and say there is now "less water" in the second glass than there was in the first. If we reverse the operation, he will say there is now "more water" in the first glass than there was in the second. Piaget and his co-workers have documented a number of examples of this type α behavior in *The Grasp of Consciousness* as well as in many other works.

Structurally, type α behavior concerns only the regulation of assimilation and accommodation within a single scheme. Neglecting the contradictory factors perceivable in the situation amounts to the same thing as ignoring other schemes for which *Obs.O* (or *Obs.OS*) could function as an intersection. Thus, there is no attempt at reciprocal coordination of schemes. Referring to Figure 9.2.5, we can describe the sequence of activities in the following way. When *Obs.S*(3) and *Obs.O*(3) are first formed (from level 2), the initial perceptions of these observables are not yet "joined" by a structure in equilibrium. All that the transformation from the previous level has done is to present the manner in which the observables are observed. To actually form the structure on level 3, there must take place an interaction regulation between these observables. Type α behavior will provide a Type I interaction that brings about the equilibrium of the structure, but this equilibrium will not be very "stable" owing to the neglect of disturbing factors. In effect, the possibility of perceiving *Obs.S* as a plurality of sub-schemes (or *Obs.O* as a plurality of "objects" or "object features") is neglected. Hence no coordinations (*Coord.S*, *Coord.O*) are

attempted and only a Type I regulation results. The primary circular reactions of sensorimotor Stage II are examples of this type of compensation behavior at work.

The second type of compensation behavior, *type β*, is observed when the Subject does not neglect disturbance factors but, instead, integrates the disturbing factor into the system. The system is modified (Piaget calls this "equilibrium displacement") and this modification turns the disturbances into "variations." What this amounts to is that what would be predicative opposites, if they were not canceled in type α behavior, are replaced by reciprocal relations in type β behavior.

Type β behavior does not cancel the disturbance; it *absorbs* it in a more stable structure. We can say, with Piaget, that type α behavior is a kind of "algebraic structure" that Piaget calls a **grouping**. Because differences are neglected in type α behavior, we can illustrate this idea of an algebraic grouping in the following way. "Additively" we have a tautological structure, i.e.,

$$A + A = A; \quad A - A = 0.$$

What is meant by this can be illustrated this way: a robin is a bird; a duck is a bird; therefore, robins plus ducks = birds plus birds = birds. The associative coordinator B, i.e. the sequence in which regulations are applied, is important in this behavior type. For example, $A + A - A$ will produce different results from taking the groupings in different orders, i.e.,

$$(A + A) - A = A - A = 0; \text{ but } \quad A + (A - A) = A + 0 = A.$$

A young child, when asked if there are more birds than there are ducks, is likely to give as an answer something like, "I don't know; I've never counted them" [PIAG17: 26-28].

Type β behavior, on the other hand, produces what Piaget calls an **order structure**. Instead of removing a disturbance by cancellation, the disturbance is removed by what Piaget calls "reciprocity." In effect, Piagetian reciprocity is a relationship that turns contradictories into mere contraries by forming reciprocal relationships. For example, under type α compensation the Subject might form groupings of *A* and its contradictory $B = non\text{-}A$. This allows *B* to be neglected in an assimilation. In type β compensation, a relationship, say $A < B$ (e.g., "*A* is smaller than *B*"), is formed that permits a reciprocal relationship, $B > A$. The resulting structure contains these reciprocal relationships (symbolically) as

$$(A < B) \Leftrightarrow (B > A).$$

The reversibility in type β compensation (reciprocity) is not an inversion or negation. Nothing is negated here. While type α behavior constitutes a primitive form of classification, type

β leads to a primitive form of seriation or "ordering."

> There is even more convincing evidence of the operational nature of this structure, and that is the fact that at the same time children become capable of reasoning on the basis of transitivity. Let us say we present two sticks to a child, stick A being smaller than stick B. Then we hide stick A and show him stick B together with a larger stick C. Then we ask him how A and C compare. Preoperational children will say that they do not know because they have never seen them together - they have not been able to compare them. On the other hand, operational children, the children who proceed systematically in the seriation of the sticks, for instance, will say right away that C is bigger than A, since C is bigger than B and B is bigger than A [PIAG17: 30].

It is obvious that structures based on type β compensation must necessarily be presupposed before it becomes possible to reason on the basis of such ordering relationships.

The last type of compensation behavior, **type γ** or "superior" behavior, can be viewed as the synthesis of the two earlier types. The new factor in this behavior is the ability to *anticipate possible variations* without having to first be confronted with them in experience. A disturbance is first transformed into a variation (i.e., given an order structure). Then, since the child has the ability to form primitive classifications (type α compensation), possible variations in order structures (type β compensation) can, in turn, be classified. This gives rise to the possibility of cancellation of variations which, in turn, leads to the possibility that for the first time the child can construct reversible schemes.

Suppose T is some operational scheme and A is an object to which this scheme can be applied. Doing so produces a result we can write as TA. Now, the possibility of canceling the transformation T by its inverse operation T^{-1} permits a structure

$$T \cdot A = TA \Rightarrow T^{-1} \cdot TA = A \ .$$

In type γ compensation the structuring of a transformative scheme T is accompanied at the same time by the structuring of it's "inverse transform" T^{-1}. In effect, negations are considered along with the 'positive' factors of the structure so that we have both

> 1) a differentiation of substructures (accommodation), and

> 2) the integration of substructures in the totality of the superior structure (an assimilation that "enriches" the encompassing cycle of the whole structure).

In summary, then, we can pair up the three types of compensation behaviors with the three types of equilibrations as follows:

> Type α $\Leftrightarrow$ equilibration between assimilation in schemes and accommodation of these schemes to objects;

Type β ⇔ equilibration resulting from the interactions between subsystems by reciprocal assimilation;

Type γ ⇔ progressive equilibrium between differentiation and integration in relationships that unite subsystems to the totality of the structure that includes them.

Functions, Compensations, and the Hierarchy of Regulations

What remains for us to do in this section is to tie together all these elements of Piaget's theory of the development of thought. We begin by looking at the constitutive functions in light of the observable compensation behaviors.[3]

Our first comment is that W, the repetition coordinator, does not get its empirical justification from any of the compensation behaviors. Rather, the empirical justification for positing the existence of this coordinator is found from direct observation of sensorimotor behaviors beginning with Stage II. Here we can observe the arising of the primary circular reaction – the repeating over and over of an innate sensorimotor scheme – by which the child acquires his first habits. While we might suppose that W has the effect of stabilizing observables for the child – from which we can see the possibility for subsequently making classifications – the fact remains that compensation behaviors are observable through the form of reversibility that results. Thus the connection between W and any of the compensating behaviors is at best indirect. (The same is true of the association coordinator B; we might well suppose that this coordinator is present because circular reactions tend to follow the same pattern, thus providing by default a sequence of actions that collects observables into an ordered pair. On the other hand, we might also suppose that the regularity in the sequence observable in a circular reaction is an *effect* of an underlying coordinator B). Thus, while we can agree with Piaget that the coordinator W "corresponds as naturally to reproductive[4] assimilation as the coordinator I . . . does to recognitive assimilation" [PIAG3: 172-173], this does not necessarily mean that the form of assimilation has a strictly one-to-one correspondence with the type of equilibration.

On the other hand, the identification coordinator I *does* gain empirical support from type α behavior. The most obvious effect of type α compensation is a primitive form of classification or grouping. Now this effect obviously suggests a scheme for making an identification and this is precisely what constitutes the defining characteristic of coordinator I. Thus, the *empirical postulate* of the existence of coordinator I as a basic function in the development of thought appears to be well-justified by observable behavior.

---

[3] It is perhaps worth reminding ourselves of something at this point. The ideas of Piaget's theory were worked out from experiment and observation. We still require an examination of their Critical ground.

[4] "Reproductive" assimilation is synonymous with "functional" assimilation in Piaget's writings.

As for the substitution coordinator C, its existence as a basic function is supported by compensation behavior β. The effect of this compensation is the structuring of an order structure, which necessarily requires both the identification of ordered elements and the preservation of their identity within the order structure. But, in addition, this compensation also involves reciprocity between the subsystems of this structure, and this reciprocity points to the ability to perform permutations on the elements within the overall structure ($A < B$ and $B > A$).

With regard to compensation behavior γ, this behavior does not suggest any additional constitutive function. However, it *does* support Piaget's finding that we must regard the coordinator functions as *schemes*. The defining attribute of compensation γ is the coordination of the other two types of compensation behaviors, i.e. the *synthesis* of behavior α and behavior β. In Piaget's theory, only schemes can be coordinated (whether the scheme is in the form of an action or in the form of the making of a representation). The structure that compensation γ appears to produce is a *constituted* rather than *constitutive* function. So we have, on the one hand, the justification for regarding coordinators as schemes and, on the other, the justification for regarding *all* Piagetian functions (constitutive or constituted) as schemes since the coordination of two schemes must itself be a scheme.

We have seen several instances of functions in the regulation of the various structures discussed in this section. They include the functions *a* and *b* of the Type I interaction, the processes *OS* and *SO* (and, for Type IIC, *XY*) in the Type II interactions, and the functions that take us from a level *n* to level *n* + 1 in the hierarchy of structures. In addition, the Type II interactions also contain transformations (*Obs.S* → *Coord.S*, *Coord.O* → *Obs.O*) and these transformations are, likewise, to be regarded as Piagetian functions. We now see that all such functions are nothing other than Piagetian schemes, with their origin posited in the constitutive functions W, I, C, and B, but also capable of extension into constituted functions (which are merely more elaborate constructed schemes). These schemes, in particular the constituted functions, each have their own structure of regulation through interaction and are therefore, in principle, capable of undergoing increasing levels of equilibration themselves. Thus, in relatively swift progression, we see that Piaget's model of the process of equilibration is capable of growing a quite complex system of interacting structures.

The schemes *employed as regulating functions* in a structure (let us say a Type II structure) are, strictly speaking, not part of the cognitive structure itself. That role belongs to the observables, *Obs.S* and *Obs.O*, and the coordinations, *Coord.S* and *Coord.O*. In this sense the functions that regulate the interaction are a kind of *materia circa quam* of the regulation.

Before leaving this summary of Piaget's model of the development of thought, there is one last point we should explicitly note. This is the role played by affective factors in the process of equilibration. We have already seen in our discussion the occurrence of such factors as the

interest of the Subject in the observable, the *desire* that appears to motivate the infant in initiating a given scheme, the *feeling* of "something not being right" and the *anticipation* of an outcome. Thus, even though Piaget devotes no significant amount of discussion to these factors in the exposition of his model, these affective factors are, nonetheless, part and parcel of the empirical description of equilibration.

In addition to these factors, we have one more to note. This is the role of "suitability" in the regulations. In both functional assimilation and recognitory assimilation, this idea of suitability enters in as one of the basic, if under-discussed, elements of Piaget's theory.

> In order to study constitutive functions, we must therefore specify the direction of these kinds of primitive 'applications' and above all study how the subject passes from functional links based on 'suitabilities' or concrete dependencies . . . to equivalence classes based on objective similarities [PIAG3: 15].

This reference to the idea of "suitability" appears elsewhere in *Epistemology and Psychology of Functions* (e.g. [PIAG3: 27-29]) just as the ideas of "value", "success & failure" and so on appear at various points in *The Development of Thought*. Even the idea of disturbances carries with it the connotation of an affective factor. Piaget does not elaborate on the roles these factors play in regulation and the hierarchy of increasing equilibrations, but the point for now is that he does recognize them as playing a part in the overall theory.

§ 3.   Acroamatic Principles and Empirical Postulates

It is clear that Piaget's theory is organized as a systematic doctrine. It is also clear that its theoretical form – structures, interactions, regulations, etc. – is a product of scientific induction since these generalizing elements of the theory are not themselves directly observable from experiment. Piaget was fully aware of this, and he was keenly interested in the epistemological implications of the facts he obtained from experiment and observation.

> Any study of the development of knowledge which goes back to its roots (omitting for the moment any reference to its biological antecedents) has the merit of providing an answer to the as yet unresolved question of the way in which cognition initially develops . . . [There] seems to be a common postulate of accepted epistemologies, viz. the assumption that there exists at all levels a subject aware of its powers in various degrees (even if these are reduced to the mere perception of objects); that there are objects existing as such for the subject (even if they are reduced to 'phenomena'); and above all intermediaries (perceptions or concepts) which mediate between the subject and objects and vice versa.
>
>   Now the first results of psychogenetic analysis seem to contradict these assumptions. On the one hand, knowledge arises neither from a self-conscious subject, nor from objects already constituted (from the point of view of the subject) which would impress themselves on him; it arises from interactions which take place mid-way between the two and thus involve both at the same time, but by reason of their complete undifferentiation rather than an interplay between different kinds of things. On the other hand, if there exists at the start neither a subject in the epistemological sense of the word, nor objects conceived as such, nor invariant intermediaries, the initial problem of

knowledge will therefore be the construction of such intermediaries: starting from the point of contact between the body itself and external things, they will develop in the two complementary directions given by the external and the internal, and it is on this twofold progressive construction that any sound elaboration of subject and objects depends [PIAG27: 19-20].

Theories of knowledge have, or should have if they are to be fecund, *implications* that can be experimentally tested and, through experiment, these theories will either be supported (although never *confirmed*) or be found wanting. This is Piaget's view, and it almost amounts to pragmatism. When subjected to testing, he finds both classical empiricism and "innatism" (classical rationalism) wanting. The solution he proposes is to develop a new philosophical doctrine, Genetic Epistemology, based on the analysis of experimental facts.

However, we must note that such a development cannot proceed solely from analysis if we accept the definition of analysis as a deductive procedure for making clear that which is, so to speak, "buried within" the observable facts. Rather, such a process must always involve a *synthesis* of these facts, and any such synthesis must necessarily make presuppositions of one kind or another. In other words, any system of empirical postulates or constructed axioms begins with some set of *acroamatic* principles. Philosophy, Kant wrote, is knowledge *through* concepts; the special sciences gain knowledge through the *construction* of concepts.

What, then, are the special presuppositions that underlie Piaget's theory? We can begin to obtain an appreciation of these by examining what Piaget has to say concerning the "biological problem of intelligence":

> The question of the relationship between mind and biological organization is one which inevitably arises at the beginning of a study of the origins of intelligence. True, a discussion of that sort cannot lead to any really definite conclusion at this time, but, rather than submit to the implications of one of the various possible solutions to this problem, it is better to make a clear choice in order to separate the hypotheses which form the point of departure for our inquiry.
>
> It is obvious, in the first place, that certain hereditary factors condition intellectual development. But that can be interpreted in two ways so different in their biological meaning that confusing the one with the other is probably what has obfuscated the classic controversy over innate ideas and epistemological *a priorism*.
> The hereditary factors of the first group are structural and are connected with the constitution of our nervous system and of our sensory organs. Thus we perceive certain physical radiations, but not all of them, and matter only of a certain size, etc. Now these known structural factors influence the building up of our most fundamental concepts. For instance, our intuition of space is certainly conditioned by them, even if, by means of thought, we succeed in working out transintuitive and purely deductive types of space.
> These characteristics of the first type, while supplying intelligence with useful structures, are thus essentially limiting in contradistinction to the factors of the second group . . . In contrast, the deductive and organizing activity of the mind is unlimited and leads . . . precisely to generalizations which surpass intuition. To the extent that this activity is hereditary, it is so in quite a different sense from the former group. In this second type it is probably a question of a hereditary transmission of the function itself and not of the transmission of a certain structure [PIAG1: 1-2].

These general ideas of organization, function, and structure are exhibited in experience to a

trained biologist as easily and with the same character of "self evidence" as mathematicians once regarded Euclid's axioms, although for the non-biologist these ideas might perhaps not be so quickly assimilated when presented through biological examples. If, however, these ideas have the fundamental import Piaget's epistemology grants them – i.e. if they *are* basic rational principles for the science of mind – we should be able to come to them from other directions as well, so that when these same ideas are expressed in musical exhibitions they will be "self evident" to a musician, when expressed in sociological exhibitions they will be "self evident" to a sociologist, and so on. Metaphorically speaking, if cats really exist then there should be more than one way to skin one. We will come back to this thought in a moment.

Returning to Piaget's science, these biologically-expressed ideas carry over into the problem of the phenomenon of intelligence.

> We find the same distinction with regard to the inheritance of intelligence. On the one hand, we find a question of structure: The "specific heredity" of mankind and of its particular "offspring" admits of certain levels of intelligence superior to that of monkeys, etc. But, on the other hand, the functional activity of reason (the *ipse intellectus* which does not come from experience) is obviously connected with the "general heredity" of the living organism itself. Just as the organism would not know how to adapt itself to environmental variations if it were not already organized, so also intelligence would not be able to apprehend any external data without certain functions of coherence (of which the ultimate expression is the principle of noncontradiction), and functions making relationships, etc., which are common to all intellectual organization.
> Now this second type of hereditary psychological reality is of primary importance for the development of intelligence. If there truly in fact exists a functional nucleus of the intellectual organization which comes from the biological organization in its most general aspect, it is apparent that this invariant will orient the whole of the successive structures which the mind will then work out in its contact with reality. It will thus play the role that philosophers assign to the *a priori*; that is to say, it will impose on the structures certain necessary and irreducible conditions. Only the mistake has sometimes been made of regarding the *a priori* as consisting in structures existing ready-made from the beginning of development, whereas if the functional invariant of thought is at work in the most primitive stages, it is only little by little that it impresses itself on consciousness due to the elaboration of structures which are increasingly adapted to the function itself. This *a priori* only appears in the form of essential structures at the end of the evolution of concepts and not at their beginning: Although it is hereditary, this *a priori* is thus the very opposite of what were formerly called "innate ideas" [PIAG1: 2-3].

Piaget's system, from the very beginning, is willing to presuppose a fundamental link between biological organization and mental organization. It is, in short, a theory modeled on the idea of an Organized Being. In the quote just given he appears to hint that he regards the biological organization as the ground of the mental organization – which, if true, subordinates the mind to the body – but he is too good a scientist to offer such a subordination as a conclusive fact or to let this presupposition of the superiority of the biological to the mental enter into his work in any truly essential way. But he *does* pose the relationship as a hypothetical: "*If* there truly exists in fact a functional nucleus of the intellectual organization that comes from the biological organization then this invariant will orient the whole of the successive structures." The question

for us in deciding whether or not we will go along with Piaget in the doctrine which follows is: Must we regard the limitation – "which comes *from* the biological organization" – as a *necessary* limitation in order to be willing to presume that a functional nucleus of mind does indeed "truly exist"?

A comment is in order here. We "need" to express such a limitation only if, in order to be comfortable with the 'functional nucleus' idea, we "need" some "reason" *in concreto* "justifying" its possibility before we are even willing to begin to explore the idea of this 'functional nucleus' in the first place. I suggest that such a need expresses a modern day form of Cartesianism and one that Leibniz would have expressed in terms of the principle of sufficient reason. I think I am not too wrong in holding the opinion that most of today's scientists, consciously or otherwise, adopt this Cartesian attitude.[1]

But is this attitude *necessary*? No. The common point in the development of every science is the objective of proposing a systematic doctrine offering to explain the phenomena of experience. This should never be forgotten or overlooked, and the relevance of this pragmatic view of science for our current discussion is this: The logical priority of the ideas of science should proceed from the question of whether a particular idea enters the doctrine because it is needed to address the phenomena under study, not from a premature attempt to hook one idea to another simply because the latter idea seems to conform with one particular aspect of the whole of the topic of the inquiry. The logically prior principle is the principle of the Organized Being, not the Biologically-organized Being. "Organized Being" *implies* biological organization in its concept.

This brings us around to the Critical Philosophy. Here we are forbidden to *presume* any real mind-body division. It is one thing if our doctrine eventually brings us to *necessarily conclude* that such a real division exists in fact. It is quite another to feel the need to *inject* such a division as a presupposition at the very beginning. The *value* of incorporating into our doctrine of method a rational system of metaphysics-proper lies in the *utility* that such a system, if it is well thought out, has in helping us metaphorically keep the horse in front of the cart. I can find in Piaget's theory not a single finding that *requires* the priority of biological organization over mental organization as an *objectively* necessary condition. Piaget's work is solid science.

Now let us look at Kant's cat-skinning method. Piaget's objection to "apriorism" is aimed fundamentally at the presupposition of fixed structures in such forms as, for instance, preconceived ideas or the "fixed forms" of Gestalt psychology (which, at root, posits what we might call "fixed templates of reality"). Yet genetic epistemology also posits, in its own way, *a priori* fixed forms; the difference is that these forms (e.g. the constitutive functions) are of a dynamical rather than a static character. Piaget's objections to Kant seem to arise from the most

---

[1] It might be said of science what de Tocqueville once wrote of America: "The Americans do not read the works of Descartes . . . but they follow his maxims."

common misinterpretation of Kant's work – namely that Kant's "knowledge *a priori*" is knowledge of the 'static' kind. This is simply not so.

We have seen the 'dynamical' character of Kant's system in Chapter 8 insofar as the representation of sensible objects is concerned. The categories were there seen as notions whose role has the same "structure-organizing nature" as the constitutive functions and structuring of regulations are portrayed in Piaget's theory. But do they maintain this character when we turn from the metaphysics of sensible objects to that of rational objects? That is the question we must next examine.

§ 3.1   The Principles of Rational Cosmology

I commented earlier in this treatise on Kant's apparent fondness for naming his terms and expressing many of his principles in what I called 'teleological' language. Nowhere is this habit more apparent than in the Ideas of Rational Cosmology and Rational Theology. We will deal first with Rational Cosmology and take up Rational Theology afterwards.

The special Ideas of Rational Cosmology all stem from a single general Idea, namely the Idea of absolute completion in the series of conditions. For us to understand the Ideas of Rational Cosmology, we must understand the Ideas of Quantity, Quality, Relation, and Modality in terms of the general Idea. Let us therefore dissect the statement of this general Idea.

We will first direct our attention to the "series of conditions." The idea of a **condition** seems easy enough. A condition is something represented as a mark that the determination of something else depends upon. Stipulations, requirements, prerequisites and grounds are all examples of the idea of a condition. When we speak of the idea of a condition of reciprocity, two relationships between objects *A* and *B* are mutually constrained by some specific rule. "Equilibrium" is an example of such a condition since it describes a characteristic pertaining to the *Existenz* of a stable structuring of Piaget's *Obs.S* and *Obs.O*. The representation of such a condition has the character of a rule of conjunction, e.g. "*A* is to the left of *B* AND *B* is to the right of *A*."

When we speak of a *series* of conditions, we combine concepts pair-wise in the form of antecedent (the condition) and consequent (the conditioned). Formal logic provides clear examples of this idea. One such example is that which we call the *necessary* condition. If *A* and *B* are propositions and *A* is a necessary condition of *B* then *B* cannot be true if *A* is not true. Another such example is that which we call the *sufficient* condition. If *A* is a sufficient condition of *B* then *B* must be true if *A* is true. More generally and in terms of concepts, a mark (as a condition) is sufficient if by it one can always recognize the object for which it is a mark; it is necessary if it must always be found in the cognition of the object for which it is a mark.

A natural enough question we might raise here is whether all conditions *must* be regarded as expressed in a series. Can we not, for example, recast the example of a conjunction given above

as "*if A* is to the left of *B then B* is to the right of *A*"? We can, of course, express this reciprocal relationship in this way, but note that if we do so we are not really expressing the same thing. In the conjunction form we are expressing ourselves categorically ("this is the way *it is*"). In the conditional form ("if this then that") we are expressing the relationship *hypothetically*. This distinction is an important one because when we say that a condition *must* always be expressed in a series we are making a declaration about the nature of what it means to understand something. If we tell an adult, "*A* is to the left of *B*," the adult will at once conclude it is also true that "*B* is to the right of *A*." He thinks a *rule* as a (higher) condition determining the conjunction. But to a very young child this conclusion is not one that may be at all evident because it is expressed by an ordinal structure – which according to Piaget's findings implicates type β compensation behavior. The point here is: A specific *instance* of the exhibition of a 'condition' is conditioned by the context.[2] Thus we must employ a degree of care in how we use this word "condition."

In the context of the Ideas of Rational Cosmology, our interest centers on the idea of a series of conditions. In particular we consider the combination of concepts, in the manifold of concepts, as this combination pertains to a relationship between concepts as higher concept to lower concept. One concept can be viewed in regard to another as: 1) a partial concept of the latter, or 2) a ground of recognition for the lower concept. It is in the second facet that we regard the higher concept, *B*, as a serial condition of the lower concept, *A*, because a higher concept is made by abstracting from lower concepts. The concept *B*, in turn, may stand as a lower concept to an even higher one, *C*, which places *C* in relationship to *A* as a remote condition of the latter. It is at this point where it becomes fecund to talk about the series of conditions since with only *A* and *B* it is sufficient to describe relationships in propositional terms, i.e. subject-predicate, antecedent-consequent, or concept to member of the divided concept (the three forms of logical momenta of Relation between *B* and *A*).

For the sake of discussion let us suppose we have a series composed of three concepts arranged from highest to lowest as $C \rightarrow B \rightarrow A$. Let us further suppose that in the development of its manifold of concepts the thinking Subject has conceived no concept higher than *C* in this series as of yet. We then say that *C* is **practically unconditioned**. This does not mean that the Subject at some later time cannot make an abstraction from *C* to make a still higher concept *D*; all we are proposing is that this has not happened *yet*.

---

[2] Because it is an idea, the idea of a condition has for its object a *noumenon*. As I have said several times before, a *noumenon* can only be exhibited in appearance through examples and never as a complete thing-in-itself. As adults we might be inclined to assume that ordinal type β thinking is "automatic." Let us not be deceived by the simplicity of the above example. The more complicated or abstract thinking becomes, the more often one finds that type β thinking is *not* automatic. As a teacher, I see examples of this exhibited by my students (including my graduate students) in every one of my classes. Deductions that to me are "obvious" (after a lifetime of professional practice) are frequently not at all obvious to the student. This is, of course, a major reason why we have teachers.

This example provides us with an illustration of what we will mean by the idea of an unconditioned. Now, every step taken in the regression of a series[1] is made by abstracting from concepts. These concepts subsequently become lower concepts in relationship to the new higher concept to which they gave rise. Since the higher concept is abstracted from immediately lower concepts, each step in regressive synthesis 'removes something' from the lower concepts through abstraction in making the higher concept. In this sense, the higher the concept, the more that is contained under it (i.e. the greater its sphere) and the less that is contained in it. This at once suggests the following question: Is there a highest concept – i.e. a concept that cannot be further abstracted from? If there is, we would call such a concept **absolutely unconditioned** since it could not stand as a lower concept to an even higher concept. We could also call such a concept an absolute primitive and say it is *theoretically unconditioned*.

If we presume that every concept, whatever it contains, is of finite number (has finite extensive magnitude), then clearly the answer to the question above would have to be yes. However, as any modern mathematician would be quick to point out, if we make such a presumption we are summarily ruling out any possibility that a concept might be of unlimited extensive magnitude. In other words, we would be summarily dismissing the possibility of objects whose representation has transfinite number. It seems to me unlikely that a mathematician would let such an assumption go unchallenged. "The number *pi* exists[2]," she might say, "and therefore your assumption is invalid." If we accept the premise that 'the concept of *pi*' somehow does contain an unlimited extensive magnitude, and if we further accept the consequences of the system of transfinite mathematics built out of a system of axioms that permit, among other things, the mathematical 'existence' of objects of transfinite extensive magnitude, must we not then conclude that the answer to the question above is no?

Suppose we come down on the side of the negative with regard to this question. We then must deal with another problem. Because we can accept no real mind-body division, we saw earlier that we must place *soma* and *nous* in a Relation of community that requires, among other

---

[1] In the synthesis of a series of concepts, if we go in the direction of a prosyllogism - that is, from lower concept towards higher concepts - we call this a *regression*. If we proceed in the direction of an episyllogism - from higher concept towards lower concepts - we call this a *progression* [KANT1a: 462 (B: 438)].

[2] The question of what a mathematician means by term "exists" is an interesting one and has been debated among philosophers of mathematics. We shall not enter the debate here but limit ourselves to one example. Poincaré held that "to exist" mathematically meant "to be free from contradiction." This view is opposed by logicians of the Peano-Russell-Hilbert tradition, for whom "to exist" means "to be a class that is non-empty" [POIN2: 180]. The irrational number *pi* (3.141592653 . . .) requires an "infinite" number of digits to represent. Therefore, if we accept that *pi* "truly exists" and if we further contend that we "truly have a complete concept of *pi*," we would have to side with the mathematician's argument above. Davis and Hersh call infinity "the miraculous jar of mathematics" because, in part, "it might seem that the axioms of infinity and that of God have the same character as far as self-evidence is concerned" [DAVI: 152-157].

things, that whatsoever we come up with in our model of mental anatomy must have its counterpart in the anatomy of *soma*. But *here* we are faced with the fact that, while there is an enormous number of glia, neurons, and synapses in the brain, this number is still finite. Furthermore, quantum mechanics tells us that even the number of possible energy states (in a living organism), while even more enormous, is still quantized and limited (else the organism is destroyed by high-energy breaking of its chemical bonds). How, then, could we possibly admit any *concept* could truly have an unlimited extensive magnitude when *soma* cannot?

It is perhaps readily apparent how this cycle of argumentation could be carried out back and forth between one side of the question and the other until all theory lies in rubble and the debate's participants stand divided into two (or perhaps more) camps of opinion. What we have here is an example of what is called an *antinomy* of reason. The question that kicked off the whole thing seemed innocent enough, but we have just seen the appalling ease with which it can carry us off into a dialectic fog. What must we do about this? One choice we might make is to adopt what is sometimes called a "scientific approach": We could simply postulate one or the other answer. If the postulate we choose makes a difference in the overall theory of Nature, we could then perhaps mount a program of experimentation "and let nature settle the issue." This seems a reasonable and sound strategy, does it not? I imagine William James would readily endorse it.

But in proposing this strategy, we also obtain a clue pointing to where we have gone wrong in the entire question argued rhetorically above. The question was quietly transformed into: Is there any such *thing* as an absolutely unconditioned? Before we embark on an attempt to answer the question, let us ask another: *In what way can this question be asked with objective validity*? Under the Copernican hypothesis we cannot simply "let nature settle it" because by "nature" we mean our world model. Shall we let appearances in *sensible* Nature (which is what experiment studies) ground that which is *supersensible* (Nature as an Object of reason)? This would be to try to make the conditioned be the condition of its conditions. It is the error in scientific materialism.

The antinomy arises because we think we must *make a decision* about either joining or not joining the *idea* of an absolutely unconditioned to the idea of the 'existence' of mathematical infinity. By posing the question this way, we put ourselves in the position of having to choose between two contradictories: either the theoretically unconditioned does exist (is possible) or it does-not exist (is impossible). But if we look at the question in these terms we find *the question* to be absurd because it requires the truth of our concept of the object, the absolutely unconditioned, *to be conditional upon a higher premise*. Could anything be more self-contradictory than this? *The question itself is not objectively valid* because it requires for an answer either a transcendental affirmation or a denial concerning a thing-in-itself.

How, then, can we *reason* about the idea of an absolutely unconditioned in an objectively valid way? First, let us note that an object of reason is always an object of a *theory*. All

theoretical constructs are, in turn, made up of concepts. Concepts *draw their objective validity from the categories of understanding* – the rules for the construction of concepts. But the categories of understanding are objectively valid only insofar as they produce concepts of *possible experience*. It was, after all, to ground the possibility of the *phenomenon* of experience that led us to the categories in the first place. Therefore, the *use* of the categories (by Reason) has objective validity *only insofar as the concepts they produce pertain to objects of a possible experience*. This is the fundamental acroamatic principle of objective validity. An object of reason has objective validity only if the construction of its idea is based on objectively valid applications of the categories throughout all judgmentation and reasoning. Otherwise Reason has done nothing except to produce a dialectic inference of *illusion*.

In what way is the idea of 'mathematical infinity' an objectively valid idea? To know this, we must look at experience to understand the real root of this idea – that is, to know "where this idea comes from." This is simple enough. We begin with one thing; to this we add another; to this we add yet another; and so on. This is to say the experience is *a process* symbolically represented by the sequence: $1; 1 + 1 = 2; 2 + 1 = 3; 3 + 1 = 4; . . .; \rightarrow \infty$. Translated into words, the last symbols in this representation read *and so on to infinity*. Now, why do we say this? *It is because we present no condition requiring that this process must terminate*. It *seems* that we can *always* add one to a number, no matter how large this number is, and get an even larger number. The *experience* in mathematical infinity is *the experience of a process*. Seen in this way, 'infinity' is never "something we get to" but, rather, a direction the results of the process appear to "move in" coupled with the absence of any "reason" why this process must end. There is nothing inconsistent or self-contradictory *in the process* so far as possible experience is concerned. The idea of mathematical infinity is objectively valid *insofar and only insofar as it is viewed as a process*. It is only when "infinity" is viewed as a thing-in-itself rather than an Ideal of pure Reason that the idea becomes *transcendent* and, consequently, loses *real objective validity*.

Mathematicians, when they rise above their Platonic impulses, know this. They are keenly aware, much more so than the rest of us, how careful one must be when dealing with infinity. The non-mathematician wonders, and sometimes even stands mesmerized, at how the mathematician *knows* that $\frac{1}{2} + \frac{1}{4} + \cdot \cdot \cdot = 1$. On the left side of the "=" sign stands infinity subsisting in an unending process; on the right side of the "=" sign stands finitude. How does this happen? The answer is that the mathematician derives procedures and algorithms – rules – by which she extends the borders of mathematics. (The branch of mathematics that deals with this is called Analysis). In her delightful book[3], Péter writes

Whenever we introduce new numbers or new operations, we should always see that they obey the

---

[3] Rózsa Péter, *Playing With Infinity*, (tr.) Z.P. Dienes, NY: Dover Publications, 1976.

old laws, since the reason we introduce them is to make the procedures more uniform. We do not want to have to split our operations into different types, depending on whether the new numbers or operations do or do not occur. This regard for the extensions of old, established concepts is called the 'principle of permanence'.

Unfortunately, the Platonic impulse is strong in mathematics. It tends to reify the idea of infinity. This is institutionalized in set theory's axiom of infinity, which states

Axiom of Infinity: An inductive (i.e. infinite) set exists.

The question is not only exists how? *but also how not*? It is a question of *overall context*.

Just as the real objective validity of the idea of mathematical infinity subsists in a process, so too does that of the idea of an absolutely unconditioned. We never encounter in actual experience any such thing as an absolutely unconditioned. The objective validity of this idea is vested wholly in the *process of abstraction* that, like mathematical induction, merely provides the direction *of* and the steps *in* the synthesis and not its endpoint. We are free to use the idea of an absolutely unconditioned, and use it with objective validity, so long as we remember this and hold it as an *Ideal* to work toward in sensible exposition rather than as a real endpoint. It is in this sense alone that it is an objectively valid object of reason. (So, too, for mathematical infinity).

Now we must return to the general Idea of Rational Cosmology and take up the final part of its statement, namely the Idea of *absolute completion* in the series of conditions. Any series of concepts connected by determining judgment constitutes a series of conditions, and by being connected in judgment this series, *taken in its entirety*, is also *a unity*. What, though, is meant by an "absolute" unity? Kant reserved for the word "absolute" a very special significance.

> However, while we are here talking about the totality of conditions and the unconditioned, as the common title of all ideas of reason, we again run up against an expression which we cannot do without and at the same time cannot safely use because of an ambiguity it has acquired through long misuse. The word **absolute** is one of the few words that in its original meaning was suited to one idea that by and large no other word in the same language precisely suits . . . The word *absolute* is now more often used merely to indicate that something is valid of a thing regarded as it is in itself and thus internally . . . On the contrary, however, it is also sometimes used to indicate that something is valid in every respect (unrestricted) . . .
> It is in this expanded meaning that I will make use of the word *absolute*, and set it against what is merely comparative, or valid in some particular respect; for the latter is restricted by conditions, while the former is valid without any restriction [KANT1a: 400-401 (B: 380-382)].

A connected series of conditions is clearly "internally valid" but this is not what Kant has in mind for the Idea of absolute completion in the series of conditions.

> Now a transcendental idea of reason goes only to the absolute totality in the synthesis of conditions, and never ends except with the absolutely, i.e. in every respect, unconditioned. For pure reason leaves to understanding everything that refers first of all to objects of intuition or rather to their synthesis in imagination. It reserves for itself only the absolute totality in the use of notions of

understanding, and seeks to carry the synthetic unity, which is thought in the categories, all the way to the absolutely unconditioned. We can therefore call this the *unity of reason* in appearances, just as that which the category expresses can be called the unity of understanding. Thus reason relates itself only to the use of understanding, and not indeed insofar as this contains the ground of possible experience (for the absolute totality of conditions is not a notion that is usable in an experience, because no experience is unconditioned), but, rather in order to prescribe the direction toward a certain unity of which understanding has no notion, and aiming to comprehend all acts of understanding together in respect of every object in an *absolute whole* [KANT1a: 401-402 (B: 382-383)].

Absolute completion in the series of conditions would require a highest concept that *grounds all other conditions*. It would be, in effect, "the reason for everything." Note that Kant does not say that pure Reason 'knows' what such an ultimate and absolute ground 'is'; he does not even say that such a concept is possible for human understanding. All he is saying is that Reason *acts as if* such an absolute condition *should* exist, and it steers the power to understand "in the direction of" making such a manner of connection of concepts as should lead to absolute completion *if possible*. It seeks termination of the series *a parte priori* in the concept of an Ideal of unity.

As an illustration, suppose the thinking Subject has constructed two series,

$$C \rightarrow B \rightarrow A \text{ and } E \rightarrow D \rightarrow A.$$

These series are joined at concept *A* but otherwise diverge in the prosyllogism of each respective series of judgments. The Idea of absolute unity in the series of conditions is the Idea that these diverging series *should at some point converge* in a higher condition. To put it in less abstract terms, if *C* and *E* are both viewed as "laws" or "principles" of *A*, the Idea is that there should be a higher law that governs both *C* and *E*, possibly through some series of conditions. That we do indeed appear to think in exactly this fashion is made evident by the practice of physics. Physics is keenly interested in finding "the first principle of everything". This is, indeed, what present attempts to "unify" the four "fundamental forces of nature" are all about.[4]

We can also compare this Idea with Piaget's theory of the coordination of schemes. Piaget contends that it appears schemes which "intersect" at a common observable, e.g.

Innate scheme *A* ⇔ *Obs.OS* ⇔ Innate scheme *B*,

sooner or later become coordinated through this common intersect. Now this is an inference; neither Piaget nor his collaborators nor anyone else can actually look into the mind of a baby and see that this "intersection" in an observable "causes" the schemes to become coordinated. Nor indeed do they say that *Obs.OS* causes the coordination to take place. The observation is that schemes *do* come to be coordinated and that *when they do* there always appears to be an

---

[4] cf., N. Arkani-Hamed, S. Dimopoulos, and G. Dvali, "The universe's unseen dimensions," *Scientific American*, Aug., 2000, pp. 62-69.

observable present that is common to both schemes; the observable provides a condition under which this coordination becomes possible for the infant.

But *why* should this happen? Piaget does not venture onto these grounds. His theory says merely that it is a fact this happens and that the way in which it happens is via a central process of equilibration. This central process is not a thing which itself is available for the psychologist-observer to observe; what he is presented with are observable behaviors and these behaviors appear to be consistent with the theory that such a central process exists. *The ground* for positing such a process, in turn, lies in Piaget's idea of *structure*, and for this idea Piaget admonishes us that we must look *at the entirety of the structure* and not its parts. But what is this idea if it is not in appearance none other than a different statement of the *acroamatic principle* of Kant's Cosmological Idea that acts of pure Reason seek absolute unity in the *totality* of the *different* series of conditions? (The synthesis is: totality + plurality = unity; this is *practical* completion).

The history of Western thought is packed with many examples that illustrate a pattern of thinking consistent with the Cosmological acroam.[5] In his *Monologion*, St. Anselm (generally considered to be the founder of Scholasticism) writes

> Of all the things that exist, there is one nature that is supreme. It alone is self-sufficient in its eternal happiness, yet through its all-powerful goodness it creates and gives to all other things their very existence and their goodness.

Moving ahead nine centuries, Professor Whitehead writes

> The point is that every proposition refers to a universe exhibiting some general systematic metaphysical character. Apart from this background, the separate entities which go to form the proposition, and the proposition as a whole, are without determinate character. Nothing has been defined, because every definite entity requires a systematic universe to supply its requisite status. Thus every proposition proposing a fact must, in its complete analysis, propose the general character of the universe required for that fact. There are no self-sustained facts, floating in nonentity [WHIT: 11].

Whitehead called *his* supreme principle the Category of the Ultimate.

In what manner does the Cosmological principle manifest itself in the outcomes of acts of Reason? What sort of idea does the "direction of Reason's search" lead to? We can describe this in a single word: Nature. Kant tells us:

> The idea of a world in general is one of the restrictions of the sensible world by reason. But we have two sorts of concepts in our soul: concepts of understanding and of reason. Concepts of reason

---

[5] The word acroam is taken from the Greek *Akroama* ("recital"); Kant derives this terminology from Aristotle's "acroamatic" lectures and uses it to distinguish fundamental principles of Reason from *axioms*, which are fundamental principles of an intuitive character. Axioms are of a "mathematical" character while acroams are metaphysical principles. In this sense, acroams are "more primitive" than "axioms" because the latter must be constructed - which requires an act of Reason, which in turn acts in accordance with its acroamatic principles. See [KANT8: cv-cxv].

come about when one enlarges a concept of understanding *ad infinitum*. Thus we have sensuous concepts *a priori*, notions of understanding *a priori*, and *concepts of reason a priori*. Concepts of reason are called *Ideas* and are those *representations* whose object *cannot be adequately given in any possible experience*, but are extremely necessary to reason and do not at all contradict themselves. These transcendental Ideas also have the benefit that, in leading us beyond all possible experience, they make us believe there can also be things outside the field of experience. All these Ideas aim at and subsist in the absolute totality of the conditions of the world. Absolute totality in the series of conditions which is found for objects of experience is the cosmological Idea. This divides into four in the manner of the categories:

1.) In the cosmological Idea of the Quantity of the world. We cannot at all know this through experience. For were the world endless this is out of the question. But were it finite I could not discover the boundary; for I cannot experience the negative.

2.) In the cosmological Idea of Quality or the decomposition, that the world consists of simple parts, which I also cannot recognize from experience since experience happens through the senses, and space and time, these forms of sensibility, are not made of simple parts.

3.) In the cosmological Idea of Relation or the absolute totality of the natural order. That in the world the cause of the conditioned is always again a condition; thus I reach for the unconditioned for absolute totality, which experience cannot give me since it is not to be met with in the world but rather beyond it.

4.) The cosmological Idea of necessity, that the uppermost condition is necessary for the sake of absolute totality. - These Ideas have the benefit that they urge us, by the events of the world, to conclude always from one cause to another in order to come to the absolute totality [KANT19: 206-207 (29: 848-849)].

Were it possible to satisfy the "urging" of this acroamatic principle, what would be the appearance of the manifold of cognition these four divisions should bring? This is what the four Cosmological Ideas, as a 2LAR of the general Idea, describe:

In Quantity: absolute completeness of the composition of the given whole in all appearances;

In Quality: absolute completeness in the division of a given whole in appearance;

In Relation: absolute completeness in the beginning (i.e., the unconditioned cause) of an appearance generally;

In Modality: absolute completeness as regards the dependence of the *Dasein* of what is changeable in appearance, i.e., in the chain of causal dependencies.[6]

These four Ideas, as regulative principles *a priori*, prescribe the course of understanding the process of pure Reason will chart. Note that these Ideas do *not* describe the *motivation* of pure Reason, i.e. what prompts the action when Reason directs the powers of understanding. What they describe is regulation for the logical perfection of one's understanding of Nature.

---

[6] Recall that in every determinant judgment of causality and dependency, the category calls for the appearance to be regarded as the effect of some cause; the Modality in such a judgment holds that the actual existence (*Dasein*) of such a cause is *necessary*; if we discover (or think we discover) the cause, it too must have a cause - hence the Idea of the absolutely necessary completeness in a chain of subordinations of one cause to another.

§ 3.2 The Principles of Rational Theology

While the principles of Rational Cosmology deal with Nature – the appearance of "the world" (or, if one prefers, "the universe") – the principles of Rational Theology deal with Reality. We do not think merely a world of appearance; we think a *real* world, the *embodiment* of everything that exists howsoever things *in* this world exist. Rational Cosmology is concerned with the form of the *nexus* of cognitions as this form is regulated in pure Reason; Rational Theology speaks to the matter of *determining* the form of this *nexus*. Rational Cosmology is the metaphysic proper of the hypothetical reflective perspective, Rational Theology of the empirical reflective perspective.

With the exception of a few lines in *Critique of Pure Reason*, the *Prolegomenon*, and his lectures, Kant did not write or lecture on Rational Theology *per se* divorced from his philosophy of religion. I am of the opinion that Kant probably did not think it proper to set this branch of metaphysics proper entirely out of a religious context, especially given the place occupied by theology in his day. His writings seem to me clear evidence that Kant was in fact a religious man, merely one not given to accept uncritically the dogmas of established church authority. But in any case, considering the religious climate of his time, it would have been imprudent for him to do so. In this treatise I have drawn out a distinction between Rational Theology (which is and will remain a metaphysic proper in this treatise) and what I regard as Kant's *applied* metaphysic of God and religion – which could probably well enough be called either "critical theology" or "critical religion" (see [PALM1: 313-323]). If you, the reader, will keep this distinction in mind, we will have no further need to go into Kant's views on religion in this treatise.[1]

While it is challenging enough to separate Kant's metaphysics proper from the admixture Kant makes with his philosophy of religion, there is an additional caution peculiar to English translations of Kant. This is the unfortunate habit translators have of changing the Latin phrases through which Kant often couches his arguments (e.g. *ens realissimum* for *entis realissimi*, *ens originarium* for *entis originarii*, etc.). This does not merely blur the distinction between metaphysics proper and Kantian religion; it erases it. Given the precision and hairsplitting exactitude with which Kant expresses his arguments, I can only regard changing Kant's Latin phrases as an error in translation. It conveys a wrongful impression that Kant is telling us God is a transcendental Idea and a regulatory principle of pure Reason. This, of course, is absurd at worst and a Spinoza-like coloration of Kant at best. If this were the case, how could Kant discuss atheism without recognizing the egregious contradiction the existence of atheism would insert in the core of the Critical Philosophy? How then could the Critical theory account for the fact that some aboriginal people hold no idea of God (or gods) whatsoever?

---

[1] Professor Palmquist provides a very interesting and detailed treatise on Kant's critical religion in [PALM3]. Where he and I most principally differ is that I interpret Kant's theory of morals as merely an applied metaphysic (not a metaphysic proper), and my friend Dr. Palmquist does not.

With these introductory comments out of the way, let us now turn to the principles of Rational Theology. Here, too, the Ideas stem from one common point, namely the general Idea of *absolute unity of the condition of all objects of thinking in general*. As before, we shall take this Idea apart and then put it back together again in order to grasp its meaning.

We begin with the idea of an 'object of thinking.' In simple terms, an object of thinking is what we think *about*. Since thinking is cognition through concepts, the object of thinking is the "what" whose appearance is represented in cognition. Such a "what" is *individual* even when this "what" is an idea such as "humanity" that encompasses many objects (e.g., all people). For example, although there are many people in the world, we think collectively of only one "humanity." The idea of "objects of thinking *in general*" is likewise the idea of something individual – namely a "what" that takes in the collective of individual objects and serves to unite this collective as some sort of entity which, if we had a complete concept of this, would explain what every "object of thinking" has in common character with every other "object of thinking."

Now this idea presupposes the objective validity of making such a representation. The *condition of* "all objects of thinking in general" is that by which we understand the objective validity of making the representation of "all objects of thinking in general." The representation of every object always involves a synthesis of appearances, and in this context the object is the unity by which we regard all these appearances as accidents of one and the same object. But this is nothing other than the making of a disjunctive judgment – the representing of a concept and the members-of-the-divided-concept that serve to limit the concept-of-the-whole under particular circumstances. Thus the *condition of* all objects of thinking in general is objective validity in the making of a disjunctive judgment. There is in this obviously a principle under which the *making* of the judgment must be tied to the categories of understanding since it is only by means of the categories that we establish any concept.

However, there are two considerations that arise at this point. First, the *real* objective validity of the categories is confined to objects of experience, and therefore the objectively valid *use* of the categories, in the process of determining judgment, is only in their *empirical* use. This is because the transcendental ground for positing the categories of understanding is their necessity for the possibility of experience. Divorced from experience, the categories have no ground for objectively valid use and they become tools of a merely dialectical reasoning.

Second, the categories do not decide their own employment. The power to determine *how* the categories are to be applied belongs to the process of determining judgment. But *when* a situation "calls for" this or that category is a determination beyond the power of determining judgment because such a determination is not "called up by appearances" (this would violate the Copernican hypothesis). Rather, this "when" must be tied to some purpose that the judgment must serve. Thus, while the categories are constitutive rules of cognition, the *regulation* of the use of

the categories by determining judgment belongs to a principle of *pure Reason*. This brings us to the idea of an *absolute unity of* the condition of all objects of thinking in general.

Pure speculative Reason has nothing to do with this or that cognition. Rather, its object is "thinking itself" – i.e., the *overall process* of cognition through concepts, which we call **judgmentation**. *Reasoning is the regulating of thinking*. The "when and why" of an *act* of determining judgment is not some random event but, rather, we say the Organized Being reasons for some purpose (the "why") and actualizes the act (the "when") under some condition. What the nature of this condition may be is something we have yet to take up, and we are not yet ready to do so. This is because to carry out this exposition we will first have to examine something "closer to us," namely, the phenomenon of the *act* of reasoning. This act has a sort of *teleological* character inasmuch as the act serves some purpose. To understand the nature of the act we must first examine the appearance of the act and this is what we shall now do.

If we examine what all objects of thinking have in common, we find that every object is thought as *being real in some way*. This means that: 1) one has a cognition of the object, and 2) this cognition is *connected* with cognitions of *other* objects that provide context and meaning. Zeus really is the chief deity in Greek mythology; teaching really is the activity of trying to help students to learn; Achilles really slew Hector in *The Iliad;* etc. Even the idea of "unreality" is real: a four-sided triangle is unreal because its connection with other objects is one of *negation* – "nothing with four sides is three-sided and all triangles have three sides; therefore anything with four sides truly *is-not* a triangle." What these "reallys" have in common is they are all taken as limited instantiations that necessarily presuppose something we call Reality: the Idea of absolute unity in the complete coherence of all that is in Nature. The Idea of Reality is the substratum of all ideas of real things.

This is the character of all objective judgments. The disjunctive synthesis by which objects are determined takes place under an overarching constraint that this great diversity of objects remains absolutely united under one principle, namely that all objects are thought as limitations of one Object – Reality – which stands as *Dasein* to Nature's *Existenz*. This we can state as a principle – the principle of the disjunctive synthesis of the parts *of a system*.

The *ground* of the Idea of Reality is transcendental apperception – the Subject's awareness of its own *Dasein* without a structure of *Existenz*. In appearance the *aim* of speculative Reason is the thorough-going determination of this *Existenz* in accordance with *a priori* rules of reasoning that eventually give rise to *empirical* rules of reasoning (which we will call *empirical maxims of thinking*).

Piaget's theory attempts to describe the manner (in German, the *Art*) by which such empirical schemes of reasoning come to be formulated. However it is obvious that his system presupposes at the least *functional* apriority in the form of the central process of equilibration, in

the processes of adaptation (equilibrium of assimilation with accommodation), in regulation through interaction, and so on. In his ideas of *structures* and of *structuring* we have nothing less than the explanation of a process of disjunctive synthesis of the parts constrained by the overriding condition that these parts be parts *of a system*.

Neither Piaget nor Kant claim that the *a priori* rules of reasoning take the form of innate objective ideas; indeed, both men deny apriorism in this form. If, however, we wish to understand the nature of these rules, we must obtain a theoretical description of them and this is to say that we must represent them to ourselves. We call such theoretical representations by the name *transcendental Ideas* and understand by this name an explanation of the appearance of the phenomenon of pure Reason. *The Idea describes the rule*. In this sense proper metaphysical theory has not only a doctrine of method but also acroams *establishing* transcendental ontology in making the theoretical description of the nature of Organized Being.

The chief characteristic of the appearance of pure Reason is *action*. We seek to understand the nature of reasoning acts in terms both of *what* these acts *do* and *how* these acts *are done*. For speculative Reason, the "what" is the process of thinking. Now, thinking appears to take a kind of "direction"; its constructions go beyond what is immediately given in the data of the senses and produces empirical ideas that "go beyond" immediate perception to produce representations of objects that can never be given through receptivity alone. Thus its actions appear to have a teleological character since we cannot presuppose the ideas resulting from reasoning are in any way *predetermined* by the given data of the senses. Thus we are faced with the problem of figuring out the nature of this "direction" in which Reason steers thinking.

We cannot say that Reason somehow "has the thing in mind" before determining judgment has determined the cognition of that object. Yet judgment produces a determination of an object and does so under the regulation that *all* its determinations must form in accordance with a constantly elaborated and developing system of concepts that appears to strive for nothing less than the thorough-going determination of a conceptual *structure*. If we cannot say that such a structure is predetermined (for that would imply that Reason holds innate objective ideas), then we must look for regulation by Reason to take the form of *a priori norms* by which, so to speak, judgment is itself judged against a *standard of Reason*. We express something of this same idea when we say that reflective judgment judges the expedience (*Zweckmäßigkeit*) of perceptions for purposes of Reason.

Now what would such a standard be? We have seen that the "direction" of speculative Reason is one of thorough-going determination of objects. Put another way, this principle of thorough-going determination is a principle calling for on-going elaboration of the manifold of concepts to understand Nature *as a complete system* in which every object stands, either immediately or mediately, in connection with all other objects and so takes part in a *rational*

schema of Reality. (This is not the same as the transcendental schema of reality). This does not mean every object in Nature must be specifically determined pair-wise with every other object. I feel no compulsion to understand the leaf of a tree with regard to the price of rice. Whatever the *a priori* norms of Reason might be, they do not compel my determinations of Nature to go so far as this. However, I *could* contemplate such a connection if for some reason it was interesting for me to do so. Let us build a rather fanciful example of this. Suppose I had discovered that tree leaves could be used to make an exceptionally fine plant food for rice so that growing rice using leaf nutrients produced an exceptionally excellent gourmet rice. It seems reasonable that such a variety of rice might command an exceptionally high price in the marketplace. If I thought I might be able to make a lot of money by producing and selling such a rice then the relationship between a tree leaf and the price of rice *would* be something I might want to determine. And I could do so.

This points out something of the character of Reason we wish to consider. The principle of the thorough-going determination of objects appears to show itself as a kind of *global* principle in the sense that Reason's regulative principles appear to operate at a "system level." Tree leaves and the price of rice seem to become objects of a common interest only through other intervening objects (e.g. a desire to be wealthy in the example above). Speculative Reason "appears content" to allow judgment to deal with the specifics and to "concern itself" only with the larger context of Reality. While we say the regulative principles of Reason are revealed as *a priori* norms or "standards," we also say these standards operate in such a way as to impel thinking toward a completeness of cognition we would call **perfection**.

> Human reason has need of an Idea of highest perfection, to serve it as its standard so as to know thereby how to determine . . . Such an idea, which one needs as a standard of smaller or higher degrees in this or that case, apart from seeing its reality, one calls an Idea . . . For such an Idea, three parts are required:
> 1) Completeness in the determination of the subject with respect to all its predicates . . .;
> 2) completeness in the derivation of the *Dasein* of things . . .;
> 3) completeness of community, or the thoroughgoing determination of community and connection of the whole [KANT12a: 341 (28: 993)].

The first two of these parts of the Idea of a highest perfection pertain to the Ideas of Rational Psychology and Rational Cosmology, respectively. It is the third aspect of highest perfection with which we are currently occupied.

Now it is obvious that completeness of community in the sense of an absolutely complete determination and connection of 'everything' is not something that could be an actual object of experience. So far as experience teaches us, we would have to live forever, go everywhere, and experience everything to come fully up to the standard that an absolute completeness of community would require. Yet we can *think*, albeit incompletely, about such an idea.

Let us consider how odd this image of a "complete thoroughgoing determination and connection of the whole" is. The whole of the idea passes beyond our most creative ability to imagine yet, by the same token, we can often recognize when our concepts are deficient with regard to the Idea of such a standard. Nothing illustrates the latter in our daily commerce of life more than when we make the frank admission *I don't know*. Thus, while our image of the idea is expressed in the form of a positive statement (completeness of community), this Idea appears to be made manifest in experience only in the negative, as a lapse or, better, the perception of an *incompletion*. Piaget spoke of "gaps" and "disturbances" that "lead to" actions taken to reestablish equilibrium. But this idea presupposes the possibility of perceiving such gaps or disturbances; this, in turn, implies the necessity that Reason hold some standard against which such gaps and disturbances will "stand out in relief."

The *positively stated* idea of this Kant called an **Ideal**. An Ideal is an Object "by which I understand the Idea not merely *in concreto* but *in individuo*, i.e., as an individual thing determinable or even determined through the Idea alone" [KANT1: 395 (B: 596)]. Note that Kant is not actually saying the Ideal is ever completely determined, either in experience or otherwise. He is saying the concrete determination of an Ideal would only be possible from the Idea. The Object of an Ideal, in other words, is a *pure noumenon* grounded wholly in pure Reason and made apparent to us in experience only through the phenomenon of Reason. The reality of an Ideal is of an entirely mental nature; it is a notion (but not a category). The theoretical Ideal is the goal of an attempt to present a "perfect something" but – precisely because this something, in a manner of speaking, "lives only in pure Reason" – our objectively valid representation of it must be confined to explanations tied directly to actions of Reason. We must not reify an Ideal by turning it into a Platonic Idea living amidst the stars rather than in one's mind.

> Without indeed presuming too much, we must admit that human reason contains not only Ideas but Ideals, which to be sure have not creative power, such as the Platonic, but nevertheless have *practical* power (as regulative principles) and lie as ground of the possibility of the perfection of certain *acts* . . . Although one does not wish to grant these Ideals the same objective reality (*Existenz*), they are not to be seen for chimeras; on the contrary, they give the indispensable standard gauge of reason, which needs the notion of that which is entirely complete to estimate and measure out the degree of incompleteness in the objects presented to it . . .

> The aim of reason with its Ideals is however thoroughgoing determination according to *a priori* rules; hence it thinks for itself an object, which is to be completely determinable according to principles, even though sufficient conditions for this are absent and the idea of the object itself is transcendent [KANT1a: 552-553 (B: 597-599)].

If the object of an Ideal of pure speculative Reason has this character of being transcendent, and if it "shows up" in experience only as the perception of a gap in knowledge or a disturbance in the Piagetian sense, how can we hope to make use of it? Must we describe the indescribable? The answer to this riddle comes from viewing this Ideal not as a *thing* in the objective sense but

rather from a viewpoint of the Ideal in accordance with the principle of thoroughgoing determination. This principle is the principle of the synthesis of all the predications that are to make up the complete concept of a thing [KANT1a: 553-554 (B: 599-600)]. As such a complete concept necessarily requires connection of this representation in the manifold of concepts, the principle and the Ideal address, in terms of our 1LAR terminology, the *matter in* the synthesis of the *nexus* of concepts (whereas Rational Cosmology addresses the *form* of the *nexus*). We seek objective validity for the Ideal by regarding the Ideal in terms of its character as a "standard gauge" for the regulation of thinking rather than in terms of some unreachable completion in an perfect end result of the process of thinking. Such an objective validity is grounded in Reason's *acts* rather than thinking's outcomes; we call objective validity of this sort **practical**.

Here our task is a simpler one. We needn't journey all the way to some transcendent image of what the perfection of all knowledge in some "ultimate reality" would look like; we only need to examine the actions of synthesis by pure speculative Reason made in pursuit of *perfecting* knowledge. These actions require only the ability to judge *imperfection*, which *is* possible in experience. An analogy is not out of place here as an aid to illustrating this point. The difference between analyzing the Ideal in terms of perfecting knowledge and analyzing the Ideal in terms of perfect knowledge is like the difference between a differential equation and an integral equation. A differential equation is "local"; it tells us something about the "direction" its solution "takes" from the point where the equation is being analyzed and it tells us something about the magnitude of the change. In this sense a differential equation has the character of a "becoming."[2] An integral equation, on the other hand, evaluates over the entire domain of its variables and returns a solution that is both a type of unity and is in a mathematical sense "global." Its character is not that of a becoming but, rather, of a completion. In an analogous sense the knowledge *a priori* that Rational Theology states in terms of the transcendental Ideal has the character of being a knowledge of "becoming" rather than knowledge of the completion. In this character we see the essence of the difference between the innate ideas of the old rationalists and the apriorism of a Piaget.

Kant said that pure speculative Reason grounds the thoroughgoing determination of objects in general in the Idea of Reality *without* "demanding that this reality should be given objectively or should constitute a thing" [KANT1a: 558 (B: 608)]. How could this be possible? The

---

[2] When we speak of solving a differential equation, this usually means "coming up with an analytical solution." Such a solution is obtained through some process of integrating the differential equation, so solving the equation in this sense of the word "solving" actually belongs to the idea of an integral equation. Many differential equations have no known closed form solution, yet these equations are still of great practical importance. They are analyzed (usually by computer) in the step-by-step and "local" fashion described above as having the character of a "becoming." Phase plane analysis and analysis by Taylor expansion methods are also examples of this.

answer to this question is now clear. The principle of thoroughgoing determination is the principle of a process. Reality is an Idea, the rational concept of which has objective validity, like that of mathematical infinity, only as the idea of a process of synthesis taking the structure of the manifold of concepts in a "direction" set according to a standard gauge of pure Reason. If I am Columbus, I need only the sun and the north star to know I am sailing to the west, but in this voyage of discovery I cannot know *a priori* whether I shall find India or a new world.

To make theoretical use of these principles of Rational Theology we must make some representation of the appearance of this process of making the disjunctive synthesis of a system. In Chapter 4 we expressed this aim of speculative Reason and its Ideal in 2LAR form as the four theological Ideas, these being the four titles in the 2LAR of the general Idea. They are:

Quantity as the Idea of *entis realissimi*: The Idea of what is to be looked upon as an essential characteristic in Quantity of representation signifying that the object of the representation is to be thought as thinglike. This principle dictates that the representation of a thing is one in which the characteristic concepts of "being a thing" are connected in understanding under the category of unity (*Einheit*, oneness).

Quality as the Idea of *ens originarium*: The Idea that in the manifold of cognitions those representations which are thought as thinglike contain somewhere in the cognition a fundamental notion of the real in appearance. It is the Idea that the "what" of thinghood is constituted in the form by which the notion of reality is combined with unity in the concept of the object. The condition of the real in appearance standing in agreement with the oneness of an object provides the original Quality of thinghood.

Relation as the Idea of *ens summum*: The Idea of the connection of the transcendental Ideal to the Idea of Nature as the highest reality. This we could call the principle of *structuring* in the Piagetian sense. It is the regulative principle by which Reason dictates that understanding a concept as a concept-of-a-thing requires this concept to be connected in the manifold of concepts through a judgment of the notion of substance and accident *and* that the individual thing enter into the *nexus* of Reality in general under the principle of connection in an on-going series in which each given conditioned is connected to its conditions in a regressive synthesis taking the structure of the manifold of concepts in the direction of Reason's transcendental Ideal. To have the representation of a real thing, we must not only have a concept of the thing but we must also structure the connection of this concept in a *nexus* of all things in one Nature with one substratum of Reality.

Modality as the Idea of *ens entium*: The Idea that the reality of things signified by their concepts must be regarded as a *necessary* reality even though the empirically given appearances are given only contingently. If we concede a contingent reality to any one thing then we must concede that something else exists *necessarily* because anything contingent requires a condition (upon which it is contingent); if this condition is also contingent, then we require *another* condition, and so on leading to a regressive synthesis in a series of judgments of conditioned-to-condition. The given real thing which anchors (grounds) this regression is transcendental apperception – the Subject's awareness of its own *Dasein*.

These are the Ideas of Rational Theology. Their statement is framed with an objective character (hence the '*ens*' terminology in *Critique of Pure Reason*), but it is easy to see that our concepts of these Ideas are objectively valid only if viewed in terms of a process of reasoning and not in terms of any *Ding an sich*. It would for this reason perhaps make better terminology if all these Ideas were expressed in the genitive case – *entis originarii* rather than *ens originarium*, *entis summi* rather than *ens summum*, *entis entii* rather than *ens entium* – because they are Ideas of the properties of thinghood, but I have followed Kant's "teleological" convention in the *Critique*.[1]

We can catch a glimpse of Piaget's principles latent in these four Ideas. For instance, in the Idea of *entis realissimi* we see the procedural ingredients of a scheme, and in the combination of *entis realissimi* and procedural *ens summum* we have the underpinnings of a structuring. The need for accommodation of appearances is latent in *ens originarium*, while the need to assimilate is latent in the Idea of *ens summum*. Reequilibration is implicit in *ens entium*. The drive to higher levels of equilibration can be seen in the combination of *ens summum* and *ens entium*. Obviously these correspondences are not one-for-one in the Ideas of Rational Theology, but this is not particularly surprising when we consider that Piaget advanced from the empirical toward the rational while Kant followed the opposite path. Piaget's theory revolves around twin principles of the functional invariants of organization and adaptation; Kant's metaphysics begins with the unity of apperception and the acroam of regulation of thinking through a system of practical principles.

We can regard the relationship between Piaget's work and Kant's work as not unlike the building of a transcontinental highway or railroad where one crew starts at the west coast and the other at the east coast. We have not yet seen the joining in the middle of these two efforts, but that, of course, is one of the things we are aiming at in this treatise. We obviously still have many miles to go in this effort. Our next step toward this unification of empiricism and rationalism will be to tie the principles and Ideas of Rational Cosmology and Rational Theology to judgment.

§ 3.3   The Regulation of Understanding

Piaget studied the development of thought in terms of a pattern of apparent structuring that seems to agree with numerous experimental examples. We might call his model a theory of the *tactics* of reasoning. Kant, on the other hand, took a much more abstract starting point by examining the appearance of the whole structure of knowledge. The explanation he offers is one in which the 'local' or (in his words) distributive unity brought about by determining judgment is enfolded into

---

[1] In his lectures on philosophical theology, Kant moved rather freely between the genitive and nominative cases depending on whether he was discussing objective principles or the idea of God [AK: 28]. All of Kant's lectures on this subject have not yet been made available in English, but those that have been are, in my opinion, deficient for not sticking exactly to Kant's Latin phrasing and not strictly refraining from re-rendering his *entis* terminology into *ens* terminology.

a 'global' or (again in his words) *systematic* unity in the whole structure of the manifold of concepts.

> Reason never refers directly to an object, but solely to understanding and by means of it to reason's own empirical use, hence it does not *create* any concepts (of Objects) but only *orders* them and gives them that unity which they can have in their greatest possible diffusion, i.e., in interrelation in the totality of series, as to which understanding looks not at all but only to the connection *through which series* of conditions everywhere *come about* for concepts. Thus reason has as objects only understanding and its expedient employment; and just as the latter [understanding] unites the manifold in the Object through concepts, so the former [reason] on its side unites the manifold of concepts through Ideas by erecting a certain collective unity as the goal of acts of understanding, which are otherwise concerned only with distributive unity.
>
> Accordingly, I assert: the transcendental Ideas are never of constitutive use, so that concepts of certain objects would thereby be given . . . On the contrary, however, they have an excellent and indispensably necessary regulative use, namely that of directing understanding to a certain goal in view of which the lines of direction of all its rules converge at one point, which, although it is only an Idea (*focus imaginarius*) - i.e., a point from which the notions of understanding do not really proceed since it lies entirely outside the bounds of possible experience - nonetheless still serves to obtain for them the greatest unity alongside the greatest diffusion . . .
>
> If we survey our notions of understanding in their entire scope, then we find that what reason quite properly prescribes and seeks to bring about is the *systematic* in knowledge, i.e., its context from one principle. This unity of reason always presupposes an Idea, namely that of the form of a whole in cognition, which precedes the determinant cognition of the parts and contains the conditions for determining *a priori* the place of each part and its relationship to the others. Accordingly, this Idea postulates complete unity of the knowledge of understanding, through which this becomes not merely a contingent aggregate but a system according to coherent necessary laws. One cannot properly say that this Idea is a concept of an Object, but only that of the thoroughgoing unity of these concepts, so far as it serves understanding as a rule. Such things as ideas of reason are not obtained from nature, rather we question nature according to these Ideas, and we take our knowledge to be defective as long as it is not adequate to them [KANT1a: 590-592 (B: 671-674)].

Let us compare Piaget and Kant side by side. Piaget tells us thought develops through a central process of equilibration in which the thinking Subject puts together structures, and does so within the constraint that substructures are always subject to regulation by the larger structure of which they are a part and within which they strive to come to various (and, over time, higher levels of) equilibria. Kant tells us the distributive unity of concepts in the manifold judgment puts together is regulated by a drive to unite local submanifolds of concepts in a greater and systematic unity of the whole of the manifold of concepts. Piaget gives us a greater wealth of detail in the workings of the phenomenon of thinking; Kant gives us a more panoramic overview of where this all seems to be heading without going in depth into the details of how this comes about. But aside from this difference in perspective, the one closer to the minutiae of empiricism, the other closer to the grandeur of rationalism, both theories follow what we have called the unified theme and *both are expressions of exactly the same theme* seen from different viewpoints. Indeed, Piaget's theory implicitly presupposes the acroamatic principles Kant states in terms of the transcendental Ideas. We could justly say that Piaget probes for the *axiomata* of pure Reason while Kant gives us

the *acroamata* of fundamental metaphysical principles.

Piaget speaks of regulation through interactions and describes this regulation in terms of the starting condition of the process of equilibration (disturbance) and the ending point in this process (equilibrium). Kant describes the principles of this regulation and its ground in terms of a standard gauge by which unity in understanding is compared to an Ideal of pure Reason. Piaget, the scientist, speaks of the Subject's actions in terms of errors, failures, and disappointments. Kant, the philosopher, speaks to the possibility of consciousness of errors, failures, and disappointments. Reason's Ideas and Ideal are not innate concepts of objects; rather, they are Self-regulative laws expressing a practical goal towards which Reason in action appears to take the process of thinking in a thoroughly *practical* context.

We have looked at Piaget's diagrammatic illustrations of regulation through interactions. Now let us do the same for Kant and pull together the many diverse elements of this same process as explained by his system of metaphysics. This is illustrated in Figure 9.3.1 below.
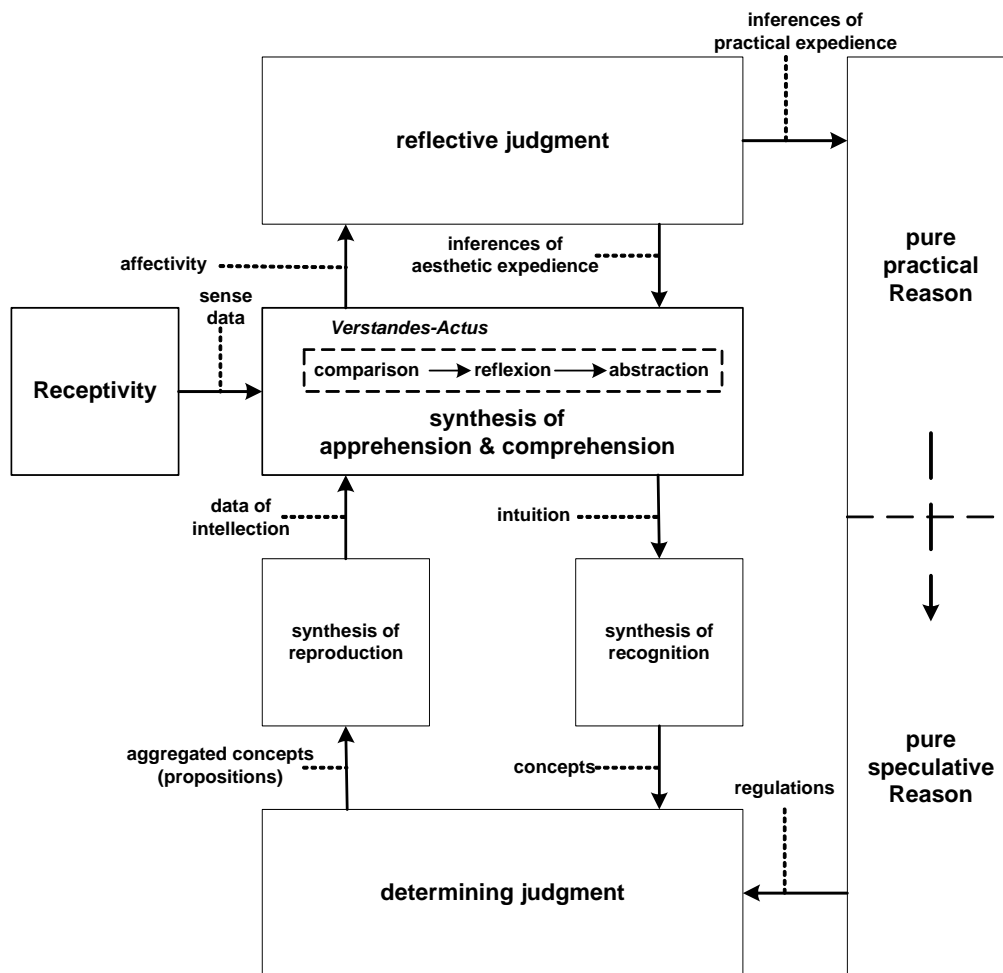

Figure 9.3.1: The Cycle of Thought

This diagram depicts what we will call the **cycle of thought**. It illustrates the flow of information in presentations and perceptions, and the transformative processes by which this information is made into empirical knowledge. Receptivity (which presumes a transcendental object in Nature as the real cause of its representing act) and the three 'synthesis boxes' make up the logical essence of representation in sensibility. The totality of the cognitive state of objective representations is what we call the **state of understanding**, an idea that has no box in this diagram because it is not itself a process but, rather, the idea of the effect of the interplay of sensibility and judgment insofar as objective representation is concerned.

This diagram depicts two "loops" involved in the synthesis of cognitions. There is an "inner loop" involving the synthesis of apprehension & comprehension, the synthesis of recognition, determining judgment, and the synthesis of reproduction. This is the *cognitive loop* and its object is the making of representations of cognition. Information flow and concept structuring in this loop constitutes thinking properly so called – the conscious representation through concepts of objects as phenomena and the construction and exhibition of ideas.

We also have an "outer loop" consisting of the synthesis of apprehension (especially the representation of this synthesis in terms of the acts of understanding, i.e. the *Verstandes Actus*), reflective judgment, pure Reason, determining judgment, and the synthesis of reproduction. This is the *rational loop* which represents *the regulation of thinking by Reason*. Its object is the state of understanding as this state is represented in the totality of perception in relationship to aims, i.e. *purposes*, of pure Reason. Reason receives its "feedback information" in the form of reflective judgments of expedience (practical inferences). From this *subjective* information Reason employs the process of determining judgment to construct concepts. The outer loop is, in engineering terminology, the control loop of the process of thinking, relative to which the cognitive loop is the process being controlled. (The diagram also has an inner *affectivity loop*; it is discussed later).

While we can regard Figure 9.3.1 as a representation of the mental anatomy of conscious thought, it is worthwhile to remind ourselves that the divisions illustrated in the figure must be viewed as only logical divisions made for the purpose of helping us to understand the phenomenon of thinking. Nothing we have presented in our theory permits us to regard this representation as necessarily having a one-for-one correspondence with specific anatomical structures of the brain. We can, and must, regard the anatomy of *soma* and the anatomy of *nous* as each necessarily containing in some way that which is represented in the other (Chapter 6), but the representation of information in *soma* takes the form of signals, whereas in *nous* the forms of information are noetic representations. While Figure 9.3.1 is a representation of the *functional faculty* of thought, it can by no means be regarded as a "signal processing diagram" for *soma*, much less a "block diagram" of the brain. It models the mental physics of *nous*, not the biophysics of *soma*. The unity of these two models can only be looked for at the level of

Organized Being.

Having reminded ourselves of this, however, Figure 9.3.1 illustrates a connection between the theory of Piaget and that of Kant which is noteworthy. Piaget's theory makes much use of the idea of *cycles*. The direct empirical evidence upon which he bases this idea is twofold: first, on the biological observation that at the organic level the functioning of the organism takes on the appearance of cyclic events; second, on the empirical observation that the infant's behavior in the sensorimotor phase of intelligence takes the appearance of cycles of actions. From this starting point Piaget looks for and finds evidence that higher intellectual activity also exhibits a cyclic character. This character enters in to the very idea of the Piagetian scheme in general and so is made an explicit principle of Piaget's theory.

Kant, on the other hand, never touches upon this cyclic idea at all in his writings. Yet this idea has an implied presence when we consider the *architectonic* of Kant's theory. The theoretical root of 'cyclicity' in Kant's theory is found in his explanations of the transcendental Ideas. These, as principles of regulation, present Reason to appearance as being in a process of striving to attain in the totality of cognition the ever-increasing *perfection* of understanding. This is described in terms of expedience with regard to the transcendental Ideal. As neither the Ideas nor the Ideal are objective representations of sensible objects, this acting-to-perfect is necessarily a building-up process in which understanding re-equilibrates towards a higher equilibrium (to borrow Piaget's terminology). If system theory had existed in his day perhaps Kant would have given voice to the cyclic character inherent in his theory. There is some irony here that whereas Piaget remained mostly silent on the role of affective perception in the development of thought (alluding to it only vaguely, a practice for which he has been criticized), Kant explicitly gave voice to the role of this affective factor in cognition[2] but let slip by the clear exposition of the cyclic character of *his* theory. Yet this cyclic character is in there, and Palmquist appears to have been, so far as I know, the first to point this out and propose a model for it [PALM1].

§ 3.4   Pure Reason as Object

We have portrayed the objective appearance of judgment as a process for the making of representations. This also is how we portray imagination with its three processes of synthesis. While we have been burdened with many details, our representation of the objective character of these has not been on the whole too much of an abstraction since they tie directly to the act of conscious representation. In classical terminology, they are "efficient causes" of representations.

In the case of pure Reason we do not enjoy this *direct* connection to perception. As Figure

---

[2] We have not yet given voice to any details of the role of affective perceptions, but we will do so starting in Chapter 14. Kant's exposition of this topic is not made in *Critique of Pure Reason* but, rather, in *Critique of Judgment*. In Figure 9.3.1 the affectivity loop runs from the *Verstandes-Actus* through the process of reflective judgment and back again to sensibility.

9.3.1 illustrates, Reason is another step removed from conscious representations. We have described Reason in terms of its role in the regulation of thinking and the directing of non-autonomic spontaneity in an Organized Being. A moment's contemplation of this description easily shows that pure Reason is not something for which we have a direct perception as the appearance of Reason *qua* Reason. Put another way, we never sense the power of Reason but only perceive effects in representations for which we posit Reason as the remote cause.

We do not directly perceive judgment or imagination either, but Reason's proper character as the regulator of spontaneity places this power of *nous* in a special class apart from the others. Reason is posited as that which, so to speak, stands *behind* judgment just as receptivity stands behind sensibility. But what, if anything, do we say stands behind Reason? If Reason is the regulator of spontaneity, the possible implications of this include the possible implication that something in the power of Reason is an *unconditioned* cause of this spontaneity. We imply as much when we speak of the idea of a purpose, thus giving Reason a "teleological character." Yet to posit an unconditioned *causatum* for pure Reason would seem to stand in violation of what we have been saying about the transcendental Ideas, which permit us to endow no other objective validity to the idea of an ultimate or "original" cause in empirical Nature beyond one understood in terms of a *process*, i.e., a "becoming." Reason may push judgment, but what pushes Reason?

It follows that for the power of Reason we must proceed cautiously and be on the lookout against introducing into our theory any fundamental contradiction at its roots. How may we, with validity, regard Reason as an *Object*? To understand this, we must now introduce into our discussion a new idea – that of the **intelligible object** – and contrast this object against the *empirical* object. In making this contrast we will be setting the stage for another distinction that will be of great importance in the following chapters, namely the distinction between a *theoretical* **Standpoint** and a *practical* **Standpoint**.

Kant explained the idea of an intelligible object in the following way:

> I call *intelligible* that in respect of an object of sense which is not itself appearance. Accordingly, if that which must be regarded as appearance in the sensible world, regarded as it is in itself, has likewise an ability which is not an object of sensuous intuition through which it can be the cause of appearances, then one can consider the *causality* of this essence on two sides: as *intelligible* as to its *act* as a thing regarded as it is in itself, and as *sensible* as to the *effects* of that act as an appearance in the sensible world. Of the ability of such a subject we would accordingly make an empirical and at the same time an intellectual idea of its causality, both of which together take place in one and the same effect [KANT1a: 535 (B: 566)].

We make such an intellectual idea when we infer the real *Dasein* of a transcendental object from the empirical cognition of a sensuous appearance. This does not mean we have a correct concept of the *Existenz* of that transcendental object, but only that we acknowledge the object as something held responsible for the causality of the sensible effect.

In most cases – that is, for an object the *Existenz* of which is placed in the environment outside the Self – we must regard the object's intelligible aspects problematically because such ideas are concepts of its *noumenal* character. The *weight* of a stone is part of my empirical concept of the stone and this weight is part and parcel of the phenomenon. That the stone has an inertial *mass* that explains the causality of weight-related phenomena (including the phenomenon of weight) is, on the other hand, an intellectual concept of the stone that speaks to its intelligible character as a *noumenon*. However, when we are dealing with intelligible objects of our own sensible characteristics, as human beings, our ideas profit from an additional aspect of our knowledge that is lacking with 'external' things: a connection with apperception.

> The human being is one of the appearances in the sensible world, and to that extent one of the natural causes whose causality must stand under empirical laws. As such he accordingly must likewise have an empirical character, just like all other natural things. We notice it through the powers and abilities which it expresses in its effects . . . Yet the human being, who is otherwise acquainted with the whole of nature solely through sense, knows himself also through mere apperception, and indeed in acts and inner determinations which cannot be reckoned at all to the impressions of sense, and of course is himself in one part phenomenon but in another part . . . he is a merely intelligible object because his acts cannot at all be reckoned to the receptivity of sensibility. We call these abilities understanding and reason [KANT1a: 539-540 (B: 574-575)].

I have no direct sensation of "that part of me" called pure Reason; we do not even directly perceive *thinking* (Hume was right to say so). What we do perceive is the outcome of thinking. The change from one perception to the next with the impression of the "order" that accompanies it we attribute to an *action* (thinking). The cause of this action, as intelligible object, we place in the Organized Being and call it the power of pure Reason.

Determining judgment as a process is bound to the pure form of inner sense (that is, to the pure intuition of time) because this process must interact directly with sensibility and is a process that deals in objective perceptions. The case of pure Reason, however, is different because Reason does not have to do directly with the making of representations in sensibility. In its *intelligible character* pure Reason stands beyond the territory of, i.e. outside the condition of, inner sense. It is important for us to clearly understand the significance of this. Empirical objects (objects of Nature) are bound, in their phenomenal character, to conformity with the conditions of sensibility and, therefore, *must* have in their representations the pure form of inner sense. Consequently, the phenomena must be appearances in subjective time. Intelligible objects, on the other hand, are not presented by sensuous appearance and this frees them from the *necessity* of being conditioned by the pure intuition of time; only the appearances *from which we infer* the *Dasein* of these *noumena* are so constrained.

If this were not the case, then the inference that pure Reason might contain an unconditioned *causatum* – that is, that Reason could unconditionally be the cause of human spontaneity – could

have no objective validity. Everything empirical is conditioned, and Reason's own Ideas legislate that for everything conditioned there is something else that stands as its condition. Hence the empirical character of thinking requires that judgment stand under some condition or conditions, and Reason is placed in this role. But Reason is an intelligible object that can never be presented through receptivity in appearances, hence is rational rather than empirical, and so it becomes possible to regard this pure cause of the phenomenon of reasoning (which, as phenomenon, is a process) as being unconditioned *without being in violation* of the transcendental Ideas that regulate the cognition of appearances. Contrariwise, it is also possible to think Reason is conditioned by something else; but here the conditioned (Reason) is never an object of an appearance, hence does not *change in appearance*, hence can never fall under the rule of the category of causality & dependency. Therefore *we lack the sensible condition in appearances* by which alone the *Dasein* of an objective cause-of-Reason could have objective validity. Therefore **the real objective validity of the regression *terminates* at intelligible pure Reason**.

We have, then, two types of objective character. On the one hand we have the empirical character of objects as *appearances*, and this empirical character is bound to the conditions of possible experience. That which in our theory concerns this empirical character is said to make up the theory from the **theoretical Standpoint**. On the other hand we have the intelligible character of objects as *noumena*. This character of objects arises from the positing of these *noumena* as causes of experiential effects. This intelligible character of objects is not bound to the conditions of possible experience but, rather, to the idea of *that which grounds the possibility of experience as we come to know it*. That which in our theory pertains to ideas built on intelligible causality of this type we say makes up the theory from the **practical Standpoint**. All objectively valid ideas of intelligible objects when viewed from the theoretical Standpoint are problematic, but from the practical Standpoint *are regarded as practically necessitated*.[1] When so regarded, we say the idea is a practical principle for the model of Organized Being. The trick is to not mistake the one character for the other.

Every science requires intelligible ideas because these ideas are the glue that binds together the diversity of experience in a theory. When we speak of something as having **theoretical objective validity** we are referring to validity with regard to phenomena and, thus, we are speaking from the theoretical Standpoint about the empirical character of the thing. We cannot speak of this type of validity for the intelligible character of an object because the intelligible character of an object is not given in an appearance. We must instead speak of intelligible objects

---

[1] We will call something "necessitated" when it is *made* necessary by a practical *causatum* rather than by having its necessity stem from the conditions of a possible experience. If *A* implies *B* and *B* implies *C*, then *A* implies *C* is logically necessary; but if I hold it to be true that stealing is morally wrong, then my choice not to steal is morally necessitated.

in terms of a **practical objective validity** tied to an actual phenomenal *effect*.

From all this we can now take a somewhat broader view of the transcendental Ideas we have been discussing. It is clear that these Ideas pertain to the intelligible character of pure speculative Reason when we envision them using such terms as the "standard gauge" of Reason. Yet these Ideas also have empirical implications and it is with regard to this character that we may speak of their objective validity. After all, it is from the nature of the *phenomenon* of thinking that we come to these Ideas in the first place. The place they occupy in our theory is consequently an intermediate position as a kind of bridge between judgment and reasoning.

Now we have seen something like this before. When we discussed the bridge between imagination and determining judgment we posited the transcendental schemata as the necessary bridge between sensible representation in intuition and discursive representation in concepts. In a like fashion we must view the transcendental Ideas *as schemata for the possibility of applying concepts in accordance with the regulation of pure speculative Reason*.

> Understanding makes an object for reason just as sensibility does for understanding . . . Thus the Idea of reason is an analogue of a schema of sensibility but with this difference: that the application of notions of understanding to the schema of reason is not likewise a cognition of the object itself (as in the application of the categories to their sensuous schemata) but only a rule or principle of the systematic unity of all use of understanding [KANT1a: 602-603 (B: 692-693)].

What is this schema of reason by which the categories of understanding are "applied"? If we look at the structure of empirical knowledge – the schema of Nature and Reality – we find the regulation of thinking by pure speculative Reason is manifested in empirical thinking by forms following from three acroamatic principles that, taken together, work for the unity of the manifold of concepts. These principles are: the homogeneity of forms (*genera*), the specification of forms, and the continuity of forms in the connection of concepts by determinant judgments (affinity).

> Reason thus prepares the field for understanding: 1. through a principle of the *homogeneity of* the manifold under higher genera, 2. through a first principle of the *variety* of the homogeneous under inferior species; and in order to complete the systematic unity it decrees 3. yet in addition a law of the *affinity* of all concepts, which requires a continuous transition from every species to every other through a step-wise growth of varieties. We can call these the principles of *homogeneity*, *specification* and *continuity* of forms [KANT1a: 598 (B: 685-686)].

Higher concepts (genera) unite a diversity of lower concepts (species) and thereby bring a distributive unity within the manifold of concepts, and this is what is meant by homogeneity of form. Determining judgment, by the same token, brings higher concepts (as coordinate concepts) together in the determination of a lower concept, and this is what is meant by specification of form. In the former we catch a glimpse of accommodation of structure to assimilate the variety of appearances, while in the latter we see the coordination of diverse appearances in the determined

concept. The logical affinity of concepts, which is represented in the continuity of form, gives us a glimpse of a process of equilibration in which assimilation is not allowed to outrun accommodation nor vice versa. These three principles are thus statements of the appearance of how speculative Reason regulates the employment of the categories in the making of judgments.

The principle of *genera* speaks to the making of concepts. Now the making of an original concept belongs to reflective judgment, but the connection of that new concept in the manifold of concepts belongs to an act of determining judgment. Thus Reason's principle of *genera* pertains to the application of the categories in cooperation with reflective judgment and involves the Ideas of Rational Psychology. This we have already seen in Chapter 8 when we looked at the categories from the transcendental perspective. We now call attention to the similarity between this act and Piaget's idea of a scheme considered as individual scheme.

Piaget's theory also contains two other ideas, namely, *coordination* (of schemes) and *structure* (as the regulation by the whole of all that is contained within it). In the sections that follow we will see that the former can be viewed under the principle of specification of forms under the schematism of the Ideas of Rational Cosmology, while the latter will emerge under the principle of affinity of concepts under the schematism of the Ideas of Rational Theology. Our exposition of this gives us the ontology of speculative Reason and completes our *Realdefinition* of the categories of understanding.

§ 4. The Categories from the Hypothetical Perspective

Rational Cosmology addresses the theory of the way in which pure Reason regulates the representation and understanding of Nature. In this Chapter, which has for its topic the ontology of speculative Reason, this "way in which" is neither a question of "why?" ("why does Reason appear to act as it does?") nor a question of "how?" in the sense of coming up with some sort of recipe or formula of reasoning. Rather, our concern and focus is with Reason's outcome – i.e. the form of the world model we call Nature.

The "why?" question is notoriously difficult for science to deal with. Indeed, empirical science most often ignores the "why?" question altogether. Richard Feynman raised this erudite ignórance to the status of a maxim:

> Taking the example of the Maya one step further, we could ask the priest *why* five cycles of Venus nearly equal 2,920 days, or eight years. There would be all kinds of theories about *why*, such as "20 is an important number in our counting system, and if you divide 2,920 by 20 you get 146, which is one more than a number that can be represented by the sum of two squares in two different ways," and so forth. But that theory would have nothing to do with Venus, really. In modern times, we have found that theories of this kind are not useful. So again, we are not going to deal with *why* Nature behaves in the peculiar way that She does; there are no good theories to explain that [FEYN1: 12].

As to the "how?" question, this is clearly something we must eventually deal with. However, its answer pertains more to the practical aspects of pure Reason than to Reason's speculative character. Piaget's theory summarized earlier gives us an empirical glimpse at the "how" process, and we must expand on this, but for now this empirical picture is clear enough to assist us in accepting the possibility of this process of structuring. To understand the ontological role of the categories, on the other hand, we must attend for awhile to the idea of what is "made" in this process.

§ 4.1　The Ideas of Nature and World, Object and Thing

We have two ideas of pairs within which there are distinctions that are now important for our further development of the theory. These pair-ideas are: 1) the idea of Nature *vs.* world; and, 2) the idea of an object[2] *vs.* a thing.

Nature and World

We have called Nature the world model constructed by the Organized Being. The inference might be and often is drawn that Nature is of a merely idealistic character while world is to be taken in a more "realistic" sense of "the universe" – hence the redundant phrase "real world." But let us not forget the Copernican hypothesis, which dictates to our theory the doctrine of method by which we must proceed. From the hypothetical reflective perspective,

> We have two expressions, **world** and **nature**, which sometimes run into one another. The first means the mathematical whole of all appearances and the totality of their synthesis in the great as well as in the small, i.e., in their development through composition as well as through division. But the very same world is called nature insofar as it is considered as a dynamic whole and one does not look at the aggregation in space or time so as to bring about a magnitude, but looks instead at the unity in the *Dasein* of appearances [KANT1a: 465-466 (B: 446-447)].

> "Nature" taken adjectivally (*formaliter*) means the context of determinations of a thing according to an inner principle of causality. Conversely, one understands by "nature" taken substantively (*materialiter*) the quintessence of appearances so far as these universally cohere by virtue of an inner principle of causality. In the first sense one speaks of the nature of fluid matter, of fire, etc., and employs this word as an adjective; conversely, if one talks about the things in nature then one has in mind an enduring whole [KANT1a: 466 fn (B: 446 fn)].

World, in other words, also has an "idealistic" character. This does not, of course, mean we are in

---

[2] The word "object" used here translates the German word *Gegenstand*. There is another German word, *Objekt*, that properly translates to English as "object." However, the technical meanings of *Gegenstand* and *Objekt* are quite different in the Critical Philosophy and we must not confuse these terms. Therefore, I follow the practice of Professor Dorion Cairns and render *Objekt* using a capitalized English form, Object. The lower case form, object, is used for *Gegenstand*.

headlong retreat toward Berkeley's extreme idealism; it only means that our *understanding* of "the world" is comprehensive knowledge of appearances gained through experience. The objective validity of our theory depends upon our keeping this solidly in mind.

Kant called "world" the "mathematical whole of all appearances". Here we remember that Kant uses "mathematics" to refer to the construction of knowledge *through composition of concepts*. World thus has the flavor of being "the big picture" in which we find the manifold of appearances of things *integrated and coalesced* into one absolute structure. Every thing constitutes a whole that is simultaneously a part of the world, but the world itself is the whole *that is not a part of any thing*. It is the absolute scope of the idea of *Dasein*.

> The world is a substantial entirety[3] which is not part of another, i.e., the absolute and non-relative which in no respect is part of another. Mere connection of the coordination of things in *commercio* is combination of the parts into a whole; but connection as subordination of effect and cause is not that [KANT19: 207 (29: 849)].

Kant tells us the world is a "substantial" entirety of appearances. This means it is not a whole of *all* objective representations but only of those appearances that are referred to objects under the notion of substance. By the latter we do not mean the accidents of appearance by which we come to know the objects but, rather, we mean the persistent that the accidents are taken to be accidents *of*. In other words, the "connection of coordination" of which Kant speaks is mutual coordination (judged under the category of community) of "substances" (judged under the category of substance and accident). Thus, "world" means the absolute entirety of all representations of substances connected absolutely in a Relation of community. The absolute entirety of substances is "everything"; the parts connected absolutely in community give us the "entire whole" that is the world.

This is what we mean by the common phrase "the real world" and what scientists usually mean by the phrase "the physical world." It may seem a trivial issue, but let us amplify a bit on what at first is a perplexity imported into this idea when we call it the idea of "everything." The perplexity is that here "every*thing*" does *not* include a great deal. It in fact *excludes* every object that is not thought as being "substantial." For example, the connection of the Relation of causality and dependency is not the representation of a *substance*; the cause (when one is posited) is a "substance" and so too is the effect, but the Relation is a representation of an altogether different sort. Similarly, the intuition of time is not thinglike since time is merely a form in the aesthetical representation of sensibility. Thus "the world" is "timeless." The same is also true of the intuition of space; "the world" is "space-less."

In short, the meaning of world excludes all the kinetic dynamism of accidents that enters into

---

[3] *Totum*: the entirety; the whole thing; all that is. *Totum* is not just a whole but *the absolute* whole.

experience. In a way this is not wholly unlike the Entity of Parmenides. When we bring in these dynamical factors to, so to speak, "complete the picture," we bring in the idea we call Nature. Nature brings to world the idea of accidents as the 'state' of the world and the idea of *change* in this state. Nature, then, corresponds rather closely to what scientists usually mean by the non-technical word "nature" and to what Margenau calls "physical reality." World-Nature is a "bigger idea" than "world." It includes those concepts and ideas of *Existenz* that unify the *Dasein* of appearances. Let us look at two of Kant's lecture comments regarding Nature and world. First,

> In the world whole we look at two pieces:
>
> 1. at *matter*, and that is substances;
> 2. at *form*, that is the putting together [*Composition*] or *nexus* of the many.
>
> The combination can be twofold, *one-sided* or *reciprocal*. It is *one-sided* when the second depends on the first, but not the first on the second. It is *reciprocal* when [each] one determines the other. But substances make a whole not by one-sided, but rather by reciprocal combinations and actions, and that is *commercium*. A *commercium* is thus needed in the substantial composite. The form of the substantial composite thus rests on the *commercio* [KANT19: 19-20 (28: 195-196)].

Second,

> The objective principles are the general grounds of reason, why things should happen (nature is the *Dasein* of a thing so far as it is internally determined according to general laws) . . . We would not know things if we did not recognize them through the act. These are the dynamical first principles of Nature . . . Understanding does not prescribe all laws of Nature, or discern them, but rather merely those that belong to the possibility of experience. (1) Only substance endures and states change. (2) What happens has a cause. (3) In all appearances there is no action without a counteraction. Now nature is the first general inner objective principle of all that which belongs to the *Dasein* of the causality of a thing. It is thereby distinguished from essence, which is the inner principle of the possibility of a thing. Nature is the first principle, and thus subordinate to no other . . . .
>
> Nature is further a general principle from which I can explain all things. Finally, it is also an inner principle which is met in things themselves . . .
>
> Finally, nature is the principle of the *Dasein* of things [KANT19: 231 (29: 933-934)].

Putting together these descriptions of world and Nature, we can view pure speculative Reason from the hypothetical perspective as the capacity for regulating comprehension of the world through construction of a context *of* Nature under the principle of the general cosmological Idea.

Objekt, Object and Thing

We now inquire about the *materia in qua*, *materia ex qua* and *materia circa quam* of this construction. We referred above to the world as 'everything' but at once added the perplexing thought that 'everything' omitted a great deal. Are we to say 'everything does not include 'some things'? The absurdity is only too evident. This brings us to the distinction of objects from things.

Every cognition is a representation, but *what*, precisely, are they representations of? From the viewpoint of realism we usually say they are representations of "things"; but this is not wholly adequate because some of our cognitions are about "things that are imaginary" – e.g. Martians or the River Styx – that we regard as "not truly being things" ("non-things"). Indeed, the term "thing" is of such broad scope that we could debate whether or not we actually know what we are talking about when we employ this word. The dictionary provides no less than thirteen definitions of "thing":

> **thing**, *n*. [ME.; AS., *thing*, a council, court, controversy.]
>   1. any matter, circumstance, affair, or concern.
>   2. that which constitutes an end to be achieved, a step in a process, etc.; as, the next *thing* is to mix thoroughly.
>   3. that which is conceived, spoken of, or referred to as existing as an individual, distinguishable reality.
>   4. any single entity distinguished from all others; as, every *thing* in the universe.
>   5. a tangible object, as distinguished from a concept, quality, etc.
>   6. an item, detail, etc.; as, not a *thing* was overlooked.
>   7. that which is represented as distinguished from the word or symbol that represents it.
>   8. an inanimate object; any lifeless material or object.
>   9. a person; often used in pity or contempt, sometimes with an idea of fondness, tenderness, etc.; as, poor *things*! [Colloq.]
>   10. an act; a deed; a transaction; a matter; an event; an action; that which is done, has been done, or will be done; as, he'll accomplish great *things*.
>   11. something mentioned but unnamed, as in contempt, or because the name is not remembered; as, It's that other *thing* I want. [Colloq.]
>   12. [*pl.*] clothes; also, personal belongings; as, pack up my *things*.
>   13. in law, that which may be owned; a property, as distinguished from a *person*.

Compare these usages of "thing" with those of the word "nothing":

> **nothing**, *n*. 1. not anything; no thing; not any being or existence; the opposite of *anything*, *something*; as, I opened the chest but there was *nothing* in it.
>   2. (a) lack of existence; nonexistence; nothingness; (b) insignificance; unimportance.
>   3. a thing that does not exist.
>   4. (a) something of little or no value, seriousness, importance, etc.; triviality; (b) a person considered of no value or importance.
>   5. in mathematics, lack of any quantity either plus or minus; zero.
>   6. no part, quantity, or degree; as, the troops showed *nothing* of their fatigue.

We should note the shapeless character of the word "thing" in these usages. If there is a common theme in these usages, this theme could perhaps be best described by saying that "thing" is a focus or center of attention or "grammatical object." Any *popular* ontological connotation of "thing" is due more or less to the West's Scholastic heritage; in present-day philosophy "thing" ("*res*") is not a technical term. If we, like Kant, are to use it in any technical context, we must understand the relationship between "thing" and our other two terms, "object" and "Object."

A. *Objekt*: As always, we must view these terms under the restriction imposed on our theory by Kant's Copernican hypothesis. The word "thing" tends to carry the connotation of "existing independently of our knowledge or thoughts." 'Thing' in this connotation is sometimes described as "metaphysical thinghood" but we cannot legitimately begin our examination under the Copernican hypothesis by disregarding the roles of thinking and cognition. Let us contrast this usage of the word "thing" (which is a kind of amalgam of definitions 1, 3, 4, and 7 from above) with the idea of a non-thing or a "nothing" in the sense of definitions 1, 2, and 3 above. These terms are opposites of each other since we cannot predicate both simultaneously of the same logical subject. Thus the ideas of "thing" (*Ding*) and "non-thing" (*Nichts*) must be viewed as members of a disjunctive proposition. However, a disjunction always requires a higher concept under which the concepts of the members of the disjunction are united.

We will call this higher concept, by which the ideas of "thing" and "non-thing" are united in the manifold of concepts, the idea of an Object (in German: *Objekt* or *Object*[1]). This description of Object allows us to visualize, from the logical perspective, a structure schema – namely that of two concepts standing under the higher concept of Object in a disjunctive proposition – but it does not serve to provide us with a complete definition of the idea of an Object. This is because the idea of an Object is not, in the Critical Philosophy, defined *by* the property of disjunction; rather, it is an idea by which we understand a great many concepts in addition to the concept of a disjunction. In *Critique of Pure Reason* Kant described the idea of Object in the following way:

> Object is that in the concept of which the manifold of a given intuition is united [KANT1a: 249 (B: 137)].

There is a great deal said in this one brief sentence. Since we are dealing here with a very important idea, let us take a careful look at what Kant has said.

First, Object is explained as "that *in the concept of which*"; there are two ways we can and must understand this. First, from a logical perspective, Object implies a *materia in qua* for the concept, i.e. "what" the concept represents. Second, from the transcendental perspective, Object implicates significance or *meaning* given by the concept. (This is because the transcendental perspective speaks to the interrelationship between the thinking Subject and what it thinks about through its concepts). We can aptly say that Object is the whole of what the thinking Subject understands by the concept.

Next, Kant's description tells us "what an Object does" insofar as thinking its representation is concerned. Object "unites the manifold *of* an intuition." The multiplicity in a singular intuition is a represented manifold *of* appearances, and an Object "pulls together" these accidents of

---

[1] *Objekt* is the modern spelling of this word; *Object* is an older spelling and is the spelling actually used in the Academy edition of *Critique of Pure Reason*.

appearance in a common *materia in qua* or "what." Indeed, without the idea of an Object the very phrase "accidents of appearance" has no meaning. Because *every* cognition is represented using both an intuition and concepts, we say every cognition "has an Object."

> Object is that in the representation of which various others will be able to be thought synthetically combined.
> Subject and predicate are in every judgment. The subject of a judgment, so far as it can contain different possible predicates, is the Object. The predicates attach all that is separate from the subject, such as warm from the warmth [AK18: 676].

We see from this that Object is an indefinite subject term in the process of thinking. Expressed in disjunctive form, an Object has a formal structure Object = {object, representation}, i.e. is a "unity of opposites." In his handwritten "Reflections on Metaphysics" Kant wrote

> All Objects are: 1. sensible, 2. aspectable[2], 3. intelligible [AK18: 668].

We (and Kant) have been using "Object" in a way which makes it clear that Object is a term which permits usage in the plural. There are many "kinds" of Objects. We consequently require a more general idea that can stand as the genus for every kind of Object; Kant calls this the idea of the ***Object-in-general***.

> The uppermost idea of all human knowledge is the concept of an Object-in-general, not of a thing and non-thing, or of something possible and impossible, for these are *opposita*. Every concept that has an opposite always requires a yet higher concept that contains this division. Two opposites are divisions of a higher Object. Thus the concept *of the possible and impossible*, or of a *thing and non-thing* cannot at all be the uppermost concept of human knowledge [KANT19: 310 (28: 543)].

It has been stated previously in this treatise, more than once, that every "thing" is real *in some sense and in some context*. The corollary to this is: every "thing" is *unreal in some sense and in some context*. But this property is a property only of an Object and so we are not really correct in saying every "thing" is "real," etc.; what we should say instead is every Object is real in some ways and unreal in others. ***An Object is that which has no opposite.*** Two Objects are *different* but difference is not opposition; positing one Object does not oppose positing another. Objects are merely different species under the genus of Object-in-general, and the concept of the Object-in-general stands under no higher genus of *materia in qua* (no higher concept of a "what").

From all this we are led to conclude that the idea of Object is *practical* and an Object inseparably binds the idea of "a thing represented" to the act of its representation. Nature is the

---

[2] *das aspectabile* - that which can be or is worthy of being envisioned or "seen." The aspectable can be regarded as a synthesis of the intelligible viewed as the sensible. As an adjective, "aspectable" is a word rarely used in English; as a noun it is even more rare. The noun is nearly synonymous with "imaginable" and differs only from this word in that "imaginable" means, in this treatise, capable of being represented in imaginative intuition, whereas the idea of the aspectable includes a reference to "the thing being imagined."

Object of the Ideas of Rational Cosmology, but Objects are not legitimately regarded as "*materia in the world*" (objects – *Gegenstande* – fill this role). "To be an Object" has thinking and unity of consciousness as conditions.

> The synthetic unity of the state of consciousness is therefore an objective condition of all knowledge, not merely of that I myself need in order to know an Object, but rather under which every intuition must stand *in order to become an Object for me*, since in any other way and without this synthesis the manifold would not be united in one state of consciousness [KANT1a: 249 (B: 138)].

B. Object (*Gegenstand*) and Thing: Standing under the idea of the Object-in-general is the idea of the Object we call Nature. As an Object – and therefore inseparable in meaning from its representation – Nature can in one way be regarded as a structural Ideal for the representation of the manifold of concepts. However and more generally, the idea of Nature contains both the idea of a representation (cognition of nature) *and* that-which-can-be "set beside" this representation as the "what" being represented (the latter is a *practical* content). This 'what' is regarded as that which "brings unity in consciousness" to the cognition and does so *necessarily*. It is that-in-which the meaning of the representation is vested in understanding and is regarded *in practice* as something different from the representation and as something that is in some way *real* (either by virtue of outer sense or by virtue of affective perception).

The idea of this 'what' is the idea of an object (*Gegenstand*). Unlike an Object – which admits no opposite – the object *does* admit of opposition. In general its opposite is the determined *cognition* of the object, i.e. the *representation* of the object.

> We find . . . that our thought of the reference of every cognition to its object carries something of necessity with it, to wit, this is regarded as what is contrary to our cognitions being haphazard or arbitrary rather than being determined *a priori* in a certain manner because, whilst they are bound up to an object our cognitions, so likewise they necessarily agree in reference to each other, i.e. must have that unity which constitutes the concept of an object.
> It is clear, however, that . . . the unity which the object makes necessary can be nothing other than the formal unity of the state of consciousness in the synthesis of the manifold of representations. Hence we say: we recognize the object when we have brought about synthetic unity in the manifold of intuition [KANT1a: 231 (A: 104-105)].

The idea of object is the idea of the ground for holding that our cognitions are objective – that is, *that these actually refer to something not merely subjective*.

Now, this idea of object has a twofold character. In the first place, we view the object as an appearance. This is required by the Copernican hypothesis by which we hold that objects must conform to our cognitions (represented knowledge). Appearance, then, is the manner in which this conformity takes conscious shape (see [KANT1a: 110 (B: xvi)]).

But, in the second place, we must *also* be able to *think* of the object as a *thing*. If it were otherwise we would find ourselves making, as Kant put it, "the absurd proposition that there is an

appearance without anything that appears" [KANT1a: 115 (B: xxvi-xxvii)].

> To *recognize* an object it is required that I be able to show its possibility (whether by the testimony of experience from its actuality or *a priori* through reason). But I can *think* what I will so long as I do not contradict myself, i.e. as long as my concept is a possible thought, even if I cannot answer for whether or not there is a corresponding Object somewhere within the quintessence of all possibilities. But for such a concept to have objective validity (real possibility, for the former was merely logical) something more is required. This "more" need not require theoretical sources but in addition can lie in practical sources of knowledge [KANT1a: 115 (B: xxvi fn)].

What, though, do we mean by "thinking of the object as a thing"? In the broadest sense of the word,

> Every Object insofar as it corresponds to my thoughts is called a thing. When no thing corresponds to my thoughts, it is *nihil negativum*[3], an un-thing [AK28: 494].

Thing and "un-thing" (*Unding*, a non-thing that is nonetheless an object; refer to the Glossary) are in opposition (hence their unity is found in an idea of an Object). "Thing" therefore has to do with *the possibility* of an actual or a necessary object. The difference between object and thing is the difference between thinking an Object in terms of appearance and thinking the Object in terms of an *Existenz* independent of the Organized Being who thinks the Object. A thing is an object that can possibly be a *transcendental* object. A *substantial* thing is possible *materia* in the world.

We make a division of this sort in the Organized Being model when we distinguish *soma* from environment. But in thinking such a division what we must ask is: Is this division a real division or merely a logical division? For the idea of a thing the answer is not difficult although perhaps also not obvious. If we hold the division to be a real one, on what objectively valid ground do we do so? To help us to answer this question, let us consider as an example the following behavior of a baby still in the sensorimotor intelligence phase of his mental development.

> OBS. 128. At 0;3 (12) that is to say, several days after he revealed his capacity to grasp objects seen, Laurent is confronted by a rattle hanging from his bassinet top; a watch chain hangs from the rattle (see [PIAG1, obs. 98]). From the point of view of the relationships between the chain and the rattle the result of the experiment is wholly negative: Laurent does not pull the chain by himself and when I place it in his hands and he happens to shake it and hears the noise, he waves his hand but drops the chain. On the other hand, he seems immediately to establish a connection between the movements of his hand and those of the rattle, for having shaken his hand by chance and heard the sound of the rattle he waves his empty hand again, while looking at the rattle, and even waves it harder and harder[.]
> Observing that the rattle no longer moves - and this is what we wanted to come to - or rather, no longer seeing anything of interest in it, Laurent looks again at his hands, which he is still waving. He then examines most attentively his right hand, which he is swinging, meanwhile retaining exactly the same facial expression he had when watching the rattle. It is as though he were studying his own power over it (just as he had already seen his power over the rattle) [PIAG2: 231-232].

---

[3] Literally, "negative nothing." The term was used in Kant's day to indicate "the utterly impossible" [KANT19: 310 (28: 543)].

Perhaps "lack of power over the rattle" would be a more accurate description. The baby in this third stage of sensorimotor intelligence has, as of yet, no knowledge of object-oriented cause and effect relationships. As Piaget puts it, his world is one of 'magico-phenomenalistic' causality. Only much later will young Laurent come to find out it was not his hand motions alone that shook the rattle but that success required the intermediary step of pulling on the watch chain.

What we see in the developmental evolution is a build up to when the child becomes able to differentiate himself from "other things" in the world and to see himself as a Piagetian "object among objects" (i.e. as a thing among things). The genesis of this division does not arise from theoretical speculation but from *practical* Reason. In terms of *Existenz*, Self is the totality of all that appears be affected by what we will call **psychological causality**; "not-Self" is that which appears incapable of being affected without the intermediary use of *soma* as a means to the effect.

This first *real* division (Self *vs*. not-Self) has *practical objective validity*, i.e. is grounded in acts of pure practical Reason. The *recognition* of the divided objects is grounded in a concept determined under the category of causality and dependency. From this notion I can recognize the *Dasein* of "things external to myself" (although recognition of *Dasein* is not the same as cognition of *Existenz*). When we judge an object assertorically as a thing, it is not only a division grounded upon causality and dependency that we think; we also think as actual, rather than as merely possible, a division that severs *necessary* Relations of *community* between thing and Self while still retaining contingent ones. (Critically, this is what we mean when we speak of "the independent thing" that would still "truly exist" in the absence of an Organized Being who has a cognition of it).

Carrying the division in cognition to the extreme – thinking the *Existenz* of the thing with concepts that contain the outright *negation* of *every* Relation of community between the thing and the Organized Being – is an idea of a *Ding an sich selbst* (thing-regarded-as-it-is-in-itself). We are perfectly free to *think* objects problematically in this fashion, but the practical validity of making a division based on the notion of causality and dependency *does not validate making a division along the lines of the notion of community*. The *Dasein* of a thing is objectively valid for representation; to *further* represent the *Existenz* of a thing-in-itself *lacks any ground of objective validity*. This is what Kant concluded and what he meant when he said we may *know* objects *with objective validity* only insofar as we *regard* these objects as appearances. Going beyond this to *higher* concepts of the thing-in-itself is transcendent because these ideas overstep the horizon of possible experience. (Without a Relation of community, we can *know* nothing about a thing). Severing all Relations of community brings us the old philosophical problem of "communication between substances" that cost Descartes, Leibniz, Spinoza, etc. so much labor.

If we cannot, with objective validity, assert the actual severing of all Relations of community

and thereby arrive at the *Ding an sich selbst*, can we assert the antithesis and claim that all things *must* stand in a Relation of community with us? Appearances, as objects, not only can but *must* be viewed in this manner whenever we recognize these appearances under the *modus* of coexistence in time. But the idea of a *thing* posits an object as being without any *necessary* connection to the subjectivity of thought and, therefore, posits contingently in regard to intuition in time. This means that all problematical marks of the *Existenz* of a thing are *noumenal* properties. If we assert that the *Dasein* of a thing is impossible *unless* it is always given in an actual appearance then the antithesis contradicts its own premise (the *Dasein* of a thing does not *necessarily* require its appearance). Thus we cannot with objective validity assert either the thesis (no actual Relation of community between Self and thing) *or* the antithesis (necessary Relation of community between Self and thing). The Relation of community is a *law for appearances* but as a proposition it is problematic for the *Existenz* of things and therefore *formally undecidable* for *noumena*. We have here an illustration of the difference in degree of certainty that runs throughout the distinction of the *noumenal* from the phenomenal, e.g. the difference between conjecture (problematic judgments of a *noumenal* characteristics) and knowledge (assertoric judgments of a phenomenal object)[4]. The sole exception is the *I* of transcendental apperception, which stands as *absolute ground* for all judgments of objects.

§ 4.2   The Schematism of the Cosmological Ideas

The outer loop of the cycle of thought is the province of pure Reason. Now that we have taken a closer look at the distinction of the Object, the object, and the thing, we return to the question of the manner in which speculative Reason directs the understanding of Nature through its Cosmological Ideas. In particular, we shall examine these Ideas in their role of rational schemata for the employment of judgment and in their ties to the categories of understanding.

Earlier we likened the character of regulative principles of speculative Reason to that of a differential equation in the sense that these principles provide a "direction" for the employment of the process of determining judgment but not a "final destination." How are we to regard this analogy of a "direction" in the case of the cosmological Ideas? To see the answer to this, we recall that the Object of pure Reason in its cosmological Ideas is Nature and, in particular, the form of the *nexus* of the manifold of concepts as this *nexus* is regulated by the Idea of absolute completion in the series of conditions.

---

[4] It may be of some interest for the mathematically trained reader to compare this fundamental conclusion of the Critical Philosophy with the "metamathematical" finding known as Gödel's Theorem for systems of arithmetic; likewise, the reader familiar with the "hidden variables" question in quantum mechanics may be able to better appreciate "thing" vs. "object" by comparing the view of hidden variables proponents against the Copenhagen school's view as a contrast between "thing" vs. "object."

Now, why should the cosmology of Nature be expressed in terms of series of conditions? Let us recall the earlier statement by Kant that "nature taken adjectively[1] means the *context* [*Zusammenhang*] of determinations of a thing according to an inner principle of causality." Causal determination does imply such a series but we need to examine what "context" means for Nature. In normal usage, the word has the following dictionary definitions.

> **context:** *n.* [L. *contextus*, from *contexere*, to weave together].
>   1. the parts of a sentence, paragraph, discourse, etc. that occur just before and just after a specified word or passage and determine its exact meaning; as, it is unfair to quote this remark out of *context*.
>   2. the whole situation, background, or environment relative to some happening or personality.

Used as a technical term in the Critical Philosophy, "context" means the connections made between the Object of a particular judgment and other concepts in the manifold of concepts that establish the relationship between the object being judged and other objects judged relevant for the manner of this judging. This is an idea of *conditioning* – either that of the Object conditioning other concepts or of other concepts conditioning the concept of the object.

But conditioning of what sort? We are not speaking of conditioning *in general* because this is too broad an idea and includes, for example, such ideas as physical conditioning for athletics or any number of other ideas that have nothing to do with the determination of the *meaning* of a concept or the understanding of an object. We are, instead, dealing here with a restricted idea of conditioning, namely conditioning as the structuring of *Existenz* in the manifold of concepts. Context is the formal aspect of the cognition of Nature in understanding a structure of relationships in which Objects are combined in the *nexus* of this manifold to determine an object.

As we have already seen, we cannot regard this structure as pre-formed or pre-existing. This would be apriorism in the sense that both Kant and Piaget reject. Instead, we must view this idea of context in terms of it being seen as the outcome of a regulated process of reasoning – a schematism of pure speculative Reason for which the cosmological Ideas provide the rules and the employment of the categories under these rules produces meaningful cognitions. This is a regulated structuring in the Piagetian sense, and the structure within which this regulation occurs is called Nature.

Here we note that the cosmological Idea is not the idea of a series *per se* but the Idea of absolute *completion* in the series of conditions. For this we must have: 1) the representation of objects to be conditioned; 2) the representation of conditions; 3) within these representations, the representation of a series *of* conditions; and, 4) unity *in* the series of conditions. Furthermore, we

---

[1] Kant used the Latin word *adjective*, which stems from *adjectivus* and denotes "pertaining to adding to." Kant is not trying to give us a grammar lesson here. His point is that "the nature of *X*" denotes attributes "added to" the concept of *X* that determine *X*. Thus, "adjectivally" means "pertaining to connections."

must not neglect the fact that if the categories are at the service of speculative Reason, the representations of which we speak must tie Reason to the possibility of experience.

In every representation we have a matter of representation and a form. Now, we are presently engaged in making a theory of the cosmological regulation by Reason of the process of thinking, and to make a theory is to make a representation of ideas. It follows that our theory must contain both matter and form so, accordingly, it is useful for us to classify the cosmological Ideas twofold. Kant called these, respectively, the *mathematical-cosmological* Ideas and the *dynamical-cosmological* Ideas. The basis for this division is merely this: The mathematical-cosmological Ideas (those of Quantity and Quality) pertain to the employment of the "mathematical" categories while the dynamical-cosmological Ideas (those of Relation and Modality) correspond to the "dynamical" categories. In the former the categories pertain to the synthesis of the manifold insofar as the elements of the synthesis are regarded as homogeneous; in the latter dynamical case the synthesis of the categories pertains to the synthesis of heterogeneous elements in the manifold, and thus to the *Existenz* of the manifold itself [KANT1a: 530-532 (B: 556-560)].

The six mathematical categories (unity, plurality, totality, reality, negation, and limitation) are rules that apply to the representation of *magnitudes* (either extensive or intensive). As such they are directly involved in the composition of intuition and, therefore, in sensuous conditions of appearances. The cosmological Ideas that regulate the act of thinking through these categories, i.e.

Quantity: the Idea of absolute completeness of the given whole of all appearances; and

Quality: the Idea of absolute completeness of the division of a given whole in an appearance,

must therefore regulate the "weaving together" of the *sensible context* in Nature. Now, that which is sensible is always conditioned (by the conditions of sensible representation in intuition); consequently, these regulations regulate for that which can never be reached in actual experience, namely the unconditioned in sensible appearance. The part of the process of reasoning that they describe is *a priori* an open-ended process that may reach, temporarily, a suitable equilibrium in representation, but one that the march of experience might upset at any moment, thus requiring the construction of a new context – in short, a reequilibration. In this way arises the necessity of a series of conditions in sensible context. The connection of the manifold under the Ideas is a connection of the homogeneous inasmuch as the homogeneity subsists in the requirement that all conditions in the series reference objects of appearance.

The situation is different for the dynamical-cosmological Ideas and their corresponding categories. Substance, causality, necessity, etc. are not *given* by the data of the senses and the context these notions provide is *intelligible* rather than sensual. It follows that the context

regulated by the dynamical-cosmological Ideas likewise pertains to intelligible conditions.

The synthesis of the manifold under the dynamical-cosmological Ideas, i.e.

Relation: the Idea of absolute completeness in the origin of an appearance, and

Modality: the Idea of absolute completeness (of the series) in regard to the dependence of the *Dasein* of what is changeable in appearance,

is therefore a synthesis that allows heterogeneous conditions to be introduced, inasmuch as *intelligible* conditions originate outside the sensible series of mathematical conditions. In this way, Kant writes, "reason can be given satisfaction and the unconditioned can be posited for appearances without thereby confounding the series [of appearances] as always conditional and without demolishing of the first principles of understanding" [KANT1a: 531-532 (B: 559)]. The Idea of Relation brings to the synthesis of understanding the intelligible context of *grounds* in dynamical Nature; that of Modality brings to the synthesis the intelligible coherence of *explanation* – e.g. the unification in a reason for the given yet contingent appearances.

> But the dynamical regression has, peculiar to itself and distinguishing it from the mathematical, this: that since the latter properly has to do only with the composition of parts into a whole, or with the decomposition of a whole into its parts, the conditions of this series always have to be seen as parts of it, hence homogeneous and consequently as appearances, whereas in the former regression - which has to do, not with the possibility of an unconditioned whole out of given parts or an unconditioned part of a given whole, but with the derivation of a state from its cause or of the conditional *Dasein* of a substance itself from the necessary - the condition need not necessarily make up an empirical series with the conditional [KANT1a: 546-547 (B: 588)].

Within the dynamical schemata of the Ideas we thus have the possibility for speculation and hypothesis; Reason need not be concerned exclusively with actual appearance but can direct thinking to the positing of the as yet unseen and un-experienced. Trained and disciplined thinking of this sort is called *theorizing* in science; yet all healthy persons exhibit the ability to speculate and invent explanations which bring order to what would otherwise be a chaos of sense data or which provide a rational justification for desires or man-made laws. We see many examples of this in ancient religious writings and mythologies:

> Six days shall work be done; but on the seventh day is a sabbath of solemn rest, a holy convocation; you shall do no work; it is a sabbath to the Lord in all your dwellings [*Leviticus* 23:3].

> And when he started to flee through the Sicilian sea, Zeus cast Mount Etna in Sicily upon him. That is a huge mountain, from which down to this day they say that blasts of fire issue from the thunderbolts that were thrown [Apollodorus, *The Library* I.vi.].

§ 4.3   The Categories from the Hypothetical Perspective

The data of the senses do not carry in presentation a necessity that demands the thinking of appearances, nor do appearances by themselves provide context. Rather, the investment of

context in appearances is a schematism of pure speculative Reason in the regulation of thinking (the alternative to this theory being the copy-of-reality hypothesis). Yet the Ideas of Rational Cosmology are not the innate ideas of the rationalists for they are merely regulative principles that produce a formal *Realerklärung* of context from the manner (i.e. *Existenz*) in which the manifold of concepts comes to be constructed through the reasoning process. Kant described the cosmological Ideas as the representation of a "task set for reason" – namely the production of a systematic unity of knowledge insofar as experiential knowledge obtains, *formally*, this unity through the *Existenz* of the *nexus* of concepts.

In consequence, the Ideas of Rational Cosmology are *practical* in the sense that they pertain to regulation of the structuring of understanding rather than directly to the thinking of objects. There can be for an object no meaning without a context but neither meaning nor context is supplied by the data of the senses. The instantiation of the effects of the cosmological regulations via the categories of understanding therefore can only be regarded, so far as objects are concerned, as the instantiation of the *hypothetical Existenz* of these objects within the formal manifold of Nature. Kant explains "hypothesis" in the following way:

> Where imagination does not rave of something but on the contrary be said to reflect under the strict supervision of reason, so previously must there be something full certain and not invented or mere opinion, and that is the possibility of the object itself. In that case it is well allowed for opinion to take refuge in the same actuality, but not [for it] to be groundless apart from what is actually given and certainly follows taken in connection with the ground of explanation, and then it is called hypothesis [KANT1a: 659 (B: 798)].

The Ideas of Rational Cosmology are Ideas of a metaphysic proper of the hypothetical perspective because the categories, seen from this perspective, are *notions of context* in judgment. The *Existenz* of objects in the context of Nature is represented merely by rational form in the *nexus* of the manifold of concepts and this form is legislated for *a priori* by speculative Reason. As Nature is merely the intelligible form of *Existenz* generally, the cosmological Ideas have only a practical necessity for the possibility of providing context to objects of appearance. That speculative Reason's objective hypotheses may be gainsaid by later experience does not diminish or abolish this practical necessity that the employment of judgment fall under the legislation of these regulative principles of thinking. The marriage of the sensuous to the intelligible carries a practical but not an empirical necessity, and this is why we call the perspective from Rational Cosmology a hypothetical perspective. From this perspective the categories are rules for a logic of context founded upon a subjective rather than objective determining factor.

So it is that from the hypothetical perspective the categories of understanding are notions of context in conceptual representation at the service of the Ideas of Rational Cosmology. We thus explain these notions as follows.

Under the Idea of Quantity – the Idea of absolute completeness of the composition of the given whole of all appearances:

Unity is *the notion of a common context in the* **Existenz** *of all appearances*;

Plurality is *the notion of sub-contexts in the form of every context*;

Totality is *the notion of a complete context as the integration of all sub-contexts into one context* **in the given whole of all appearances.**

Under the Idea of Quality – the Idea of absolute completeness in the division of a given whole in an appearance:

Reality is *the notion of the sensible context of the appearance in an intuition*;

Negation is *the notion of the intelligible context in the concept of an appearance*;

Limitation is *the notion of the real context in a cognition of an appearance.*

Under the Idea of Relation – the Idea of absolute completeness in the origin (beginning) of an appearance generally:

Substance and accident is *the notion of the object as the formal condition of every context*;

Causality and dependency is *the notion of a series of conditions in the appearance of contexts*;

Community is *the notion of the world as the formal context of all objects.*

Under the Idea of Modality – the Idea of absolute completeness as regards the dependence of the *Dasein* of what is changeable in appearance:

Possibility and impossibility is *the notion of a possible* (*or impossible*) *context*;

Dasein - Nichtsein (**actuality and non-being**) **is** *the notion of an actual context* (*or non-context*) *of real experience*;

Necessity and contingency is *the notion of a context made necessary* (*or made not necessary*) *by the condition that the context of every object must be true.*

This last *momentum* can be regarded as the context of truth in Nature. It is a notion of truth anticipating the pragmatic philosophy of truth that was expressed by William James in the following fashion:

> The truth of an idea is not a stagnant property inherent in it. Truth *happens* to an idea. It *becomes* true, is *made* true by events. Its verity *is* in fact an event, a process: the process namely of its verifying itself, its veri-*fication*. Its validity is the process of its vali-*dation* [JAME1: 89].

"Absolute Truth" can never be anything other than a mere Ideal of pure reason; pragmatic truth is congruence conditioned by context. Contextual truth is the condition pure speculative Reason places on the *nexus* of all contexts.

§ 5.   The Categories from the Empirical Perspective

The Oxford Dictionary of Philosophy defines "rationalism" as "any philosophy magnifying the role played by unaided reason in the acquisition and justification of knowledge." Under this definition, the hypothetical perspective we discussed in §4 is a rationalist perspective provided we view the theory of the cosmological Ideas as somehow "magnifying the role" of pure Reason. This same dictionary defines "empiricism" as "the permanent strand in philosophy that attempts to tie knowledge to experience" where "experience is thought of either as the sensory contents of consciousness or as whatever is expressed in some designated class of statements that can be observed to be true by the use of the senses." Other than the fact that *The Oxford* goes on to implicitly call for the deportation of "truth" from the realm of mind and for making it some property or characteristic of *things* – independently of the mind that holds these things to be true – this description is not very much at odds with the Critical Philosophy.

Where empiricism, as this term is normally taken, breaks with the Critical Philosophy lies in the next qualification made in its description, namely the *denial* that there is any knowledge other than empirical and, in particular, the denial of any sort of knowledge *a priori*. The creed of conventional empiricism is *nihil in intellectu nisi prius in sensu* ("nothing in the intellect that was not previously in the senses"). In this treatise we have repeatedly referred to knowledge *a priori* in its various forms as "know-how" – not the knowledge of objects *per se* but knowledge necessary for turning the receptivity of sense and spontaneity of action into empirical knowledge. Traditional empiricism denies even knowledge of this sort but is then left with the problem of how mere sense impression can be or become knowledge. The usual last resort of this brand of empiricism for answering this issue is the copy-of-reality-hypothesis, an hypothesis ruthlessly attacked by Hume, who concluded that we have no actual knowledge insofar as this implies *certainty* of the truth or knowledge beyond that which is contingent and habitual.

A compromise position was taken up by William James in the philosophical attitude he called "radical empiricism."

> To be radical, an empiricism must neither admit into its constructions any element that is not directly experienced, nor exclude from them any element this is directly experienced. For such a philosophy, *the relations that connect experiences must themselves be experienced relations, and any kind of relation experienced must be accounted as 'real' as anything else in the system* [JAME4: 42].

Ignoring the not inconsiderable question of what it means for a 'relation' to be 'experienced,' it is not too unfair to James to say that his philosophy regards speculation concerning the grounds of the possibility of these "experiences" to consist merely of contingent and ever-developing hypotheses, which then fall under James' dictum that "there can be no such thing as a difference

that makes no difference to anything else." Speculations thereby become testable and risk refutation through experience.

A somewhat similar attitude is adopted by Piaget in his genetic epistemology, as we saw earlier in the quote where Piaget claimed a kinship with the tradition of British empiricism. Piaget does admit a kind of apriorism, but he thinks of it as a "functional" apriorism rather than as knowledge *a priori* – i.e. as "organization" rather than "know-how." If there is a weakness in this philosophy, it is its implied dependence on the community between the observer and the observed that must find a common intersect in things rather than objects or Objects in the Kantian sense. It is not too unfair to Piaget to say that genetic epistemology is also a form of pragmatism, although one which has pronounced differences from the philosophy of James. In both cases, ontology slips into a position of precedence over epistemology, the ultimate referent lies with things, and, therefore, both stop short of the Copernican hypothesis and all that it implies.

§ 5.1   The Critical Philosophy of Empiricism

"Transcendental idealism" and "objective idealism" are two names by which the Critical Philosophy is also known. The former was used by Kant while the latter has been used by Joad as a description not only of Kant's philosophy but that of Hegel as well. In view of the ontology we have been discussing, both names seem well-deserved; however, in rejecting the copy-of-reality hypothesis, are we not somehow casting the sort of doubts upon the "nature of reality" that must lead us to the position of a Descartes or a Berkeley or a Spinoza? Are we bound by this position to condemn "things" to a status no better than fantasy or fiction? To the scientist "the empirical" carries the connotation of "the things in the real world" that are revealed to us in the laboratory through experiment or, in the case of non-laboratory sciences, to the factual evidence we find "in nature." Of all the endeavors we call science, only mathematics and formal logic are content to deal entirely and only with "formal things." Science turned its back on Hegel in large part because scientists could not see how Hegel's system could adequately speak to the empirical. Do we find the Critical Philosophy in this same boat?

The answer, of course, is no; but to clearly see why this is so, despite the formidable "idealism" we have been discussing at length, we must understand what it means when we say our *knowledge* is empirical, and why we are justified in maintaining that knowledge can be empirical even with the denial of the copy-of-reality hypothesis. We are asking, in short, for a Critical explanation of what "empirical" *means.*

The Copernican hypothesis states: objects must conform to our capacity for cognitions. From our previous discussions we can appreciate now what the Copernican hypothesis does *not* say; it does not say *things* must conform to our cognitions. When we speak of *having empirical knowledge*, this is not knowledge of things but rather knowledge of objects.

We must resist the tendency to want to make synonymous the terms "thing" and "object." From the viewpoint of epistemology, their ideas are quite different. The latter stands right at the boundary of the scope of human knowledge and is a strict phenomenon. The former straddles this boundary with one foot beyond the possibility of appearances, therefore beyond possible experience, and hence beyond the horizon of knowledge. A thing is the phenomenal object fading into the noumenal *Ding an sich*. Our cognitions can be objectively valid only in their objective character (and this is in nothing else than the object – the "foot of the thing placed down inside possible experience"). This is because wherever we sever the Relation of community between the transcendental object and the transcendental Subject we lose our objective bases or grounds for *knowledge*, i.e. objective validity in our concepts of the object. The thing-regarded-as-it-is-in-itself (*Ding an sich selbst*) we *know* not at all. Empirical knowledge is always and only knowledge of objects of experience. As Palmquist put it, "subject and object are fused" in the empirical perspective and "strictly speaking, 'empirical knowledge' should denote only that synthetic *a posteriori* knowledge which arises out of empirical *reflection on* the objects of one's experience" [PALM1: 122].

Kant expressed this admittedly subtle but fundamental point in the following way:

> If therefore we say: The senses place before us objects *as they appear* but understanding *as they are*, then the latter is to be taken not in transcendental but merely empirical significance, namely how they must be conceived as objects of experience in the thoroughgoing context of appearances, and not according to what they might be outside of the reference to possible experience and consequently to sense in general . . . With us *understanding* and *sensibility* can determine an object *only in combination* [KANT1a: 352 (A: 258)].

"Things," he tells us elsewhere [KANT1a: 347 (A: 249-250)], "are only known as they appear." That which is empirical is at the same time and always that which is either *experienced* or could possibly *be* experienced, as Kant explained in a 1792 letter written to J.S. Beck:

> I begin by defining experience through *empirical cognition*. Cognition is but the representation through concepts of a *given* Object as such; it is empirical cognition if the Object is given in the representation of the senses (hence conjointly with sensation, and this joined with consciousness, i.e. contains perception) but is *a priori* when the Object is indeed given but not in the presentation of the senses (but which can then nevertheless always be sensuous). For cognition two sorts of representations are needed: 1) intuition through which an Object is given and 2) concept through which it is thought. To make one cognition of these two *pieces of cognition* requires a further act: to put together *the manifold given in intuition* expressed in the concept in conformity with the synthetic unity of the state of consciousness. Since composition through the Object, or its representation in intuition, cannot be *given* but can only be *made*, it must rest on the pure spontaneity of understanding in concepts of Objects in general (composition of the given manifold) [KANT20a: 400 (11: 315-316)].

As for what it means for an Object to be 'given' (in view of what we said earlier about the term Object), Kant tells Beck

You have hit upon it quite well when you say, "The quintessence of representations is itself the Object, and the act of the mind through which this quintessence of representations is presented is what is meant by 'referring them to the Object'." . . . [This quintessence] can only be *thought* in a concept through the synthetic unity of the state of consciousness . . . Objects [*Gegenstände*] are known only in certain respects by means of the categories, merely as things in appearance and not according to how they are in themselves [KANT20a: 399 (11: 314-315)].

Does this clarifies matters, or does it not? Let us untie the knots in this Kantian bulrush. An Object, Kant tells us, is the "quintessence" (embodiment) of a representation. We make an Object *for ourselves* whenever we *make* a cognitive representation. The idea of an object is the idea of *that which makes a representation meaningful to us*. But an Object is also *that which admits no opposite* and, consequently, the making of cognitive representations is highly constrained by a fundamental regulation of pure speculative Reason, namely that all such representations which refer to the *same* object must be made to *cohere* (not conflict with or contradict each other). It is the coherence of all the particular cognitive representations that have *context* in the same Object that makes for us that which we call the *real meanings of* the Object.

Earlier we noted that Nature "taken *materialiter"* is the idea by which we understand "the quintessence of appearances so far as they generally cohere by virtue of an inner principle of causality." We are now in a position to appreciate that this "inner principle of causality" is a principle referring to the acts undertaken by pure speculative Reason that bring about cognitive representation through the employment of the processes of judgment. However, the principles of pure Reason are merely *regulative* principles and not *constitutive* principles. This means that an Object is not predefined to be some particular 'this' or 'that'; indeed, until we have cognitions (intuitions *and* concepts) to "cohere in an Object" that Object is *nothing* to us. It "becomes something" to us when cognitions are put together under Reason's regulation for the synthetic unity of the state of consciousness.

It is one thing for us to say that cognitions cohere in an Object under the regulation of pure speculative Reason. But the legislation of Reason goes beyond the mere regulation of individual Objects. Reason also regulates for the thoroughgoing determination of all objects under this same principle of synthetic unity in the state of consciousness. It is not enough that cognitions cohere in their Object; the cognitions of different Objects must also not be in conscious incoherence with each other because the idea of a synthetic unity in the state of consciousness would be contradicted if the individual Objects were perceived as being in incoherence. An Object admits of no opposite, but incoherence among Objects would be nothing else than the opposition of Objects to one another.

In this regard, Nature viewed as an Object is the substratum or quintessence of all particular Objects. The idea of a particular Object is the idea of a limitation, by transcendental affirmations

and negations, of some particular aspect of Nature as a whole. The representing of such a limitation is regulated by the positive principle of conscious coherence *in* an Object and the negative principle that there can be no conscious incoherence *among* Objects. These are the principles of meaning in the *formal* context of all conscious objective representations. Object (*Objekt*) seen in this light has the connotation of that which is an *aim* of pure Reason and is of a *rational* character. However, an Object also has an *empirical* character inasmuch as the *conscious* representation in which it is the quintessence must be cognition. The name we give the unity of this empirical character is "object" (*Gegenstand*). The idea of the object is the idea of that in which meaning is invested in the *material* context of appearances.

> The transcendental employment of a concept in any sort of first principle is this: that it be referred to things *in general and regarded as they are in themselves*; and if it is referred merely to appearances, i.e. objects of a possible experience, [the employment] is empirical. But that overall only the latter happens we see from this: For every concept there will be, first, the logical form of a concept (of thinking) in general and then, second, the possibility to give it an object to which it refers. Without this latter it has no sense and is entirely empty of content, even though it may still contain the logical function for making a concept out of whatever *data* there are. Now the object of a concept cannot be given otherwise than in intuition and . . . even then this can acquire its object, thus its objective validity, only through empirical intuition . . . Thus all concepts, and with them all first principles however *a priori* they may be, nevertheless refer to empirical intuitions, i.e. to *data* for possible experience. Without this they have no objective validity at all, but are rather a mere play, whether it be of imagination or of understanding, respective to its representations . . . Hence it is also required for one *to make* an abstract idea *sensible*, i.e. to display the corresponding Object in intuition, since without this the idea would remain (as one says) without *sense*, i.e. without meaning . . . [In mathematics the] concept is always generated *a priori*, together with the synthetic first principles or formulas from such concepts; but their use and reference to supposed objects can in the end be sought nowhere but in experience, the possibility of which (according to the form) is contained in them *a priori* [KANT1a: 356 (B: 298-299)].

This, then, is how empiricism stands within the Critical Philosophy. The rational Object is nothing to us without the empirical object of experience (the appearance represented by intuition and concept in cognition). The Object is the structure of reasoning and serves synthetic unity in the state of consciousness as a pure aim of Reason in the formal context of meaning; the object is given by sensuous exhibition with meaningful contexts in the representations of its manifold appearances. The representation of the latter belongs to understanding (through sensibility from the spontaneity of determining judgment), but this representing is in every case under the formal regulation of pure speculative Reason. Thus, under the Copernican hypothesis pure rationalism is empty and pure empiricism is meaningless; only the two in conjunction can be objectively valid.

§ 5.2   The Schematism of the Theological Ideas

An Object of experience unites diverse appearances in the state of consciousness. But, as we have just argued, the unity in appearances is always subject to regulation by pure Reason, which has

for its aim **coherence** of the empirical object in every context of a rational Object. Viewed from the hypothetical perspective, the form of the *nexus* of representation is the context of Nature and the Ideas of this formal context are those of Rational Cosmology. In the *empirical* perspective, our attention turns to the *matter* of this *nexus*. This matter – coherence *in* the context – is the structure of objective meanings of cognitions (without which we cannot say we have knowledge of the matter). The universal coherence of meanings in the *nexus* of cognitions is none other than that which we call Reality *in* Nature. Pure speculative Reason presumes Reality, not as a "given *by* experience" (for experience is *made* through synthetic representation, not *given*) but as a substratum *of* experience, and directs the employment of the power of representing appearances accordingly to produce the representation of a *system* of cognitions. The investment of meaning through the *nexus* of cognitions, which is clearly an act of synthesis since the given sensation carries in itself no meaning, begets synthetic *a posteriori* knowledge inasmuch as an Object is nothing until an object of experience is subsumed under it. The Ideas that *regulate* for conscious coherence in the Object and against conscious incoherence in Nature are the Ideas of Rational Theology.

To those of us who are accustomed to viewing science through the lens of scientific materialism, it may seem very strange to be calling such an idealistic-sounding theory an *empirical* perspective. Empiricism – which comes from the Greek word for "experience" – is traditionally the view that if we want to know anything about nature we must "go and look at it," and the Critical Philosophy is not in disagreement with this premise. The classical distinction between rationalism and empiricism was described by Joad in the following way:

> The rationalists had tended to reason away the actual stuff of our sense-experience; they were concerned with the world as it ought to be, not in the moral sense of the word "ought," but in the sense in which ought implies necessity . . . Hence, the rationalists, when faced with brute-facts, such as the fact that a substance with the chemical composition of sugar happens to be sweet, a combination which just is, but which is not rational, tended to ignore it. They left out, that is to say, the observation of actual facts. The empiricists, realizing that no amount of reasoning will give us information as to the nature of what exists, and that if, therefore, we want to know what the world is actually like, we must go and see, relied entirely upon sense-experience for knowledge, affirming that there was nothing in knowledge which had not previously been in sense-experience. Just as the rationalists made no provision for our observation of actual facts, so the empiricists made no provision for our knowledge of the general principles governing our observation, in virtue of which we arrange, compare, group together, or select from what we observe in order to form general conceptions . . . Thus, if the empiricists were right, reasoned knowledge was impossible; if the rationalists were right, it would be impossible to explain how there were things to know [JOAD: 366-367].

Both schools of thought – the rationalists and the empiricists – begin by more or less cutting the connection between "the things we know about" and "the mind which knows them"; they are then left with the problem of how to put back together that which by presumption they had cut apart.

On the empirical side the copy-of-reality hypothesis dies hard. But if we deny the copy-of-reality hypothesis – and the very sort of experiential observation upon which empiricism rests appears to require us to do just that – nothing is left for empiricism except the raw data of sense-perception. It is but a short step to suppose that this raw data is something more than simply the manner in which the Subject is affected by objects of experience. It is easy to regard the data of sensation *itself* not merely as 'data' but rather as *fact*. But what do we mean when we say something is a fact? This is a simple word with a non-simple meaning:

> **fact**, *n*. [L. *factum*, that which is done, a deed, fact, neut. of *factus*, pp. of *facere*, to do, act].
> 1. a thing that has actually happened or is true; a thing that has been or is.
> 2. reality; truth; actuality; the state of things as they are.
> 3. something declared to have happened or to have existed; the assertion of something as existing or done; as, he depends upon his imagination for his *facts*; there are many false *facts* in his report.
> 4. anything done; an act; a deed [obs.].

In light of what we have seen from Piaget's theory earlier in this chapter, the etymological root of the word "fact" in the verb "to act" (*facere*) is particularly noteworthy. Still, nothing can be meaningfully called a fact until we have taken care of what we mean by such terms as *thing*, *reality*, *truth*, *actuality*. In the Critical Philosophy the empirical perspective has for its task the taking care of precisely these matters. In short, the perspective is empirical precisely because it is concerned with establishing what is required for the data of sense-perception to yield Objects of experience and, hence, "matters of fact."

It is with matters of fact that the Ideas of Rational Theology are concerned. The regulation of thinking by pure speculative Reason – the process by which representation becomes *factual* representation – is nothing other than a schematism of pure Reason by which representations in understanding become conscious representations of "the real" – i.e., "achieve reality-hood" in understanding. Under the Copernican hypothesis the matter of *nexus* "in" Nature *is* Reality. The "ought" of the rationalists – that is, the sense of necessity that the rationalists endow to "reality" – is a correct view up to a point; Reason has need to presuppose Reality as a substratum. But this necessity is *subjective* rather than *objective*. The determination of objective "reality" originates in a subjective ground and this is the significance of Kant's calling the transcendental Ideas by the adjective *transcendental*. The Ideas serve to **orient** thinking:

> To *orient* oneself in thinking in general means thus: to determine [thinking] according to a subjective principle, with insufficiency in objective principles of reason in the holding-to-be-true [KANT12a: 10 fn (8: 136 fn)].

To orient thinking is to satisfy a subjective need of Reason for thinking the form of an object.

Because reason needs to presuppose reality as given for the possibility of all things, and regards differences in things only as limits through negations attaching to them, it sees itself necessitated to lay as a primitive ground one single possibility, namely that of an unlimited essence[1], and to regard all others as derived. Since also the thoroughgoing possibility of every thing must be met with throughout in the totality of all *Existenz* - or at least since this is the only way in which the first principle of thoroughgoing determination makes it possible for our reason to distinguish between the possible and the actual - we find a subjective ground of necessity, i.e. a need in our reason itself, to lay for the ground of all possibility the *Dasein* of an omni-reality (highest) of essence [KANT12a: 11 fn (8: 137-138 fn)].

Such an Object as an "omni-reality of essence" is an Ideal that would stand directly counter to empiricism in the tradition of Locke if we were to take this Object as a *thing* given *a priori* (for then this Object would be an innate idea in the sense of traditional rationalism). This, however, is not what Kant is saying. An Object is not a *thing* but only the function of unity in the conscious state by which we say appearances stand in combination with each other to form a unity in objective understanding. It is our concept of the phenomenon of Reason by which we understand the appearance of reasoning. Behind any idea of any Object stands a transcendental Ideal, which speaks not to things but to the appearance of the orienting function of pure speculative Reason in acts of the cognitive structuring. The Ideal is an aim of pure Reason. In this context the idea of a purpose reflects one's demand that there be "a reason for" or "cause of" Reason's acts; but since such a cause stands outside any possible sense perception, we are dealing here with a *practical* context, and for this we can only seek a subjective ground.

Put another way, Reason's "need" to presuppose Reality is an idea necessary for the possibility of experience as we come to know it in the phenomenon of cognizance. It appears to be the nature of our thinking process that a person can no more do away with the presupposition of Reality (as the material substratum of all our knowledge) than can that person change at will from a human being into a bird. All our cognitions are structured to be in coherence in the context of one Nature and, ultimately, this structuring "makes sense" only in the context of an Object for which we find a ground only in that which provides a subjective orientation in our thinking.

Kant developed this thesis in his 1786 essay, "What Does It Mean to Orient Oneself in Thinking?" in two steps. First, he commented on how we come to orient ourselves physically by means of using our sense of direction in objective space to locate ourselves and other observable things. After pointing out that this kind of orientation always involves a subjective ground of differentiation (e.g. the "sense of balance" or the "feeling" of left vs. right or up vs. down), he

---

[1] *Wesen*. This word can also be, and often is, translated as "being," as in, e.g., *das höchste Wesen* ("the Supreme Being"). I render *Wesen* as "essence" rather than "being" to more clearly distinguish between the Ideal of an "aim" or "drive" of pure Reason (in the practical positing of objects) and the reifying of an exposition of this Ideal of Reason as a "supreme Being" or God in Kant's Critical religion. That we must make such a distinction is clear because different cultures in different times have exhibited great variety in expressing the latter, while the metaphysic proper of Critical Philosophy must concern itself only with the principles from which all such various expositions draw their *subjective* necessity.

goes on to argue that by analogy we can view orientation in thinking, i.e. 'logical' orientation, as an equally subjective discrimination in the 'direction' of thought.[2] Speaking of the idea of "the procedure of orienting oneself," Kant wrote:

> Finally, I can widen this idea even inasmuch as it passes as a capacity to orient oneself not merely in space, i.e. mathematically, but also in *thinking*, i.e. *logically*. One can according to analogy easily guess that it will be a business of pure reason to guide its employment when it will go beyond all borders of experience and find absolutely no Object of intuition but merely space for the same[3]; whereupon there it is no longer in a position to bring its judgments under a determinant maxim according to objective grounds of knowledge, but on the contrary merely according to subjective grounds of discrimination in the determination of its own capacity of judgment. This subjective means thereupon remaining is nothing other than the feeling of reason's own **need** . . . But where it is not arbitrary whether or not one determinably judges something, where an actual *need* attaches that makes that judgment necessary, and to be sure is one which attaches to reason regarded as it is in itself, and yet lack in regard to the fragments of knowledge requisite for judgment curtails us: then a maxim is necessary according to which we take our judgment, for reason will be satisfied. For if it has been previously made out that here there can be no intuition of Objects, not even something through which we can give this homogeneity through which our enlarged ideas present a suitable object, and thus secure a real possibility for them, then there is nothing left for us to do except first to examine the concept . . . to see if it is free of contradiction; and then at least to bring the *relationship* of the object to objects of experience under pure notions of understanding . . .
> Yet through this, namely through the mere idea, nothing is settled in regard to the *Existenz* of this object and its actual connection with the world (the quintessence of all objects of possible experience). But now there enters the *right* of reason's *need*, as a subjective ground for presupposing and assuming something which it may not presume to know through objective grounds; and consequently *to orient* itself in thinking, solely through reason's own need, in that immeasurable, and for us filled with dark night, space of the supersensible [KANT12a: 9-10 (8: 136-137)].

This subjective maxim comes into play wherever our knowledge lacks objectively sufficient grounds for thinking an object – a situation that seems to rather concisely describe the cognitive condition of the newborn infant, for example – yet where nonetheless we "feel the need" to produce such an object. This "feeling of the need" is, of course, where reflective judgments of the expedience of representations must enter in to our theory, but what will subjectively satisfy such a need rests on the aims of pure Reason. For cognition this is nothing short of unity of consciousness. Reason consequently employs the power of thinking in a 'direction' in which the determination of the concept can be held-to-be-true from its coherence (in Reality) in the context

---

[2] It is worth recalling at this point that reasoning by induction and reasoning by analogy are two manners of proceeding from the particular to the general in drawing generalizing concepts for empirical judgment. In our present context, where the Object is *noumenal*, there can be no other way to come to an understanding of the appearances connected in this Object; hence, that Kant employs analogy here is not a weakness of his theory but a necessity of method.

[3] "Space" is Kant's name for the pure intuition of outer sense. What he is saying here is that imagination can produce the idea according to the mere form of an object but that there is no possibility of obtaining the matter of the object from the data of the senses. The object is then not a transcendental object (because the matter of a transcendental object means that which corresponds in it to sensation) but rather a transcendent object (a phantom of reasoning) once thinking loses all direct contact with the real in experience.

of Nature.

Thus we come back to the transcendental Ideal of Rational Theology. As a "standard gauge" of the *perfection of knowledge*, this Ideal provides *a priori* an orientation (a schematism) for thinking the object. The four Ideas of Rational Theology are, consequently, nothing other than guidelines-of-Reality in terms of the four titles of all representations: Quantity, Quality, Relation, and Modality. If, however, it is to be possible for such a "standard gauge" to regulate thinking, it is then necessary for the categories of understanding, as the rules for the making of concepts, to accord with the orientation of pure speculative Reason. Thus, from the empirical perspective, the categories are to be understood in the context *of producing coherence in understanding*.

§ 5.3   The Limits of Knowledge and Boundaries of Reason

The categories from the empirical perspective must be viewed as notions by means of which it is possible for the employment of determining judgment to bring the manifold of concepts into coherence within the substratum of Reality – the matter of the *nexus* of experience. Thus they are notions of combination in determining judgment through which the process of perfecting empirical knowledge is possible. To so understand them we must examine them in terms of how they make possible the thoroughgoing determination of appearances such that the structure of cognitions that results can move toward that overriding unity of cognition we call the Object insofar as the coherence of concepts in the overall context of Nature is concerned.

The employment of determining judgment for this purpose can be called the *problem of speculative Reason*. In this sense the transcendental Ideas of Reason are not to be regarded as merely transcendent presuppositions of Reason but, rather, as representing the principles of an Ideal that Reason must pursue when it employs the power of determining judgment. The Ideal is the measure of the accomplishment. On the one hand, this problem Reason sets for itself is hopeless inasmuch as its final satisfaction is beyond the power of Reason to obtain. The objectively valid employment of the categories of understanding is confined to sensible appearances, and the Ideal of Reason, viewed as the idea of a perfection, is an idea that far surpasses knowledge gained from actual experience. On the other hand, Reason's efforts on this behalf are not entirely in vain, for without the making of this effort much of what is great and good in human intellection would be impossible. Science, for example, depends wholly on the power of ideas to go beyond what is presented in experience to reach an understanding of what we call the 'natural order' of the world.

> When I take together all the transcendental Ideas . . . I think I come to discern that this natural disposition is aimed to set loose our concepts from the fetters of experience and the bounds of the mere contemplation of nature so far as to at least open before itself a field it may see which contains mere objects for pure understanding which no sensibility can reach [KANT2: 111 (4: 362-363)].

This does not mean we are to regard Reason as being in possession of innate anthropomorphic images of transcendent *noumena*. This is made clear by the most elementary observation of the diversity of opinions various people hold regarding such transcendent ideas as the soul, God, ghosts, angels, demons, witches, etc., and of the influence of one's society, culture, experience and education in the formulation of these opinions. The only valid manner in which we can view the transcendental Ideas is as regulative principles of pure Reason, and these principles regulate merely the manifold and not the objective content of ideas.

> Yet although an absolute whole of experience is impossible, so nevertheless the Idea of a whole of knowledge according to general principles is able to obtain its peculiar manner of unity, namely that of a system, without which our knowledge is nothing but a patchwork and cannot be used to the highest purpose (which is always just a system of all purposes); and I may understand here not just the practical but moreover the highest purpose of the speculative employment of reason [KANT2: 97 (4: 349-350)].

Even the wisest and most learned among us will admit that the knowledge gained from experience about Nature and the world is *limited* and that there is much we do not know. But, at the same time, we know of no *bounds* for the knowledge of experience and any person who so wishes may continue to learn new knowledge throughout life. The distinction between **limits** and **boundaries** is an important one. Limits "are mere negations which affect a magnitude so far as it is not absolutely complete." Limit is thus a *determined* finitude of a *scope*. But, Kant writes,

> As long as the knowledge of reason is homogeneous, no determined boundaries can be thought for it. In mathematics and natural science, human reason indeed knows of limits but not of boundaries, i.e. admits that something indeed lies outside it, where it can never arrive, but not that it will itself be completed in its intrinsic progress [KANT13: 93 (4: 352)].

The process of reasoning is open-ended, and so far as our knowledge is concerned none can foresee where or if our empirical knowledge would or could completely satisfy the demands of pure Reason. However, into this consideration we must admit the distinction between what we *know* for a fact and what we merely *think* to be true. The process of reasoning in its *systematic advance* must necessarily make *a priori* suppositions – e.g. Reality as the substratum of all that is real – and so we are faced with an issue: how are we to know where objectively valid knowledge ends and where purely subjective holding-to-be-true begins?

What we are in effect asking here is where the objectively valid understanding of objects ends and objectively ungrounded speculation concerning Objects begins. This is what Kant called the boundary of the field of experience. A boundary, he writes, is "something positive, which belongs to that which lies within as well as to that which lies without the given content." That experience must have such a boundary is evident when we look at the transcendental Ideal as if it were an image of a thing, i.e. a primal "essence of all that exists." To know this transcendent thing-in-itself would require us to know *everything*, and even the most optimistic among us must

concede the practical impossibility of such an attainment. While we may know no boundary for the possible extent of our knowledge, we *do* know that there must be a boundary for possible experience, at which lies the juncture of that which we can know as fact and that which is merely a product of intellection.

> But the boundary of the field of experience because of something which is otherwise unknown is a knowledge still remaining adhered to reason in this standpoint, and through which it is neither settled within the sensible world nor strays beyond it, but only limits itself - as befits the cognizance of a boundary - merely to the relationship between that which lies beyond it to that which is contained within it [KANT2: 109 (4: 361)].

Most of the time in everyday life we do not concern ourselves with probing for this boundary, but we do know, or if questioned can recognize without much difficulty, the manner in which we do or do not hold objects to be real in relationship to ourselves and to other objects. The regulative principles of Rational Theology regulate for the perfection of our knowledge of Nature by placing a brake on what we hold-to-be-true on objectively valid grounds and by providing for the ability to distinguish these cognitions from those we must hold-to-be either false, incomplete, or needing limitation in order for these cognitions to cohere with others. The former constitute facts, the latter non-facts. Coherence-in-fact is a requirement of the transcendental Ideal.

> But even though reason in its merely speculative employment is far from adequate for such a great aim as this - namely attaining to the *Dasein* of a primary essence - it still has in it a very great utility . . . *in correcting* this knowledge to make it agree with itself and every intelligible aim, and to cleanse it of everything that might be incompatible with the concept of a primary essence and of all admixture of empirical limitations.
> Transcendental theology accordingly, despite all its inadequacies, retains an important negative use and is a constant censor of our reason when it has to do with pure ideas, which for this very reason admit of no standard but a transcendental one [KANT1a: 588 (B: 667-668)].

The categories of understanding from the empirical perspective are the notions of judgment by which this censorship becomes technically possible.

§ 5.4   Empirical Quantity and Quality

The mathematical categories are notions of composition in judgment. The mathematical-theological Ideas, on the other hand, pertain to coherence in the *nexus* of these compositions by which we regard objects as limitations in the empirical substratum of an all-of-Reality. In other words, these categories are from the empirical perspective notions of what many have called "the nature of being."

Judgments of Quantity are judgments of homogeneous composition in the representation of the extensive magnitude of cognitions. But from the empirical perspective Reality for these representations is vested in the coherence of how these representations are thought in thinglike contexts – i.e. object and appearance. The conscious regard for these cognitions is from this

perspective nothing other than how these cognitions enter in to the regulation of thinking such that judgments of Quantity come under the regulation of the standard gauge of Reason in its Idea of the extensive magnitude of the transcendental Ideal – the Idea of *entis realissimi*.

The notions of oneness (unity) and manyness (plurality) are opposites and, indeed, each has no comparative meaning without the other. Oneness is "that-which-is-not-itself manyness"; manyness is "that-which-is-not-itself oneness." Seen as opposites, these notions of "that-which-is-not-itself *x*" cannot be notions of an Object since an Object admits no opposite. Furthermore, the appearance of a cognition judged under the Quantity of plurality is not even regarded as one object since manyness is a differentiating notion rather than an identifying notion. The empirical significance of these two notions is therefore quite clear. **The category of unity is *the notion of a determined object*; the category of plurality is *the notion of determined appearances*.**

That which is represented through these notions can cohere in Reality only through the synthesis of object and appearance in a higher Object. Otherwise we would have no notion of how object and appearance belong together in one Reality. To so unite them in a coherence requires a notion that is the synthesis of unity and plurality. This is precisely the empirical significance of the category of totality. **Totality is *the notion of a real Object* symbolizing a *res ipsa*** (thing in fact) **under principle of the Ideal of an *entis realissimi*** (a most real of being).

The judgment of Quality, on the other hand, is a judgment made on the matter of composition in a cognition. From the empirical perspective, the intensive magnitude of any object is the nature of the matter of its *Existenz* in Reality. More specifically, the notions of Quality viewed empirically speak to **coalition** of empirical cognitions for their coherence in Reality in general. In making such a determination, **the categories of reality and negation are *notions judging either a transcendental affirmation of the quality of being something or a transcendental denial of such a state of being*, respectively**.

But, as opposites, neither notion makes an Object. They serve Reason in making divisive inferences under the Idea of All-of-Reality, but do not in themselves refer to anything more than the Quality of *Existenz* (not *Dasein*) of objects within this Reality. The category of limitation, on the other hand, is the synthesis of these two notions and therefore addresses the Object of this disjunction as the point of coalition in Reality for cognitions judged by the categories of reality and negation. **Limitation is *the notion of the divided Object in Reality* and symbolizes in this Object an *ens priorem*** (prior being) **under the principle of the Ideal of an *ens originarium*** (original being). "Original being" is here understood as no more than a ground for thing-hood in Reality and never as a transcendent divine Being. "Prior being" denotes the transcendental object of the Object (matter of an Object), which stands as cause to sensuous effects of receptivity. *Ens priorem* is that which gives the Object its transcendental ground in Nature.

§ 5.5   Empirical Relation

The dynamical categories (those of Relation and Modality) are expressed in terms of correlate pairs, e.g. substance *and* accident, possibility *and* impossibility, etc. In this regard, they differ from the mathematical categories, as befits their role in judging the *nexus* of cognitions.

> The categories of relation and modality by themselves lead to pure and simple *correlata*, which are placed beside each other such that to set in place the one is to have placed the other, e.g. they refer directly to one another, substances to accidents and vice versa, cause to effect, and likewise reciprocal action . . .
>   The categories of relation in particular have the cognition of the thing itself in its relationship to the object; the categories of modality, on the other hand, only go from[1] the knowledge of the concept of the thing to the whole faculty of knowledge.
>   In particular the categories of relation may thus be regarded as mutual realities as relationships, i.e. the relationships of things in respect to their *Existenz*, in that a real of the thing always involves the idea of being, namely in accordance with the threefold modes of *Existenz* in the series of logical judgments . . . [KANT19: 470 (29: 1002)].

While the objective validity of the categories lies always and only with understanding sensible appearances (e.g. with the accident, the effect, the reciprocal Relation), our conscious thinking of Nature and Reality is always in terms of objects, and it is precisely with this *nexus* between our knowledge of appearances and our significations of these appearances as thinglike that Rational Theology concerns itself. We must examine this *nexus* and, in doing so, we come at once upon a fundamental distinction in *kind* for the objects we think about.

The first of these is that which we think of as being a specific thing or 'thing in the world' – an "object-matter" that is entity-like, that "exists as a matter of fact" and so on. In German, which has a richer lexicon of distinctions among "things" than we have in English, this kind of object-matter is called *Sache*; we will call such an object a **Sache-thing**. The *Sache*-thing is that which materialists usually mean when they speak of "the real thing." It is the corpuscle of Boyle or an inhabitant of the zoo of elementary particles of modern-day physics. Margenau calls this "the real in the Roman heritage" of a *res* [MARG: 5-9].

This manner of thinking the thinglike calls upon judgments under the category of substance and accident. Of the idea of the "real essence of a thing" Kant comments:

> A real essence is indeed the first inner ground for all of whatever on account of which is due to the object-matter [*der Sache*] itself . . . The real essence is not the essence of the concept but rather of the object-matter . . . hence the real essence of things [*der Dinge*] is inscrutable to us, whether just the same we recognize many essential parts [KANT19: 319 (28: 553)].

Whatever we might think about the "real essence" of a *noumenal* thing [*Ding*] we come to this only through appearances and hence through judgments of substance and accident. But such

---

[1] Reading *auf* as *aus* in [AK29: 1002].

judgments do not give us insight into the thing-in-itself; rather, our inferences and judgments can with objective validity go only so far as the thing-in-appearances – i.e. to a *Sache*-thing rather than the inscrutable thing-regarded-as-pure-*noumenon*, i.e. the *Ding an sich selbst*.

But although this "real essence" of a *Ding* must always remain unknown to us (it is not an object of any possible experience), Reason must nonetheless presume the real existence of real things. The category of substance and accident therefore occupies a position at the boundary between possible experience and the *noumenal Ding an sich selbst*. The knowledge of experience in the cognition of the *Sache*-thing is not knowledge of any "real essence *per se*," but merely the judgment of the *inherence of accidents* in an object of experience. **The category of substance and accident from the empirical perspective is therefore** *the notion of subsistence and inherence at the boundary of experience* **signifying the** *Existenz in* **Reality of a** *Sache***-thing**.

Now, besides the object of a *Sache*-thing, there is another sort of object of experience possible for empirical judgment. When a succession of appearances is connected in judgment in the Relation of causality and dependency, we again have an object but this judgment is not thought in terms of the accidents of a substance. Rather, the 'reality' of this object is one that is quite opposed to the sort of 'reality' we grant the *Sache*-thing because, while the judgment does represent something, this something is recognized under the schema of succession in time rather than through the *modus* of persistence in time. It is not the appearance of an object as *Sache*-thing that is judged by causality and dependency, but rather merely the connection of a series of appearances. We can rightly call this object an ***event*** or "happening." We do not think of an event-object as having the same state of being as we ascribe to the substantial *Sache*-thing. The connection of the event-object in the substratum of Reality in general consequently involves a transcendental negation, i.e. an event is an ***Unsache*-thing** that is thought as an object in which is contained a peculiar kind of "non-being" in comparison to the *Sache*-thing.

It is this difference in the makeup of the concept that distinguishes "being a thing" from the peculiar "un-being" (as a substantial thing) by which we regard a mere event.

> Substance and accident are each something real since their notion contains a being, and, be it substance or accident, the *Existenz* of a thing [*des Dinges*] is necessary for that. A thing [*Ding*], accordingly, whose concept contains a non-being (negation) can neither be substance nor accident just because it lacks reality and *Existenz* [KANT19: 471-472 (29: 1003)].

Since "everything" is "real" in *some* context, we must take Kant's comment to mean the *Unsache*-thing lacks "reality and *Existenz*" *in the sense of being a* Sache-*thing*. As an object of experience, the *Unsache*-thing is an existential opposite of a *Sache*-thing object; consequently, neither's concept is the concept of an Object. **Causality and dependency is** *the notion at the boundary of experience* **signifying the** *Existenz* **in Reality of an** *Unsache***-thing**.

A judgment of causality and dependency is a connection of different appearances in a

succession. In such a judgment, the concept of the *Unsache*-thing is the concept of an object that has *kinesis* (change) as its primary attribute. This *kinesis* is the appearance we call the *effect*, and effects are attributed in thinking to an otherwise undetermined *cause*, just as accidents are attributed to an otherwise undetermined substance in a judgment of substance and accident. The cause-effect object (*Unsache*-thing) and the substance-accident object (*Sache*-thing) are clearly of very different "natures" in the division of Reality-in-general. However, Nature is a singular Object and neither the object of substance-accident nor the object of cause-effect, nor even these two objects displayed side by side are adequate for the concept of this Object. A third class is necessary for the possibility of singular Nature, and this Object is thought with a concept of the *state of Nature*.

> The coexistence of the changeable with the fixed is the state [KANT19: 180 (29: 772)].

The judgment of an Object as a state-of-Nature is made under the category of *mutual interaction*, i.e. the category of community. This notion unites the concept of the substance and the concept of the cause by making every substance in Nature (which is schematized as the persistent in time) the cause of accidental appearances of other substances *and*, reciprocally in its own accidental appearances, the effect of other substances. In the face of the manifold of kinematical appearances in real experience, we could not otherwise find any coherent meaning in the notion of the persistent in time without such a *synthesis* of the *Sache*-thing and the *Unsache*-thing in the Object of a natural state (where endurance and *kinesis* are co-determined in the Object). Indeed, substances, as persistent, must be thought as coexisting unconditionally with regard to their *Dasein* but as mutually conditioned insofar as their *state* of *Existenz* is concerned. **The category of community is the notion at the boundary of experience signifying the *Existenz* in Reality of a state of Nature in the concept of an Object as an *ens superiorem* (higher essence) under the Ideal of *ens summum* (highest essence).**

We call this Object a "higher essence of Nature" because in this Object we give coherence to the persistent-in-Nature and the changeable-in-Nature. A *state of Nature* is a superior structure compared to things-in-the-world or events-in-Nature. In Piaget's theory our knowledge of Piagetian objects is developed only through and beginning with the elementary schemes of the Subject's own activities. It is, I think, quite clear that this theory relies inherently on the metaphysical ground of the three notions of Relation we have just described. Indeed, the equilibration of Piagetian interaction structures we discussed earlier takes in all three of the elements – *Sache*-thing, *Unsache*-thing, and the state of Nature – we have outlined here. The empirical perspective is concerned with the coherence in the context that makes it possible to bring meanings to our concepts, and it is the special job of speculative Reason to legislate *a priori* for the greatest degree of perfection in conceptual coherence in Reality.

§ 5.6   Empirical Modality

Finally we come to the categories of Modality. I said earlier in this treatise that these categories have the peculiarity of being notions that add nothing to the determination of the object but only concern the metaphysical *nexus* of concepts in the organization (faculty) of understanding. In the previous three titles of Quantity, Quality, and Relation we have been concerned with the composition and form of judgments with regard to the idea that our concepts must cohere in the context of Reality. But what of this idea of "coherence"? What does it mean to say that concepts "cohere" in their connections? It is to this question that we address ourselves in the discussion of empirical Modality.

I have said (or at least implied) that concepts and their objects cohere in a higher unity we call the Object. Operationally, this is as much as to say that the concepts agree *in* the object (that is, concepts and object are congruent in the Object), which is generally what we mean by the word "truth." However, because this part of our theory lies wholly in the realm of ideas – and under the transcendental Ideal falls under the regulative principles of the transcendental Ideas – we must resign ourselves that a definition of what it is "to cohere" in terms of the categories must be limited to what we can say in reference to appearances. Again, the reason for this is that the categories have objective validity only as *a priori* notions necessary for the possibility of experience. This is to say that we must couch our understanding of "coherence" in terms of *its* appearances – i.e., in operational terms of judging the outcomes of judgments according to some standard. (Modality is a judgment of judgments). In these terms, coherence is the determining factor in judgments of the *nexus* of Nature. It is thus explained as the standard of *consciousness of complete conformity in a transcendental Ideal of Reality*. What, then, is the structure of such a standard?

Rational Theology is concerned with those inferences of Reason that address "the determination of all concepts in the Idea of a complete embodiment of the possible" [KANT2: 78 (4: 330)]. Now, a *complete* "embodiment of the possible" (quintessence of Reality), regarded as an Object, is a transcendental Ideal. Inferences determining special Objects "within it" are formally *disjunctive*, i.e.,

> In disjunctive judgments we regard *all possibility* as divided up with respect to a particular concept. The ontological principle of the thoroughgoing determination of a thing[1] generally (that it comes to one of all possible opposed predicates of every thing) - which is at the same time the principle of all disjunctive judgments - is laid as the ground for the embodiment [*Inbegriff*] of all possibility, in which the possibility of any thing in general is looked at as determined. This serves as a slight explanation of the above proposition: that the act of Reason in disjunctive inferences of reason is the same, as regards form, as that through which it achieves the Idea of a quintessence of all reality, which contains in itself the positive of all mutually opposing predicates [KANT2: 78fn (4: 330fn)].

---

[1] *eines Dinges*

Metaphorically speaking, it is as if every cognitive act of determining judgment begins with Reason asking "what can this be?" and then proceeding to employ the power to make judgments for the purpose of determining an answer to this question. We regard the transcendental Ideas as principles of the schematism for the making of inferences of Reason; Modality, as the matter of the form of *nexus*, is concerned with how the determinant judgment is to *serve this purpose*. Put in terms of the outcomes of determinant judgments, the *nexus* of the manifold of concepts is a structure, and "to cohere" with this structure is to be capable of being assimilated within it. Viewed from this perspective, **coherence is the necessary form of complete congruence among all Objects in the *nexus* of judgments under the principle of thorough-going determination**.

Viewed as a pure *noumenon*, the transcendental Ideal lies beyond the boundary of possible experience, and the Idea of the matter of its form – the "essence of all essence" or *ens entium* – is the Idea of an Object that speculative Reason proposes to try to determine. With regard to the boundary where the *noumenal* and the experienced meet, **the category of possibility and impossibility is empirically the notion that predicates the manner of a merely conceptual coherence of the concept in the context of Nature**. It is a notion of how an object could (or could not) cohere in the *nexus* of Nature. But this object, as a mere object of thinking, has in its concept no connection in *actual* experience. Opposed to this is **the category of *Dasein* and *Nichtsein* (actuality and non-being), which is the notion that predicates the manner of phenomenal coherence of an object in the context of experience**. This category, in other words, is the notion of a concept of an object of actual experience.

Now a moment's reflection easily finds that neither of these notions by itself is sufficient for the determination of a thoroughly complete "embodiment" of an Object in Reality. Indeed, the concept of an Object understands *both* of these kinds of judgments. For example, Achilles *may* or *may not* have been a 'real person' – an actual human being who lived before the time of Homer and won great renown in battle – but the Achilles we know *is certainly* the central character in *The Iliad*. Both these objective determinations *must* cohere in Achilles as an Object. More generally, **the category of necessity and contingency is the notion that predicates the manner of systematic coherence in Reality under the principle of the Ideal of *ens entium***.

§ 6. Resume

We have now laid out the ontology of speculative Reason. Its constituents are not atoms, nor corpuscles, nor force fields, nor any of the other inhabitants of the ontology of materialism. Rather, they are more fundamental than any of these things. They are *contexts in coherence*: appearances, objects, Objects, *Sache*-thing, *Unsache*-thing, state of Nature. Understanding all of

this is the Idea of Nature and the Idea of Reality. We do not build up Nature nor discover Reality by a piece-wise process of integrating beginning with "things"; quite to the contrary, our hypothetical and empirical discoveries are housed and clothed *in the practical presupposition* of Nature and Reality as the *a priori* substratum for all determinations of judgment directed and regulated by reasoning.

This brings us to the end of three difficult chapters dealing with Kant's transcendental ontology. The common objective of Chapters 7, 8, and 9 has been the exposition of the *Realdefinition* of the pure notions of understanding (the categories of understanding). In this we have succeeded but only after having introduced a number of other ideas and constructs that attach to our explanations of the categories. Without these ideas of the *faculty* of the cognitive processes, our *explanations* of the categories would lack a *context* within the model of the Organized Being and we would have no *systematic doctrine* of the categories.

In the following chapters, we must turn our attention to these other contextual 'matters' of the theory. We have, for example, called upon the idea of a *reflective* process of judgment and the idea of a power of *pure* Reason (in which speculative Reason is merely one expressive part). What is the ground for these ideas and how must we view them? How does the formal ontology we have presented meet up, as it must, with the experimental *facts* Piaget and others have so painstakingly documented? We have presented the rational underpinnings which even Piaget's theory of the development of thought tacitly relies upon, but we have not shown how the constructs of experience (perceptions and Objects) can be joined with the idea of the *act* of thinking, nor the manner in which such acts and their representations are fused in a Piagetian *scheme*, nor how Piaget's *structures* of interactions among schemes cohere in our mental powers such that equilibration is possible. We have, of course, sketched the barest of outlines for how this might be possible; but we cannot rest here and must pursue the details if we are to achieve more than a mere aggregation of ideas and make a systematic *doctrine* of these ideas.

In the next chapter we will regroup and begin to tie together these diverse issues. Our focus will turn for awhile from objective cognition to the subjective arena of mental acts and subjective judgments. From a *theoretical Standpoint* we have examined the phenomenon of understanding rather closely; we shall soon see that there are two *additional* Standpoints that also require detailed examination, and that the Critical doctrine does not stop at anything less than the complete synthesis of all three Standpoints.