

Chapter 7 The Applied Metaphysic of Intellect Education

§ 1. Manifold Perspective of the Schematic and the Transcendental Acroams

The mathematical form of intellect education, and of the other two headings in the applied metaphysic of public instructional education, is identical to the mathematical form of corporal education. It contains six functionals deduced according to the formulae

$$\begin{array}{lcl}
 \Sigma 2_t + MA_t \xrightarrow{SC(1)} f_{t,1} & \Sigma 2_t + MA_t \xrightarrow{SC(2)} f_{t,2} & \\
 \Sigma 2_e + MA_e \xrightarrow{SC(1)} f_{e,1} & \Sigma 2_e + MA_e \xrightarrow{SC(2)} f_{e,2} & (1) \\
 \Sigma 2_\Delta + MA_\Delta \xrightarrow{SC(1)} f_{\Delta,1} & \Sigma 2_\Delta + MA_\Delta \xrightarrow{SC(2)} f_{\Delta,2} &
 \end{array}$$

where $\Sigma 2$ denotes the schematic of Quality in the 2LAR of appetitive power. What changes in going from the heading of corporal education to intellect education is the manifold perspective.

Perspective in general is a philosophical viewpoint for systematically evaluating philosophical concepts that emphasize a particular aspect of relationship to metaphysics proper and in relationship to the capacities of the phenomenon of mind. Perspective-in-general is classified into: (1) objective perspectives, called reflective perspectives; (2) subjective perspectives, called Standpoints; and (3) mathematical perspectives, called manifold perspectives. The technical term "perspective" was originally introduced by Palmquist (1993) and included at that time only the first two of the three classifications just listed. The third classification was added in order to provide more distinctness in the perspectives lexicon after the doctrine of method for synthesizing applied metaphysics was developed.

Manifold perspective is perspective from the viewpoint of evaluating metaphysical concepts in terms of the four general headings of a 2LAR: Quantity, Quality, Relation, and Modality. These headings are metaphysically distinct because each pertains to a different kind of manifold synthesis, i.e., the extensive manifold, the intensive manifold, manifold of combinations of appearances with one another, and manifold of combination of appearances in the *a priori* faculty of knowledge in an Organized Being [Kant (1787), B:201-202 fn].

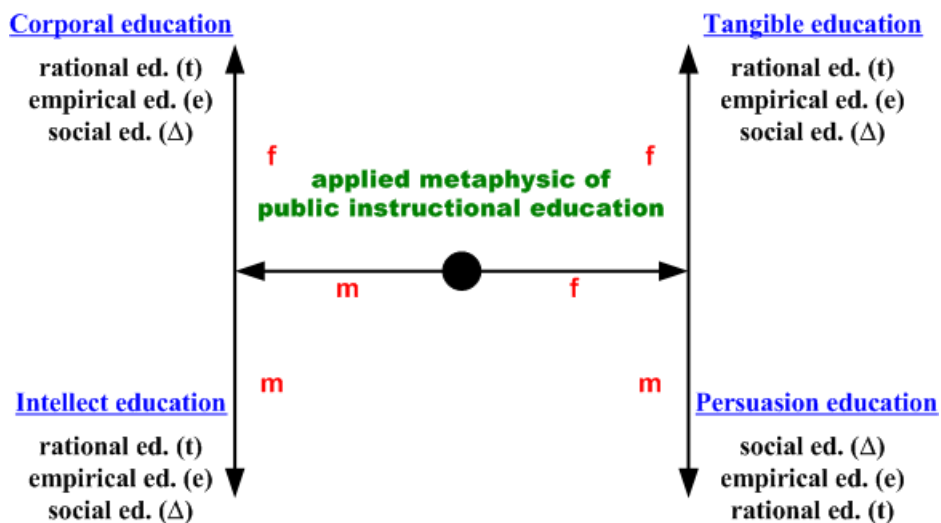


Figure 7.1: General 2LAR of the applied metaphysic of public instructional education.

Intellect education is Quality in the general 2LAR structure of the applied metaphysic of public instructional education (figure 7.1). Consequently, it is viewed from the Quality manifold perspective. This means that the transcendental Ideas pertaining to it are the Quality perspectives in each Idea, and that the transcendental schematic of its structure is the Quality schematic from the 2LAR of appetitive power (rule of commission, rule of omission, and rule of exception). The general Standpoint remains unchanged, i.e. the metaphysic is still viewed from the practical Standpoint. The major acroams remains the theological Idea and the minor acroams are still as assigned in chapter 6, i.e., the cosmological Idea (t), the psychological Idea (e), and the physical Idea (Δ). The difference is that each of these is now viewed in the Quality manifold perspective in the practical Standpoint. The acroams as stated in this perspective are as follows.

- M: theological Idea of Quality = the regulative principle of good choice under an original Ideal of *summum bonum*;
- μ_t : cosmological Idea of Quality = absolute value in the division of a given whole of *Existenz*;
- μ_e : psychological Idea of Quality = unconditioned unity of value (compatibility of desires and the rule structure in the manifold of rules);
- μ_Δ : physical Idea of Quality = the degree of perception is a consequence of the regulation of sensibility through validation of acts of reflective judgment.

The *Realerklärung* of each of these acroams is provided in the text below.

The change in manifold perspective means that the metaphysical axioms to be used in intellect education, i.e. $MA_i = \mu_i \subset M$, are also changed by the change in perspective and require new deductions. This is probably more or less obvious to you. What possibly might be less obvious, at least immediately, is that the specifying concept is also changed by the change of manifold perspective. This is because the manifold now pertains to Progress in the intellectual power of a person. Thus the nature of the Object has changed and requires a new context of deduction. The specifying concept of a heading in any applied metaphysic is the context-providing concept. There is again a disjunctive inference of Reason called for because we still are dealing with two different dimensions of Progress, namely, that of the learner-as-a-free-person and the learner-as-member-of-a-Community. Thus the new specifying concept SC is classified into two parts, SC(1) and SC(2).

I think I would be remiss if I did not at this point recapitulate a point Kant always stressed and which is illustrated in what I have just written above. Philosophy is knowledge through concepts, mathematics is knowledge through construction of concepts. It should be amply clear to you that the formal mathematics being used here is identical to that used previously. The form has not changed at all and the *construction* of our metaphysical concepts of applied metaphysic is carried out by the same *formal* methodology as used in chapter 6. The difference between corporal and intellect education is philosophical difference, specifically metaphysical difference, and this difference obtains from the difference between concepts of context that are being applied to them.

§ 2. The Specifying Concept of Intellect Education

The specifying concept for intellect education is *intelligence-building*. To properly understand what this concept means, we must examine several interrelated concepts and properly set out their common context. It seems to me best to begin with the idea of the *Personfähigkeit* of intellectual power because Progress in intellectual *Personfähigkeit* is an objective of instructional education.

Intellectual power is the person's power subsisting in his capacities of knowledge, intelligence,

and judgment. It does not pertain to what a person knows but, rather, *what a person can do with what he knows*. Kant referred to this as *Geisteskräft* (literally "power of spirit"; in mental physics the technical translation of this word is "power of intellect"). Kant wrote,

Powers of intellect are those whose exercise is possible only through reason. They are creative so far as their use is not drawn from experience but rather derived *a priori* from principles. Such things are mathematics, logic, and the metaphysics of nature, of which the latter two are also included in philosophy, namely in the theoretical, which then does not mean wisdom, as the word [philosophy] would suggest, but only science, although the former can be conducive to [science's] purpose. [Kant (1797), 6: 445]

The context of "what a person can do with what he knows" could scarcely be more clearly expressed than Kant has done here. Intellectual power of a person pertains to what he can *do* with knowledge, e.g., how he uses it to deal with circumstances and judge or understand appearances and events. This is "intelligence" in *practical* connotations of that word. Scheme-building pertains to a person's *acquisition* of knowledge, intelligence-building to his *uses* of it. Thus, I speak here of "intelligence" in the dictionary connotation of "intelligence" as "the ability to respond quickly and successfully to a new situation, and to use reasoning to solve problems, direct conduct, etc. effectively."

This context for "intelligence" has ties to some contexts in which the word "spirit" is used. It is worthwhile to take a moment to clearly outline this general context of "spirit" because that word has many contexts. Webster's *Unabridged Dictionary*, 1962, lists 18 connotations for it plus 9 more special usages. Many of these are mystical, and with mystical connotations we have nothing to do whatsoever. The contexts that are pertinent are contexts that are often described using such words as personality, disposition, vigor, enthusiasm and true intent, as in, e.g., "the *spirit* of the law." In this latter context, it is not out of place to take a look at how Montesquieu employed the word "spirit" in his famous treatise:

I have not separated the political from the civil institutions, as I do not pretend to treat of laws, but of their spirit; and as this spirit consists in the various relations which the laws may bear to different objects, it is not so much my business to follow the natural order of laws as that of these relations and objects. [Montesquieu (1748), Vol. I, Bk. 1, pg. 7]

Montesquieu's treatise was written in the legal context of the word "law," and his "spirit of law" pertains to such things as: (1) what good purpose is served by legislating a law? (2) who or what is the law to benefit? (3) what circumstances necessitate a law? or (4) what social, political, or environmental conditions provide the justifying basis for a law? These are contexts of "the spirit of laws." Remaining strictly within the delimiting boundaries of such contexts in one's thinking and reasoning is necessary for maintaining the objective validity of Montesquieu's treatise as a work of social-natural *legal-science*. A person always runs the risk of making a transcendental error in his reasoning when he reasons by inference of analogy or inference of induction in making a new concept of an object. The risk can only be moderated by paying close attention to the concepts of objective validity in which the new concept is to be contextually embedded. A person *always* makes a transcendental error if he reifies the object of a mere mathematical concept lying beyond the horizon of possible real experience and treats that object as if it had *ontological* significance rather than just having epistemological significance.

The word "intelligence" is one of those words where we must be prudent and grasp the context of its usages in relationship to the idea of the intellectual power of a person because it, too, is a word that has been saddled with a number of mystical usages. Indeed, the question "What is intelligence?" has historically been mired in controversies that stem from divers metaphysical and pseudo-metaphysical viewpoints. The proper educational context for "intelligence" is one that

takes in some pertinent remarks made by Piaget in *The Origins of Intelligence in Children*. Piaget wrote,

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

Now, just as sensorimotor assimilation of things to the subject's schemes extends biological assimilation of the environment to the organism, so also it presages the intellectual assimilation of objects to the mind, such as is proven to exist in the most evolved forms of rational thought. In effect, reason simultaneously manifests a formal organization of the ideas it utilizes and an adaptation of those ideas to reality – an organization and adaptation which are inseparable. Now, the adaptation of reason to experience presupposes an incorporation of objects to the subject's organization as well as an accommodation of the latter to external circumstances. Translated into rational terminology, it can therefore be said that organization is formal coherence, accommodation is "experience" and assimilation the act of judgment inasmuch as it unites experimental concepts to logical form. [Piaget (1952), pp. 409-410]

While here Piaget stopped short of clearly explaining how this context is pertinent to intelligence, perhaps this might have been because he had stated the contextual unity in one of his earlier works, namely, *The Psychology of Intelligence*. There he wrote,

What common sense calls "feelings" and "intelligence," regarding them as two opposed "faculties," are simply behavior relating to persons and behaviors affecting ideas or things; but in each of these forms of behavior, the same affective and cognitive aspects of action emerge, aspects which are in fact always associated and in no way represent independent faculties.

Furthermore, intelligence itself does not consist of an isolated and sharply differentiated class of cognitive processes. It is not, properly speaking, one form of structuring among others; it is the form of equilibrium towards which all the structures arising out of perception, habit and elementary sensorimotor mechanisms tend. It must be understood that if intelligence is not a faculty this denial involves a radical functional continuity between the higher forms of thought and the whole mass of lower types of cognitive and motor adaptation; so intelligence can only be the form of equilibrium towards which these tend. . . Intelligence is thus only a generic term to indicate the superior forms of organization or equilibrium of cognitive structurings.

This view means, right from the start, an insistence on the central role of intelligence in mental life and in the life of the organism itself; intelligence, the most plastic and at the same time the most durable structural equilibrium of behavior, is essentially a system of living and acting operations, that it to say, the indispensable instruments for interaction between the subject and the universe when the scope of this interaction goes beyond immediate and momentary contacts to achieve far-reaching and stable relations. [Piaget (1947), pp. 7-8]

Intelligence-building, then, means *the constructing of mental schemes for how to effectively adapt knowledge to uses*. The objective of intellect education is Progress in both dimensions of the intellectual power of the person, thus its accomplishment is grounded in helping the learner to acquire effective schemes for finding ways to apply the knowledge – practical as well as theoretical – that he already has for assimilating his environment and adapting himself to it. Here, again, the focus is on schemes-for-building-schemes. The distinction between Quality and Quantity in this thesis of schemes-for-building-schemes is that in the latter case the aims of the

constructed schemes are those of acquiring knowledge (as in the type-II interactions in chapter 6), whereas in the former its purposive effects are those for using that knowledge (as in the type-IIC interactions in chapter 6). Intellectual *Personfähigkeit* is in this sense the homologue of physical *Personfähigkeit*. It pertains to uses of knowledge capacity as a homologue to uses of body capacity.

Teaching a person how to recognize when he has made a transcendental error of reification in his reasoning is one example of the sort of reasoning scheme intelligence-building aims to teach the learner to produce. Another example is teaching a person to examine and correctly understand limitations of context in assaying the objective validity of his reasoning. Again, the instructional education focus is not principally on such concrete scheme examples – although, of course, helping the learner to construct such schemes is necessarily part of overall instruction – but, rather, on teaching the learner how to reason effectively and efficiently. This is, of course, the same as teaching him how to construct schemes of reasoning-schemes. Something like this is what many teachers mean when they speak of teaching "skills of critical reasoning."

To illustrate more fully the extensive scope of the concept of intelligence-building, something mental physics has to say in regard to intelligence is pertinent for that part of public education commonly called "special education." Many people regard intelligence as some sort of "gift." I rather often encounter the phrase "gifted student" in conversations with others who work in the academic field. When I meet a gifted student, I study him. I find no mystic attribution needed to explain a gifted student. *If intelligence is a gift, it is a gift you give yourself.* True enough, it is often so that this gift is one that a person can only give himself if he has the assistance of others. These others are called teachers, whether their teaching is intentional or not. Whether or not, however, a person gives himself this gift of intelligence depends on whether or not he engages in acts of educational Self-development. The object of the concept of intelligence-building subsists in part *in provoking him into doing so* by hindering the *satisficing* Nature of practical Reason.

In this regard, there is a mental physics implication for teaching and for teaching expectations. This implication is the following. It is almost certainly a transcendental error to presume that a child born with a pathological medical condition, e.g. Mongolism, is inherently limited *a priori* to some fixed low level of intelligence beyond which he cannot progress. Pathologies of Mongolism or autism pertain to and are important for corporal scheme-building, but not to intelligence-building for the simple reason that *the latter extends the capacity of the former*. The structure of mind is *an open system*.

A person retarded by his physical condition can be limited in regard to the scope of his innate sensorimotor capacities, but this only means *the methods of teaching that will be effective for him differ from those that are effective for the majority of individuals who are not so impaired in sensorimotor capacity*. It might – and probably usually will – take more time for the individual to develop his schemes of intellect, but development time is nothing other than a measure set against a social norm for evaluating the efficacy of the environment for educational Self-development. It does not measure intellectual capacity but merely learning rate achieved in a given educational environment. I think historical popular unawareness of this aspect of the phenomenon of mind has had a role in setting up institution of education in such a way as to prejudicially condemn many physically impaired people to lifetimes of unnecessarily limited *Personfähigkeit*. It has also left teaching methodology for special education scientifically under-explored because objectively valid research here must be grounded in the mental physics of the phenomenon of mind.

In this context I think it worth mentioning that the contrary effect – namely that of deprivation of effective educational Self-development environment – is already known to produce retardation and limitation in individual intellectual *Personfähigkeit*. This is well documented. The literature on this is quite extensive so I will only pick out one example to cite here [Skeels (1966)] and refer

you to any generally competent introductory textbook on psychology for others. One thing that it is pertinent to mention in this regard is that there are some developmental theories that posit a so-called "critical period" for intellectual development. The basic notion is that ability to learn has ties to biological maturation – which does appear to be true *to an extent*. Mental physics does tell us that the one *must* affect the other because of thorough-going *nous-soma* reciprocity. My point in bringing this up is merely this: it is erroneous to think that "once a critical period has passed, there is nothing that can be done to help the person." This presupposes that there exists only a single way to provoke educational Self-development in *H. sapiens*, and *this assumption has no documented foundation in scientific fact*. If some particular critical period *hypothesis* is true, that only means that some particular learning mechanism has closed. It does *not* mean others do not "open up." It is a fundamental Duty for a scientist whose work is publicly funded to do everything he can do to avoid mistaking scientific hypothesis for scientific fact. Dereliction of this Duty is at best a deontological moral fault and at worst it is a deontological crime done to his Society.

There are many subtle ways to reify mathematical concepts, and this is an example of one of them. A social consequence of an error of this sort is that it provides a false but scientific-like facade upon which to base a satisficing excuse for a Society to abandon the citizen-parents of such a child, leaving them on their own without Community assistance to deal with the situation. But if the parents are citizens, the Society has public scientific resources it could justly apply to seeking ways to overcome the handicap, and if the terms of its social contract require assistance of this kind be rendered to every citizen-at-need¹, such an abandonment is an injustice and a violation of civil rights. There might be – and often will be – legitimate practical reasons why a Society's social contract is unable to be extended far enough to protect citizens from a particular kind of social-environmental threat, but a satisficing scientific prejudice is never one of them.

Getting back now to the main thesis of this chapter, the specifying concept of intelligence-building must deal with the two dimensions of the learner, i.e., the learner-as-a-free-person and the learner-as-member-of-a-Community. This is the same as is the case for scheme-building. Thus the applied metaphysic again has six functions of Quality for intellect education.

§ 3. The Transcendental Schematic of Intellect Education

The transcendental schematic $\Sigma 2$ is provided by the three *momenta* of Quality in appetitive power: rule of commission; rule of omission; and rule of exception. The *Realerklärung* of each of these *momenta* is fundamentally derived from the role of appetitive power as the regulatory determiner of motoregulatory expression in *psyche* and ratio-expression in speculative Reason. When asserted the rules state,

- rule of commission: motoregulatory expression of the manifold of Desires serves a purpose of practical Reason;
- rule of omission: motoregulatory expression of the manifold of Desires conflicts with a purpose of practical Reason;
- rule of exception: validation of the motoregulatory expression of the manifold of Desires is contingent upon and conditioned by the manifold of rules in practical judgment.

¹ In other words, if the Society has the capacity to deal with the problem without perpetrating worse social injustices that would occur if it applied its capacity in this particular way – for example, abandoning civil defense against aggressions from other Societies. All decisions regarding the allocation of limited social resources to particular ends eventually run up against limitations in the corporate *Personfähigkeit* of any Society, and this pertains to justice in social-natural economics under a Society's social contract.

The rule of commission is the default rule of appetitive power. When an impetuous act of teleological reflective judgment produces a particular form of motoregulatory expression in *psyche*, if the form of this act does not conflict with the manifold of rules in practical Reason then Reason allows the act of reflective judgment to be expressed and no ratio-expression is triggered by appetitive power (Figure 7.2 A). The fundamental principle of reflective judgment is the principle of formal expedience of Nature, i.e., all acts of reflective judgment legislate for formal unity in Nature according to the expedience of representations for the categorical imperative of pure practical Reason [Wells (2009)]. Unless prior experience has actually demonstrated that a particular act of expression failed to lead to the satisfaction of equilibrium, the reflective judgment is presumed by Reason to be expedient for the satisfaction of the dictate of the categorical imperative. Assertion of the rule of commission validates the act of teleological reflective judgment.

The rule of omission invalidates an act of teleological judgment and asserts the practical veto power of Reason, thereby preventing the judicial act from being expressed in an action through *psyche*. The condition for asserting the rule of omission is a determination by practical judgment that the particular act of expression conflicts with some rule in the practical manifold of rules. This means that in prior experience an expression of the judicial act proved to be contrary to equilibrium and, therefore, was contrary to the formula of the categorical imperative. Assertion of the practical veto is also accompanied by assertion of ratio-expression, which causes speculative Reason to employ the process of determining judgment to change the representation in sensibility so that ensuing acts of reflective judgment are brought into compliance with the manifold of rules (figure 7.2 B).

The rule of exception can be regarded as a synthesis of the first two rules (Figure 7.3). When it is asserted a part of reflective judgment's impetuous act is allowed to be expressed through *psyche* and the rest of it is vetoed by practical Reason. Concurrently, ratio-expression is triggered and a motivational dynamic is initiated. The animating principle of somatic organization in *psyche* states: motivation is the accommodation of perception and motoregulatory expression is its assimilation. Assertion of the rule of commission signifies immediate assimilation of perception in sensibility (apprehension & apperception), whereas the rule of omission signifies failure to assimilate perception immediately, necessitating an accommodation. The rule of exception signifies a partial assimilation with an accompanying necessitation for accommodation. In figures 7.2 and 7.3 we have a full illustration of the psychology of motivation in mental physics.

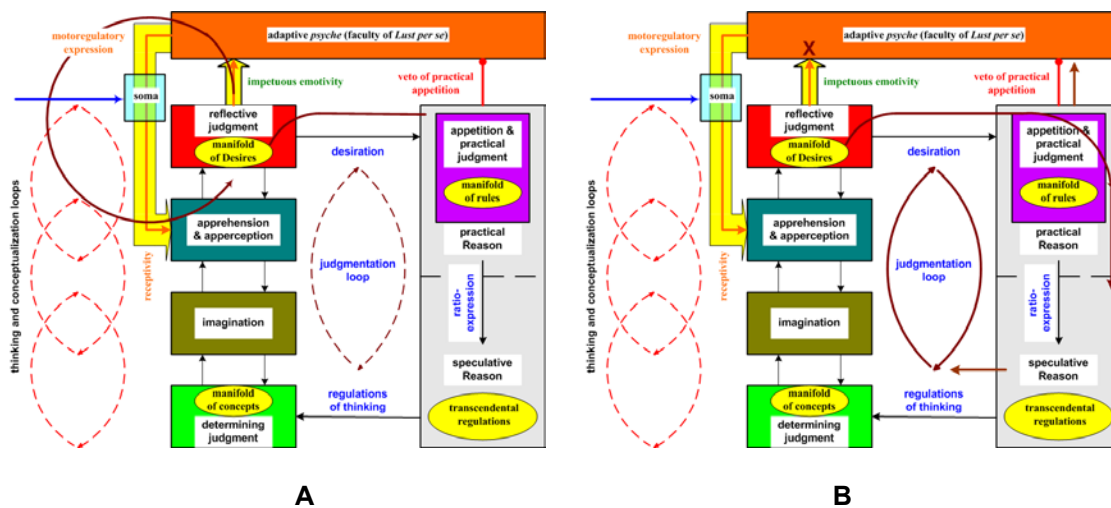


Figure 7.2: Effects of asserting the rule of commission (A) and the rule of omission (B).

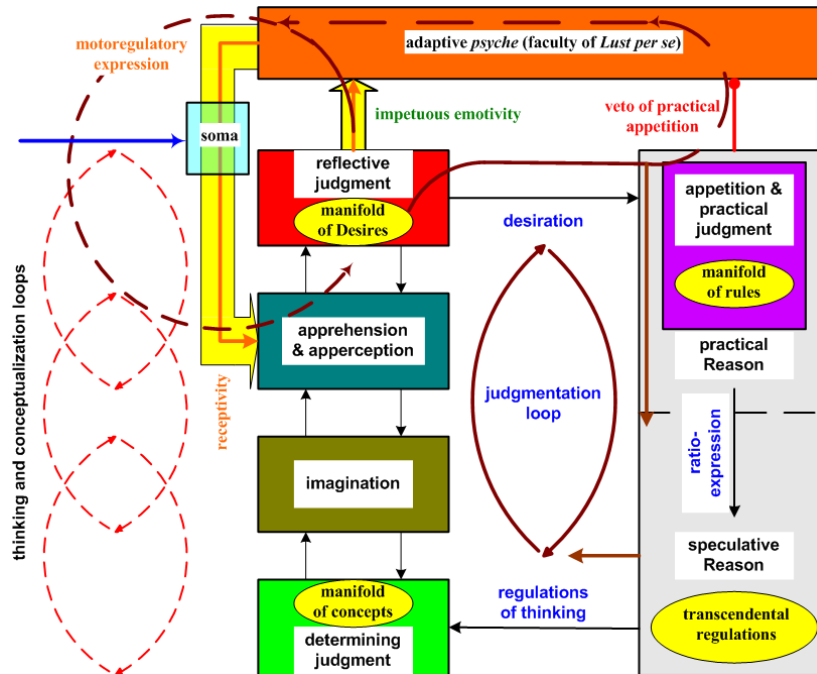


Figure 7.3: Effect of asserting the rule of exception.

These real-explanations are low-level explanations lying near the "nuts and bolts" in mental physics of motivation and decision-making in an Organized Being. To comprehend the role of the Quality *momenta* of appetitive power as the transcendental schematic of intellect education we must raise our sights somewhat and view their effects from a psychology of behavior point of view.

Assertion of the rule of commission implies absence of past disturbance to equilibrium in the expressions of a sensorimotor scheme represented through reflective judgment. That constitutes in Critical metaphysics attainment of an empirical state of *happiness*. In the continued absence of disturbance, the individual simply maintains his whole action scheme as what Piaget termed a *circular reaction*. For infants circular reactions tend to be relatively simple in organization [Piaget (1952)]. For older children and adults the scheme cycle is typically much more complex and is extended over relatively long intervals of time with only minor variations in the action sequences expressed². In common American vernacular, some people call a situation like this a "routine" while others sometimes call it "being stuck in a rut." In less-charged language terms the phenomenon can properly be said to indicate a state of contentment and tranquility.

Assertion of either of the other rules signifies a checking of motoregulatory expression, either full in the case of the rule of omission or partial in the rule of exception. This is accompanied by a direct regulation of the employment of determining judgment by speculative Reason, and the effect of this is called a "tension" because it sets up a motivational dynamic in judgmentation that seeks to accommodate perception (by an accommodation in the manifold of concepts) or to satisfy the categorical imperative by means of an accommodation in the manifold of rules, or both. This means the momentary checking of the motoregulatory action expression is followed at

² These variations are, in a manner of speaking, "ripples" in the cycle caused by minor disturbances that are easily compensated without rupturing the major scheme cycle. The overall cycle is maintained despite their occurrence. In this typical case, psychologists are prone to call the Organized Being's perception of its state of *Existenz* a "mood."

once by another act of motoregulatory expression. This is the Critical *Realerklärung* of *emotion* [Kant (1790), 5: 226]. If the disturbance to equilibrium is too great to be assimilated by the action scheme in progress, this scheme is *ruptured* and replaced by the establishment of another action scheme. Otherwise the action scheme in progress is accommodated to remove the disturbance. I think perhaps you can now see why in various places in this treatise I have called particular things "provocations" and spoken of "provoking" the individual. Scheme accommodation or active scheme replacement is necessary to effect a change in behavior. Because this always involves either the rule of omission or the rule of exception or both, behavioral change is said to be "provoked" because the empirical state of happiness is interrupted by the stimulus.

Both the rule of omission and the rule of exception are, in particular contexts, acts of negation. In this regard a finding Piaget stated in *The Development of Thought* is pertinent to the present discussion:

From the psychological viewpoint, let us recall that negation is essential only when the subject has no need to construct it, i.e., when it is imposed from without. For example, a denial of the facts is . . . actually a refusal to accept what is unwanted. When there is a failure in object accommodation, in order to understand the reasons for the failure and to change this into a success, we must distinguish the positive characteristics *a* from their absence *non-a* with justification of this negation. . . . All negations are constructed by the subject and by no means result from object resistance. This construction is slower and more difficult than the more or less direct composition of positive characteristics. . . .

When speaking of actions we should remember these are centered on the aim to be reached and not on the distance to be covered. . . . The conceptualization begins with an organization of the positive characteristics . . . In brief, everything is aimed at the primacy of the positive during the elementary stages, and the positive corresponds to what, on the level of experience, represents the "immediate data," whereas negation depends either on derived verifications or on more or less labored constructions as determined by the complexity of the systems. [Piaget (1975), pp. 16-17]

As with Kant, Piaget's statements tend often enough to be somewhat opaque to his readers. I'd say it's just as well that neither of them ever wrote any children's books. What did he mean by "negation is essential only when the subject has no need to construct it"? Would it not be true that if the subject "has no need to construct" a negation then he would not? Clearly. Assuming that we're not dealing here with either an error in translation or an uncaught typographical error in the text³, if we take this statement literally it is false. What Piaget is trying to say here is that it is not a whim of the subject that produces negations – acts of omission or exception, although these are not Piagetian terms. He means – or, more accurately, what he *ought to* have meant according to mental physics⁴ – is that the subject constructs negations when external circumstances *provoke* in him a need to do so in order for him to try to satisfy pure practical Reason's relentless demand for equilibrium.

This is a point where the impatient Nature of practical Reason is important to appreciate. If a minor tension can be removed by a quick and simple act of ratio-expression that accommodates

³ I cannot assess this. My knowledge of the French language is nil.

⁴ Like Kant, Piaget was neither infallible nor an *Übermensch*. He did make a few ontology-centered mistakes and his system has some rather surprising holes in it. This is particularly so in regard to emotion psychology. These are points his critics in the American psychology and education communities seem to me to fixate upon obsessively and from judgments of taste and pseudo-metaphysical prejudice rather than from scientific analysis. See, e.g., Ruch and Zimbardo (1971), pp. 110-111 and Buck (1988), pp. 371-372 for more balanced American commentary. I find Piaget's many *observations* to be extremely revealing even when his theoretical hypotheses drift a bit into either naive realism or Platonic idealism, as they sometimes do from time to time.

perception *without the need* to accommodate either the manifold of concepts or the manifold of rules, this is what is termed type α compensation – to use another word, ignorance. This is the significance of Piaget's remark that "the conceptualization begins with an organization of the positive characteristics." Type α compensation behavior is the earliest infantile behavior observed in early formation of sensorimotor habits. It is very often the most expeditious tactic for removing tensions and achieving equilibrium, and it is the basis for the satisficing character of appearances of reasoning and decision making. Note that changes in the manifold of Desires are not accommodations properly so-called because the manifold of Desires *is not a structure*. It is not conserved in judgmentation, as are the constructions in the other two manifolds. Desires fill the role of energetics of actions and do not represent knowledge organization. Piaget himself said,

We can extract a provisional conclusion from such facts and state the themes we shall develop. The first of these is that although affectivity is constantly at work in the functioning of thought, it does not create new structures of reasoning. This means that affectivity does not create laws of equilibrium which are more and more differentiated from their content and independent of functioning. The second of our provisional conclusions is that the energetics of behavior arise from affectivity whereas the structures arise from cognitive functions. [Piaget (1953-54), pg. 7]

Mental physics tells us that if reflective judgment did form structures human beings would at most become complete automatons during infancy – a consequence that quite likely would have favored extremely early extinction of our species.

Educational Self-development events – learning – requires accommodation in the manifold of concepts and the manifold of rules. This requires provocation of the rules of omission and exception. The rule of commission, in its turn, is necessary for *validation* of what is learned. Validation shuts down ratio-expression, terminates accommodations, and thereby completes the assimilation of perceptions and establishes the new equilibrium. Therein lies the real significance of the rules of Quality in appetitive power as a schematic for intellect education.

§ 4. Rational Intellect Education

§ 4.1 The Metaphysical Axiom

The combination $\mu_t \subset M$ subsumes the acroam (absolute value in the division of a given whole of *Existenz*) under the theological Idea (regulative principle of good choice). A value is an affective condition of appetitive evaluation. This means a value is represented and presented by the process of reflective judgment. The presentation is presented to practical Reason where it is checked for conformity with the manifold of rules (by practical judgment). If it is found to be in compliance with this subjectively universal rule structure the valued action is expressed through *psyche*. Otherwise the presentation is invalidated by the determination of appetitive power and its motoregulatory expression is vetoed. **Absolute value** is a subjective Ideal of value that is valid in every respect and without condition. The practical implication of this notion is as follows. All representations of reflective judgment are grounded in the principle of formal expedience, which means that within every value representation is posited some hypothetical desire unconditionally expedient for the categorical imperative of pure practical Reason. This is to say there is a scheme-in-equilibrium to be built around this "atomic" value. The cosmological acroam asserts that such an atomic value *is inherent in* every presentation of Desires synthesized in the process of reflective judgment, a subjective belief in a judicial Idea of continuity in *Self-Existenz*.

Recognize, however, that the principle of formal expedience is a *subjective* principle, not an objective one. Reflective judgment *never* makes ontological pronouncements. All its acts serve one purpose only, and that is the satisfaction of the categorical imperative. Kant put it this way:

We must thus think of there being in nature, with regard to its merely empirical laws, a possibility of infinitely manifold empirical laws, which as far as our insight goes are none the less contingent (cannot be recognized *a priori*); and with regard to them we judge as contingent the overall unity of nature in accordance with empirical laws and the possibility of the unity of experience (as a system in accordance with empirical laws). But because such a unity must still necessarily be presupposed and assumed, for otherwise no thoroughgoing context of empirical knowledge into a whole of experience would take place, because the natural laws yield such a context among things with respect to their genus, as things in nature, but not specifically, as such and such particular beings in nature, the power of judgment must thus take it as an *a priori* principle for its own use that what is contingent for human insight in the particular (empirical) natural laws nevertheless contains a lawful unity, not fathomable by us but still thinkable, in the combination of its manifold into one possible self-contained experience. Consequently, because the lawful unity in a combination that we recognize as conformable with a necessary aim (a requirement of understanding) but yet at the same time as contingent in itself, is represented as an expedience of the Objects (here, of nature), thus the power of judgment, which having regard to things under possible (still to be discovered) empirical laws is merely reflecting, must think of nature with regard to the latter according to a *principle of expedience* for our faculty of knowledge, which is then expressed in the above-mentioned maxims of the power of judgment. Now this transcendental notion of an expedience of nature is neither a concept of nature nor a concept of freedom, because it attributes nothing at all to the Object (of nature), but rather only represents the unique way in which we must proceed in reflection on the objects of nature with the aim of a thoroughly contextualized experience, consequently it is a subjective principle (maxim) of the power of judgment [Kant (1790), 5: 183-184].

Quite a mouthful, isn't it? Let's break this down a bit. The data of the senses *never* presents us with anything that can be called "the unity of nature." The notion of a "unity of nature" is wholly supersensible and is never an object of any possible sensuous experience. Yet, nevertheless, we *think of and understand nature in terms of there being only one nature*. Furthermore, every human being's personal experience is always known as *one whole of experience*. These are rock-bottom facts about experience *the way that human beings know experience*. But since we cannot say with objective validity that "nature itself" *has* such a unity as a property *in itself* and "impresses this fact" upon us (*H. sapiens* has no copy-of-reality mechanism), the very fact that we only *understand* nature as a unity-of-all-things means that our capacity for and faculty of knowledge must *build* this unity into our understanding of nature and experience.

This, however, means that it must be a *law of human mental Nature* that our empirical knowledge is *made in this form*. This law does not belong either to determining judgment (which judges particulars) or to practical judgment (which does not judge objects at all). It resides in the power of reflecting judgment as the fundamental law of the *process* of reflective judgment. This is the principle of formal expedience of Nature. In a manner of speaking, it is the "job" of reflective judgment to *make* everything we know fit snugly in a general and unified universal context. (The notion of "context" – *Zusammenhang* – is one of the most important transcendental notions in Critical metaphysics; nothing that utterly lacks context is real for us).

Thus it is that *all* representations of *every* sense-of-value (more briefly, "all values") are required by the principle of formal expedience to *be* valuable in *some* natural context. This *subjective* notion of reflective judgment is what is meant by "absolute value." Because we cannot "get behind" this rock-bottom notion of an absolute value and explain it in terms of anything more fundamental, absolute value is a *primitive* of affective judgment. Its objective validity for understanding can only be a *practical* objective validity, and we find this in validity for practical appetite under the master regulation of the categorical imperative of pure practical Reason.

At the same time, the *parástase* of reflective judgment is presented as impetuous emotivity to

psyche. This presentation determines motoregulatory expression according to the animating principles governing *psyche*. The cosmological Idea therefore tells us that with every absolute value contained in the manifold of a value there must correspond some scheme of expression that is expedient for the purpose of pure practical Reason.

So it is that subsuming the cosmological acroam under the major acroam (the theological Idea) amounts to subsuming the principle of formal expedience under the law of the categorical imperative. The metaphysical axiom follows at once from this. The axiom MA_t is: ***for every manifold of Desires presented by reflective judgment there is some practical scheme in the manifold of possible schemes of motoregulatory expression associated with it by which the condition of equilibrium can be satisfied***. This is clearly a transcendental axiom, not an empirical one, because obviously it is empirically possible for the motivational dynamic in judgmentation to fail to find this scheme. The phenomenon of suffering is one such example. Santayana wrote,

That we desire to escape pain is certain; its very definition can hardly go beyond the statement that pain is that element of feeling which we seek to abolish on account of its intrinsic quality. That this desire, however, should know how to initiate remedial action is a notion contrary to experience and itself unthinkable. . . . The bitterest quintessence of pain is its helplessness and our incapacity to abolish it. The most intolerable torments are those we feel gaining upon us, intensifying and prolonging themselves indefinitely.

This baffling quality, so conspicuous in extreme agony, is present in all pain and is perhaps its essence. If we sought to describe by a circumlocution what is of course a primary sensation, we might scarcely do better than to say pain is consciousness at once intense and empty, fixing attention on what contains no character, and arrests all satisfactions without offering anything in exchange. . . . In itself it has no resource; its violence is quite helpless and its vacancy offers no expedients by which it might be unknotted and relieved. [Santayana (1905), pp. 224-225]

This sort of failure *is* sensuously exhibited in actual experience, thus is phenomenon. The axiom is the metaphysical homologue to what mathematicians call an "existence proof." Knowing that some mathematical object exists is not the same as knowing what it is, and an existence proof in mathematics never tells us *what* the mathematical object is. It merely declares the objective validity of positing its *Dasein*. So, too, it is with MA_t. Knowing that in every manifold of Desires is contained an absolute value tells us nothing about what action or actions satisfy the condition of that absolute value. The subjective law of reflective judgment merely proclaims the *Dasein* of a satisfactory action scheme. I call this axiom the ***axiom of expedient scheme***.

§ 4.2 The Functions of Rational Intellect Education

The functions of rational intellect education follow from synthesizing the schematic of the rule of commission with the axiom of expedient scheme to produce a combination conditioned under the specifying concept of intelligence-building. The schematic tells us that good schemes are those schemes that succeed in satisfying Reason's demand for *Existenz* in a state of equilibrium. The axiom is a subjectively sufficient existence principle of objective validity in positing the *Dasein* of such a scheme but tells the Subject nothing whatsoever in regard to its *Existenz*. The major acroam tells us that practical Reason will seek to find a satisfactory scheme of equilibration so long as the feeling of *Lust* or *Unlust* is not negated in reflective judgment. *Psyche* is the faculty of *Lust per se* in the Organized Being, and its animating principle of Quality states that the co-determination of somatic representations⁵ and the affective perceptions of Desires in reflective

⁵ For example, nociceptor signals in the body are somatic representations reciprocal with the feeling of pain and the phenomenon of suffering.

judgment are energetics for understanding and reasoning in the structuring of a value system and for the orienting of activity.

However, Reason's ability to find a satisfactory scheme is conditioned by the organization of the Subject's sum-total of empirical knowledge (*a priori* in innate sensorimotor reflexes, practical in the manifold of rules, and cognitive in the manifold of concepts). Reasoning in the motivational dynamic of judgmentation subsists in the Subject's heuristic procedures by which he attempts to discover the sought-for scheme. Properly speaking, heuristic is an adjective that means "helping to discover or learn." One empirical method of education that has been proposed uses the word "heuristic" to mean instruction by which the pupil is trained to find things out for himself. The word heuristic derives from the Greek word *heuriskein*, to invent, discover.

H. sapiens is not born with any *a priori* cognitive knowledge of heuristics. There is empirical evidence providing objective validity for the empirical postulate that some particular aspects of innate sensorimotor reflex organization function as very primitive and behaviorally simple practical heuristics. An example of this can be observed in the development of the sucking reflex of a new-born infant in its first few days of life. Piaget made the following empirical observations:

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, in a quarter of an hour and a half hour after this, respectively, had already sucked their hands like this. . . .

A few hours after birth, first nippleful of colostrum. 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 with the nipple suffices to produce sucking and swallowing. Other children, such as Jacqueline, have slower co-ordination: 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 first placed in his mouth. There are some children, finally, who need real forcing: holding their head, forcibly putting the nipple between the lips and in contact with the tongue, etc.

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 finding 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 gropings characteristic 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. [Piaget (1952), pp. 25-26]

By the twelfth day Laurent had sufficiently developed this sensorimotor skill to the point where as soon as his cheek touched the breast his search for the nipple immediately progressed in

the correct direction to find it [*ibid.*]. Mental physics theory tells us that this means nothing else than that by then he had developed a few early concepts in the manifold of concepts that he could employ for accommodation of perception to practically orient his sensorimotor search. This does not, of course, imply that this infant had yet developed any concept of the breast or nipple as an object distinct and separate from the kinaesthetic sensations of his own movements. In fact, other observations refute such a speculation. His objective cognizance of the situation was wholly syncretic.

Some American psychologists harshly and dismissively criticize Piaget's work in *Origins* on the basis that his study had too few children in it (three) and what the relationship was between Piaget and these children (they were Piaget's own children). This first excuse for ignorance reflects an habitual attitude of a judgment of taste that I regard as rather lazy and lunkheaded in a scientist. There are millions of experienced mothers spread across the face of the Earth who could provide all the observational verification anyone could reasonably demand or a research budget could support. All it would take to tap into this vast pool of "research assistants" would be for the scientist to get over his own self-conceit in thinking that the mere fact he has a degree in psychology disqualifies non-degreed people as competent observers. He would probably also be well advised to prepare himself for being taken for a fool by mothers for asking questions they by and large tend to regard as both absurd and "just the sort of thing a man" would fail to have already noticed. As for the second excuse for ignorance, I do not see how anything about it is the least bit pertinent. Nobody denies that Piaget's children were human beings, and a presupposition that Piaget's own affections for his children would compromise his judgment as a scientist is unsupported by anything I have read or heard regarding Piaget's personality. Hunt writes,

What was he like, this man who could sit with and listen to children for sixty years but who also had the intellectual might to transform a major area of psychology? The unlikely answer: gentle, dignified, benign, friendly, and warm. His colleagues and co-workers all referred to him affectionately as *le patron* (the boss), he never aroused vicious opposition, he almost always responded mildly to criticism of his work, and none of his close associates ever broke with him. . . . The worst one can say of him is that he was so serious that he took almost no interest in children's jokes and laughter. [Hunt (1994), pg. 355]

Piaget even said of himself,

I started to forego playing for serious work very early; this I obviously did as much to imitate my father as to take refuge in both a private and non-fictitious world. Indeed, I have always detested any departure from reality, an attitude which I relate to my mother's poor mental health. [*ibid.*]

For example, when he was ten years old Piaget wrote a scientific report on a partly albino sparrow he had observed in a park; the report was published in a scientific journal – presumably in part because the journal's editor was unaware that Piaget was a ten-year-old boy. He was publishing scientific articles on mollusks in zoology journals before he was sixteen. I'd say the man's lifetime of demonstrated scientific work merits being taken seriously.

More empirical evidence of the self-development of heuristic mental schemes appears in infants by around an average age of eight to nine months. Piaget called the behavioral exhibition of these schemes the "fourth stage of the development of sensorimotor intelligence." There are many observations reported in *Origins* to support his findings. Let us look at what Piaget said about stage IV:

At about 8 to 9 months a certain number of solidary transformations appear concerning at the same time the mechanism of intelligence and the elaboration of objects, of spatial

groups as well as of causal and temporal series. These transformations seem important enough to characterize the appearance of a stage: that of the first actually intelligent behavior patterns⁶. . . .

In short, the reactions of the third stage . . . constitute the simple prolongation of the primary circular reactions; they owe only to their complexity the fact of drawing, after the event, a distinction between transitive and final states, between means and ends. On the other hand, the behavior patterns of the fourth stage involve such a distinction at the very outset. The criterion of their appearance is, in effect, the coordination of the secondary schemes. Now, in order that two schemes, until then detached, may be coordinated with one another in a single act, the subject must aim to attain an end which is not directly within reach and put to work, with this intention, the schemes hitherto related to other situations. Thereafter the action no longer functions by simple repetition but by subsuming under the principal scheme a more or less long series of transitional schemes. Hence there exists simultaneously the distinction between the ends and the means, and the intentional coordination of the schemes. The intelligent act is thus constituted, which does not limit itself merely to reproducing the interesting results, but to arriving at them due to new combinations. [Piaget (1952), pp. 210-211]

This phenomenon is nothing else than an exhibition in actual experience of behavior that implicates the *Dasein* of a human capacity to develop *scheme-making schemes*. As the matter of a scheme-of-schemes consists of schemes, and because the character of the scheme-making scheme requires sufficient cognizance of schemes to be able to imagine *concepts of coordination* – and the object of a concept of coordination can never be presented directly in the data of sensation through receptivity – the phenomenon provides a demonstration *in concreto* of the *Dasein* of a capacity in the motivational dynamic of judgmentation *to imaginatively produce heuristic procedures*. The *development of this capacity* is the object of the functions f_{ij} in rational intellect education. I.e., the idea of developing this capacity is the objective of intelligence-building instruction under the specifying concept of intelligence-building.

Inferences of coordinations are empirically developed *concepts* arising from the synthesis carried on in the thinking and conceptualization loops in *nous* (figures 7.2, 7.3). They are what is meant by the objects *Coord.S* and *Coord.O* in Piaget's schematic illustration of the general form of practical type-II interaction schemes (figure 7.4). *Obs.S* and *Obs.O*, by contrast, are concepts of appearances in the manifold of concepts (this is why Piaget called them "observables"). Schemes *OS* and *SO*, as well as the interaction scheme denoted by the double arrow, represent the role of the manifold of rules and impetuous emotivity in scheme-building.

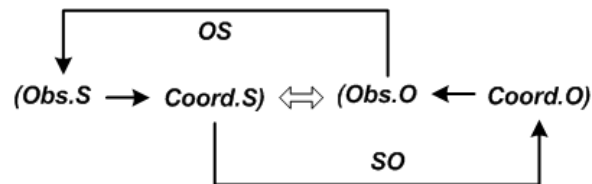


Figure 7.4: Illustration of the general form of type-II interactions.

⁶ As a scientist, Piaget was extremely cautious and conservative about how much behavioral evidence he required before he would put forth an hypothesis. In this case, he was unwilling to call any behavior "evidence of intelligence" until he was past any reasonable doubt that the behavior involved both intention and innovation. Mental physics, on the other hand, says that the development of intelligence begins no later than the first day of life provided the newborn infant is not environmentally deprived of the opportunity for experiential situations that are provocative of educational Self-development. As a mental Object the idea of intelligence is objectively valid only in the context of it being a capability, never in the context of it being some mysterious sort of *Sache-thing* (as mental habits of realism in thinking tend to make it out to be).

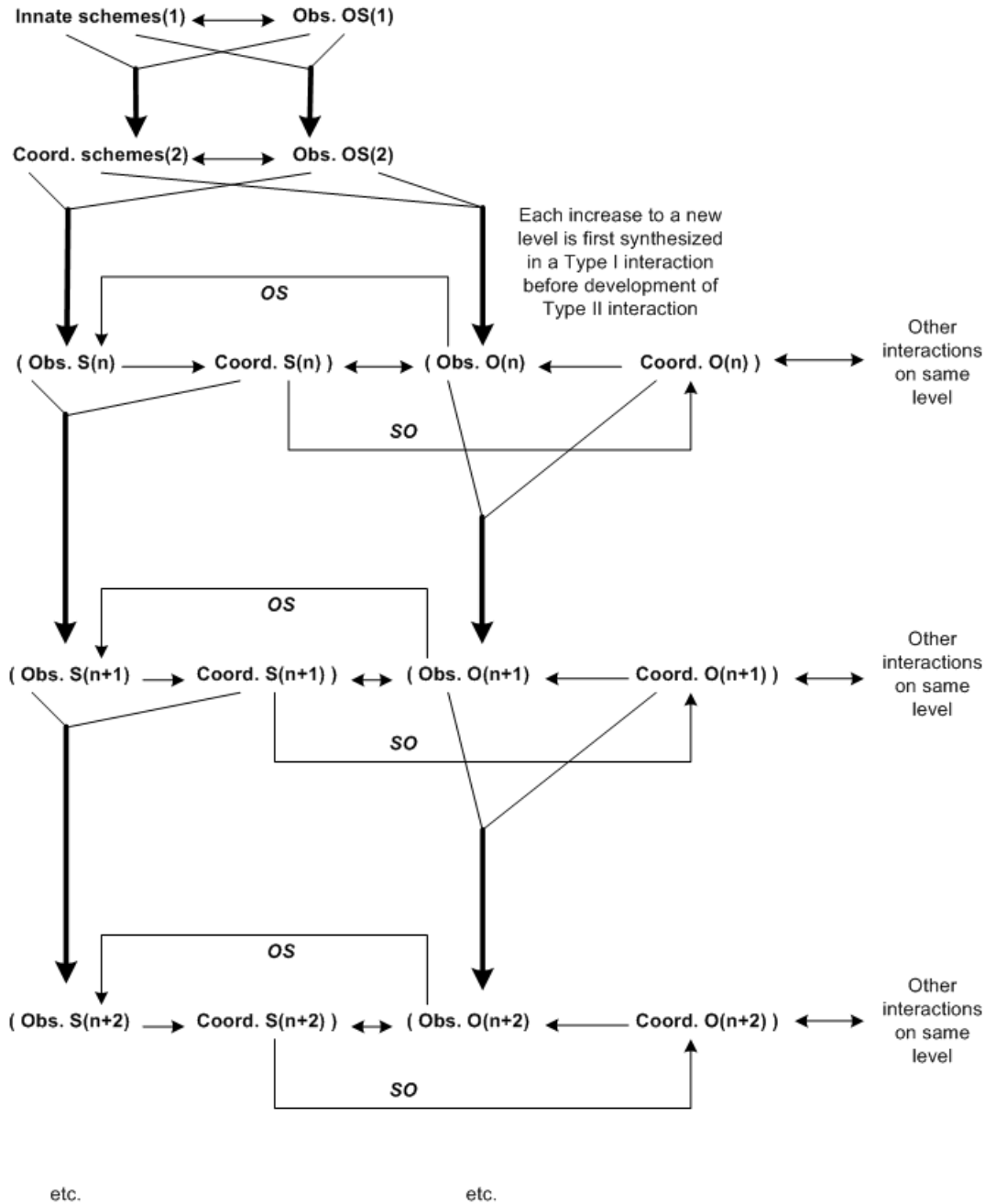


Figure 7.5: Schematic illustration of the empirical hierarchy of scheme-building demonstrated by the researches of Piaget, *et al.*

The metaphysical axiom establishes the objective validity of the *Dasein* of scheme-building schemes (heuristics) in which subsists the development of intelligence. The *Existenz* of the form of heuristics development, on the other hand, must consult empirical science for its elaboration. Figure 7.5 illustrates the main finding coming out of the work of Piaget's research organization [Piaget (1975)]. Functions $f_{i,j}$ in the applied metaphysic pertain to *instruction* for empowering the learner to develop this potential power residing in the Nature of the motivational dynamic of *H. sapiens*. Σ_2 pertains to *outcomes* this instruction must produce (because the rule of commission is a *terminating* determination of appetitive power in regard to ratio-expression).

After one has comprehended the significance of these considerations, arrival at the correct deduction of the functions themselves might seem almost trivial by comparison. In the context of the learner-as-a-free-person, $f_{t,1}$ is ***provision in the curriculum of exercises through which the learner practices developing his ability to construct heuristic procedures applied to dead-matter objects***. This means the learner must be presented with concrete dead-matter problems, puzzles, situations, etc., new in character to his prior experience, and require him to grope and experiment in order solve the problem, answer the puzzle, resolve the situation, etc. He *must not* be told *how* to solve the problem, work the puzzle, etc.; in other words, he must not be *given a technique*. He must instead be set to the task of *developing a technique* in the absence of *a priori* knowledge of how he can attain the objective. Naturally, the task he is confronted with must be designed to be one within the reach of a person at his current level of intelligence capability.

The function $f_{t,2}$ is similar to this except for the context of the application. In this case, the aim of the exercises targets heuristic procedures applied live-matter objects (other people) to build maxims of socially cooperative behaviors. Thus, the statement of $f_{t,2}$ is ***provision in the curriculum of exercises through which the learner practices developing his ability to construct heuristic social procedures applied to live-matter objects***. I call $f_{t,1}$ ***heuristics of technique***, $f_{t,2}$ ***heuristics of social custom***. The first pertains to vocational intellect education, the second to moral intellect education.

One thing about all this I wish to point out is the relationship between empirical findings such as those of Piaget and metaphysics. Piaget's findings come out being congruent with what is predicated in consequence of the metaphysical acroams and principles. Those acroams and principles do not derive from the empirical findings. Empirical findings merely test the predictions of rational theory. They play no role in metaphysical deduction other than as aids for guiding the applied metaphysician in determining the proper context for his specifying concepts.

§ 5. Empirical Intellect Education

§ 5.1 The Metaphysical Axiom

The minor acroam for the empirical function is the psychological Idea: unconditioned unity of value. This phrase means that the Desires presented by reflective judgment and the rule structure of practical Reason are regulated to be compatible with each other. Synthesizing $\mu_e \subset M$ therefore merely says that good choice in the appetitive determination of actions means choosing that act by which expression of Desires does not contradict the Subject's self-constructed "legal code" that he represents in his manifold of rules. I call this axiom the metaphysical ***axiom of choice***: *chosen actions are non-contrary to the actor's value system*.

This basically implies all choices can be really only be validated or invalidated *ex post facto* of first expression of a particular manifold in Desires. The determination is made on the basis of *discovery* of unity or disunity between Desires and practical law. The first time a particular manifold of Desires is presented to appetitive power, wherein no part of the manifold has previously been applied to motoregulatory expression in *psyche*, the manifold of rules will contain no rules governing its expression. Therefore there is no possibility of contradiction, the impetuous act of reflective judgment is not-invalidated and will go forward in motoregulatory expression. Reason knows no objects and feels no feelings. Its manifold of rules is in a manner of speaking an empirical history of actions that resulted in unsatisfactory outcomes.

Furthermore, a manifold of Desires that has been previously expressed and for which that expression did produce a satisfactory outcome (progress towards a state of equilibrium) will not have provoked any accommodation in the manifold of rules (by practical judgment). In this case, the next time that same manifold of Desires is presented it is again not-contradictory and will

produce the same action expression as before. One might say metaphorically and in a poetic sense that all Desires are innocent until proven guilty. A manifold of Desires is "proven guilty" if the outcome of its expression proves contrary to preserving an initial state of equilibrium or proves to be a hindrance to achieving one.

Practically speaking, measuring efficacy for or hindrance of achieving and maintaining a state of equilibrium is what the feelings of *Lust* or *Unlust* in affective perception accomplish. The feeling of *Lust* is a measure of progress towards equilibrium while that of *Unlust* is a measure of departure from it. If, metaphorically, we regard these feelings as analogous to force vectors in classical physics, they are oppositely-directed force vectors and equilibrium is judicially the state obtained when these two force vectors negate each other's effects. Good choice in determination of appetitive power is verified by outcomes that result in progress towards real negating of these feelings. To the degree that one or the other of these feelings predominates, the value presented in the manifold of Desires is incompletely realized and this implicates the *Dasein* of some additional condition by which realization of value is further perfected. Appetition chooses to effect ratio-expression when the *Dasein* of such a condition is implicated by perceived imbalance between the feelings of *Lust* and *Unlust*. All acts of ratio-expression evoke acts of determining judgment through which sensible representation in apprehension and apperception is changed, and this is none other than the real-explanation of motivation in Critical metaphysics.

One can see in this overall picture of the free play of judgmentation the character of the animating principle of Quality in *psyche*: *the co-determination of somatic representations and the affective perceptions of Quality in reflective judgments are energetics for understanding and reasoning in the structure of a value system and for the orienting of activity*. Quality in the 2LAR of the adaptive *psyche* is called **noetic Kraft**, which means the power of *nous* to produce or suffer effects. Perhaps you have already been asking yourself how the principles of the applied metaphysic of public instructional education pertain to the learner's *psyche* (since such a connection is inherent in every system of principles that pertain to Self-development activities). The axiom of choice is one of those principles where exhibiting this connection is relatively easy.

It is of informative value to look back retrospectively, in this context, at the axiom of design-objectives-of-social-outcomes in corporal education. This axiom states: the objective of corporal empirical education is to orient and guide the learner's educational Self-development of his manifold of rules to produce a common system of meaning implications for laws of social intercourse that lead to congruent moral customs of behaviors and maxims of Enterprise for which actual agreement to the laws of this system by every citizen in the Community is made possible. We can compare this with the animating principle of Quantity in *psyche* (somatic *Kraft*, the power of *soma* to produce or suffer effects), which states: *reciprocity through somatic Kraft is determination of a condition, called an elater animi⁷, through which the structuring of somatic actions expresses acts of aesthetical judgment of the form of a system of values, desires, and interests*. It is not difficult to appreciate, once the context of connection has been brought out, that the axiom of Quantity for empirical education likewise has a connection of pertinence with the animating principle of Quantity in *psyche*.

The two metaphysical axioms of corporal and intellect empirical education are axioms of composition, i.e., both pertain to the *matter* of Progress in developing learner *Personfähigkeit*. It is worthwhile to point out that if we take the simplest description philosophers use in trying to explain what "ethics" means, these axioms of composition have a bearing on a real-understanding of the notion of ethics. The simplest description of ethics, the one that is provided in *The Oxford Dictionary of Philosophy*, holds that ethics is "the study of the concepts involved in practical

⁷ literally, "driver of mind." An *elater animi* is a ground of determination or a source of the possibility for producing represented, determining, or impelling causes.

reasoning: good, right, duty, obligation, virtue, freedom, rationality, choice" [Blackburn (1996)]. I think the contextual linkage between this and the metaphysical axioms of empirical education is probably apparent enough to you that I need not belabor the point here. A person who adopts an attitude of coldly abstract psychologism in his appreciation of the axioms is likely to miss putting together two important appreciations of the role of public instructional education. He is likely to appreciate the role it plays for Progress in the *Personfähigkeit* of the learner. What he is likely to miss is appreciation that this Progress *includes* Progress in constructing a system of *deontological* ethics, which becomes established as the learner discovers how *his* Progress in his own *Personfähigkeit* is bound up with his ability to live in harmonious *cooperation* with others in his Society. The philosophical concepts Blackburn specifically identified above are concepts without objects, emptied and set adrift, outside this *social* context of their expression.

The Romans, whose institution of education is the ancestral sire of today's Western institutions of education, made ethics the centerpiece of their system. In their case ethics was predominantly utilitarian and, in the greatest measure, can be characterized as a mixture of Stoic and Epicurean principles. This character comes through fairly clearly in the writings of Cicero and Marcus Aurelius. Its foundation was a Stoic-religious eclecticism demonstrated by Roman practices of augury and veneration of Rome's pantheon of gods. The Stoic motto, "The Fates guide the man who wishes to be guided; the man who does not wish to be guided they drag along," was one the Romans appear to have adopted whole-heartedly. The Romans were very much a people for whom the ends justified the means. The Roman notion of *mos maiorum* – respect for old customs – very much reflects this and was the pivot point of Roman education. The tradition continued in medieval education in Europe, as this was instituted by the Roman Catholic church, but with a shift in emphasis from utilitarian- to virtue-oriented ethics. It remained, however, eclectic inasmuch as utilitarian considerations – namely, personal salvation and an afterlife in heaven – were always a central feature in medieval education. This tradition was handed down to American institution of education and remained its central premise until well into the nineteenth century. Acknowledgement of an ethical foundation for education continued into the twentieth century, but in a form that was more re-focused on utilitarianism and deemphasized sectarian religion without completely abandoning it (so long as the religion was one of the divers Christian, and preferably one of the Protestant, religions).

Ultimately, however, the ethical foundations of Western education disintegrated and are today barely discernible. This was inevitable by human Nature because the foundational presumptions were and are ontology-centered. This is to say the ethics being appealed to removed the ethical ground from within the individual, attempted to plant it in one form or another in a mystical exterior ground, and then tried to tempt or coerce the individual into obliging himself to respect this exterior teleological cause. This, more than anything else, is what leads to the acts of coercion typical of all systems of ontology-centered ethics⁸. The ancients, the schoolmen, and the early American ministers were not, however, altogether wrong in their ratiocinations that ethics is a real factor in the institution of instructional education. Their error was not in this judgment of taste but, rather, in their ontological centering of theories of ethical motivation. The distinction between their institutions and the principles of the applied metaphysic is that theirs presumed ontological, the present metaphysically deontological, ethics. The former are non-human-natural

⁸ When the agents of an institution attempt to coerce compliance by force or the threat of force, their actions provoke *only* maxims of Obligation-to-Self in the individual being coerced. Educational Self-development consequences of this actually train the individual to live in state-of-nature relationships with others. Civil relationships grounded in mutual Obligations and Duties can never be imposed on one person by any other person but, instead, can only be Self-imposed. External coercion without deontological Self-commitment inevitably leads to formation within a Society of a Toynbee proletariat who hold little or no Self-commitment to that Society. The result is eventual disintegration and the death of the Society.

theories, the latter a human-natural theory.

§ 5.2 The Functions of Empirical Intellect Education

Σ_e is the rule of omission schematic. The synthesis of the schematic with the metaphysical axiom under the context of intelligence-building is a synthesis pertaining to an actor's choice to effect a veto of motoregulatory expression and, simultaneously, carry out ratio-expression stimulating the motivational dynamic in judgmentation (figure 7.6). It is furthermore a choice by which an act of educational Self-development is evoked. The real-explanation of the meaning of this synthesis is not hard to find. It implies, first, that *failure* in what the learner is attempting to achieve is a necessary first step in the process of learning. The functions therefore pertain to instigation of a learning event by means of *a tension-producing failure*.

This is likely something many modern American educators will initially feel uncomfortable about accepting. The very idea goes against the prevailing grain of teaching ideology in the United States. "What about the child's sense of self esteem?" some will protest. What kind of person, after all, intends to deliberately set a child up to fail? A child abuser? My answer is, "No, a teacher." *Every act of learning involves accommodation of either the manifold of concepts or the manifold of practical rules, or both.* A great mass of empirical findings from psychology point out beyond reasonable doubt that some initial perception of failure is necessary to stimulate a learning event. Piaget's school, of course, has been unequivocal about this for decades, but his is not the only school of psychology to come to the same conclusion. What one must attend to very carefully is what nature, degree and extent of failure is educationally productive and at what point failure becomes counterproductive.

To understand this, however, requires us to clearly comprehend what "failure" is. At first brush this seems like a trivial question. After all, doesn't everyone know what "failure" means? Well, apparently not. Webster's (1962) provides eight different definitions of the word, so either everyone does not know what "failure" is or the word has been saddled with so many contextual or metaphorical nuances that as a general term it has become meaningless⁹.

To untangle the confusion we have to go back to it's Latin root, which in this case is the verb *fallere*: to belie the expectation of, disappoint (a person). The verb leads directly to the only one of Webster's eight definitions of the word failure that has real psychological significance, namely, "a not succeeding in doing or becoming" [Webster (1962), def. 5]. The other common English usages of the word are transferences of a different Latin word, *defectio*, which means "a process of falling short, deficiency." Transference takes the meaning of "failure" from an epistemology-centering in the person who *perceives* something as "being failure" to an ontology-centering that *attributes a blame* as a character flaw the person has somehow come to possess. This, of course, is a mystic fallacy somewhat akin to saying "the devil made him do it."

Even so, the significant definition in Webster's also makes a turn towards ontology because "a not succeeding in doing or becoming" is a "happening" (an *Unsache*-thing), which also transfers the dictionary meaning from the person who perceives failure to the thing he is perceiving the appearance of. To remain epistemology-centered, we have to leave the idea wherein its cause subsists, and this is place is *within the perceiving person*. The *Realerklärung* of **failure** is *perception of lack of congruence between the appearance of a phenomenal object and the appearance of an Object of anticipation*. This is the *Realerklärung* from the judicial Standpoint. In the practical Standpoint and under our specifying concept, this specializes to *perception of lack of congruence between the appearance of an Object of anticipation and the phenomenal appearance of the outcome of an action intended to make the anticipated object actual*.

⁹ It is interesting in this regard to note that "failure" is not a designated technical term in psychology.

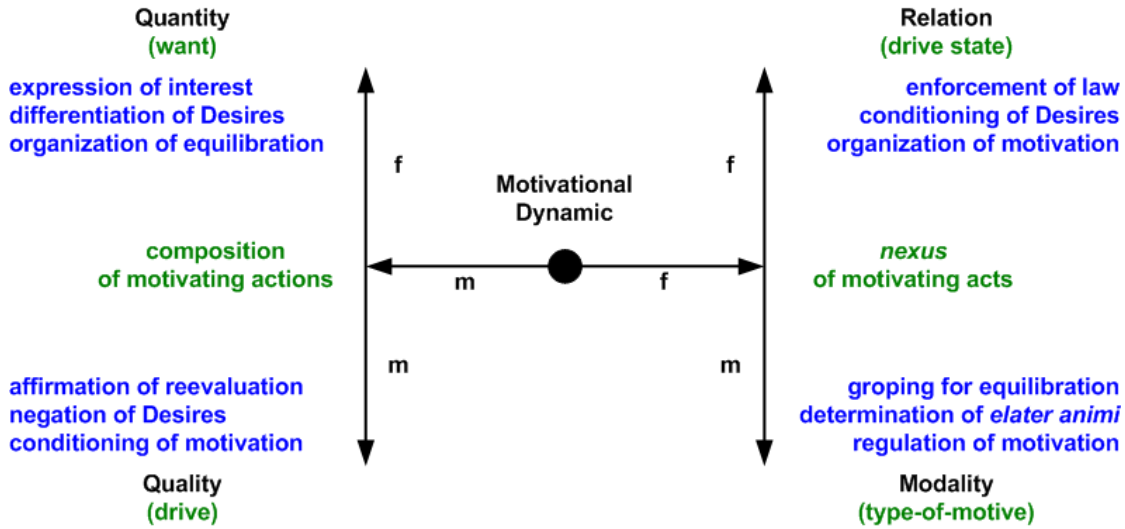


Figure 7.6: 2LAR of the motivational dynamic.

What, though, does "anticipation" mean? This term is a technical term from metaphysics proper. *Anticipation* is *knowledge through which an Organized Being can recognize and determine a priori what belongs to empirical cognition*. Put more simply, it is the ability to perceive objectively what to expect empirically in appearances before the fact. The power of reproductive imagination (figure 7.3) enables the thinking person to represent an object *a priori* using concepts he already has in his manifold of concepts. This is how, among other things, a human being is able to sensibly represent something that he hasn't yet experienced. Kant called this the *facultas fingendi*¹⁰ or fictive faculty of a human being [Kant (1783), 29: 884-887]. All cognitive goals and aims are products of a person's *facultas fingendi*. A cognitive goal or aim, even if its representation is merely intuitive and not fully conceptual, is an Object of anticipation and the product of *facultas fingendi*.

Failure, then, is an unexpected feeling of dissatisfaction, experienced when the appearance of an actual outcome disagrees with the expectation produced by anticipation, *and nothing else*. A feeling of dissatisfaction is a feeling of *Unlust* and thus failure is an affective perception of a disturbance to equilibrium. The perception provokes a motivational dynamic characterized by the four constitutive functions of expression of interest (Quantity), affirmation of reevaluation (Quality), enforcement of practical law (Relation), and groping for equilibration (Modality) (see figure 7.6). The consequence of this is called *tension* and the effect on the human being is change in behavior from whatever would have normally followed in his current scheme of action to a new scheme of behavior that is now going to be judged and evaluated not in terms of the original goal or aim but for the practical purpose of re-establishing a state of equilibrium.

Failure evokes the synthesis in judgmentation. Figure 7.7 [Wells (2012a)] illustrates an embedding field process for this synthesis in the motivational dynamic of judgmentation. There are only two ways by which this process can come to a termination. One of these is cycle rupture, the complete abandonment of the attempt to restore equilibrium within the structure of the active scheme in which failure originated. Under this reaction there are again two different courses for the new action scheme to follow. One of them is to abandon the effort completely and dismiss the object as unimportant or not worthy of additional effort. This is the response that is allegorized in Aesop's fable of the fox and the grapes and it is educationally counterproductive.

¹⁰ ability to form a mental picture

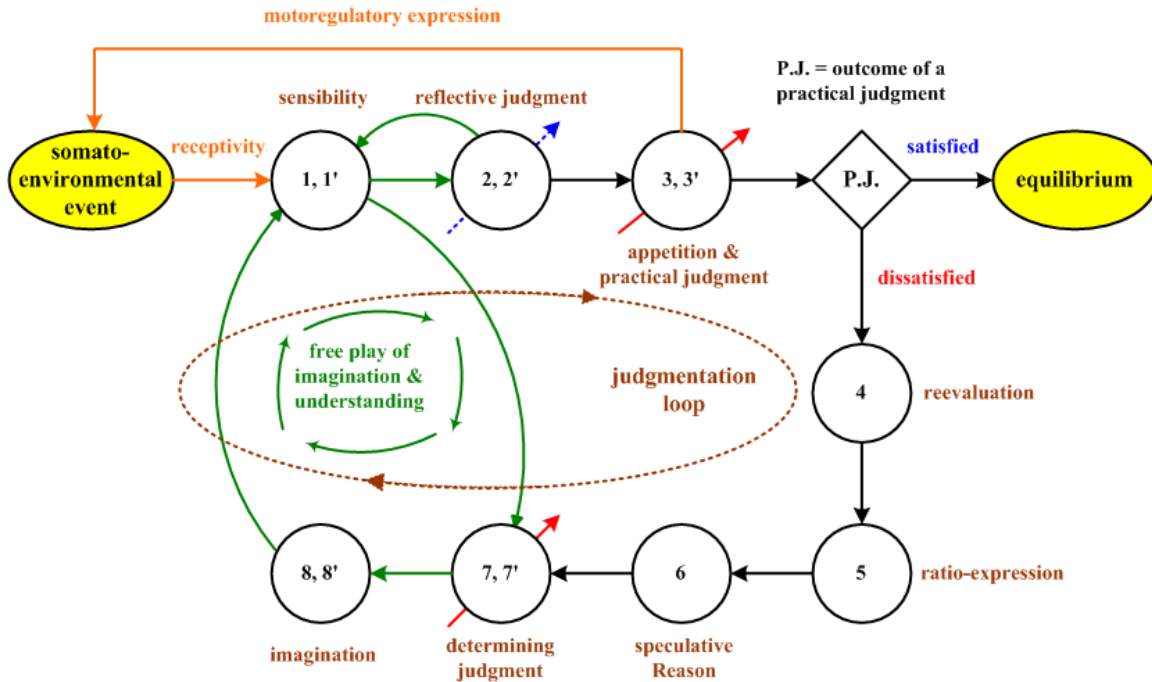


Figure 7.7: Logical synthesis in the motivational dynamic modeled using an embedding field.

The second response in a cycle rupture is to put off satisfaction of the original goal and make a new goal to seek help from another person or resource. In the context of education this other person is asked to serve in the role of teacher. This is the productive outcome of a cycle rupture but in order to have this outcome the learner must first have developed a practical maxim for seeking assistance. *Teaching the learner to develop maxims of this sort is the educational purpose for deliberately introducing the provocation of failure into the teaching-and-learning process.* Maxims of seeking assistance are not innate nor are they *a priori* reflexes. They are learned behaviors. This is something even Vygotsky correctly concluded (despite his fatal infection of Hegelian philosophy at the foundations of his overall education theory, an infection that makes his *system* transcendent and objectively non-valid):

We call the internal reconstruction of an external operation *internalization*. A good example of this process may be found in the development of pointing. Initially this gesture is nothing more than an unsuccessful attempt to grasp something, a movement aimed at a certain object which designates forthcoming activity. The child attempts to grasp an object placed beyond his reach; his hands, stretched toward that object, remain poised in the air. His fingers make grasping movements. At this initial stage pointing is represented by the child's movement, which seems to be pointing to an object – that and nothing more.

When the mother comes to the child's aid and realizes his movement indicates something, the situation changes fundamentally. Pointing becomes a gesture for others. The child's unsuccessful attempt engenders a reaction not from the object he seeks but *from another person*. Consequently, the primary meaning of that unsuccessful grasping movement is established by others. Only later, when the child can link his unsuccessful grasping movement to the objective situation as a whole does he begin to understand this movement as pointing. At this juncture there occurs a change in that movement's function: from an object-oriented movement it becomes a movement aimed at another person, a means of establishing relations. *The grasping movement changes to an act of pointing.* [Vygotsky (1930), pg. 56]

This interpretation of behavior by Vygotsky can be traced back to a Critical capacity of mind, closely related to *facultas fingendi*, that Kant called *facultas signandi* (the capacity of signifying) [Kant (1783), 29: 887]. Vygotsky's work is not devoid of correct (Critical) foundations in many cases where he focused it on specific empirical cases. It is merely his generalizations that sail off into the Hegelian fogbank and forfeit claims to objective validity.

The other possible termination of the motivational dynamic synthesis is, of course, the case where the learner discovers for himself an accommodation of his original scheme and is able to apply it to successfully accomplishing his original aim. This, however, pertains to the third set of functionals, $f_{\Delta j}$, I take up in the next section. For the case of the functionals f_{e_j} it is the function of failure in instructional education that currently occupies us.

Failure is educationally productive only when the failure-provoking experience does not lead to termination in cycle rupture of the first kind described above. Let us take a look at the allegory of sour grapes:

There was a Time when a *Fox* would have ventur'd as far for a Bunch of *Grapes* as for a Shoulder of Mutton; and it was a *Fox* of those Days, and that Palate, that stood gaping under a Vine, and licking his Lips at a most delicious Cluster of Grapes that he had spy'd out there; he fetch'd a hundred and a hundred Leaps at it, till at last, when he was as weary as a Dog, and found that there was no Good to be done; *Hang 'em* (says he) *they are sour as Crabs*; and so away he went, turning off the Disappointment with a Jest. [L'Estrange (1662), pg. 221]

There is an educational moral to the story of *The Fox and the Grapes* we should not allow to slip past us. A "sour grapes" maxim is one of the quickest and easiest routes by which *impatient* practical Reason can find a satisficing equilibrium by type- α compensation behavior (ignorance of the disturbing situation). Instruction that provokes as an act of educational Self-development the formation of "sour grapes" maxims in effect *teaches the learner to accept lack of accomplishment* and stunts Progress in his development of the intellectual power of his person. This is precisely the sort of lesson an institution of public instructional education must *not* teach.

The design of failure-provoking experiences must strike a rather delicate balance between producing tension that leads to productive motivation and tension that arouses such a high intensive magnitude of the feeling of *Unlust* that the cycle rupture is characterized by *frustration* in the context that psychologist Harold Leavitt employed that term. Leavitt wrote,

Frustration is a "feeling" rather than a "fact." It is a feeling that arises when one encounters certain kinds of blocks on paths to certain kinds of goals. These feelings arise when the block seems insurmountable and when failure to surmount it threatens one's personal well-being – when the goal involves the self. . . .

Many obstacle situations are depriving rather than frustrating because the obstacles do not seem insurmountable or the goals are not central to the self. Some people may therefore meet fewer frustrations than others because they have more ways around more obstacles or because they are self-confident enough so that their self-esteem does not have to be proved again by every new problem they encounter. [Leavitt (1972), pg. 38]

Failure provocation is necessary for the possibility of Progress in intelligence development but the situations in which it is provoked must be *non-frustrating* situations. This means that the "block" (as Leavitt put it) must occur as a situation where the learner is able to solve the problem, either by himself or by learning that others can help him when he experiences failure. This at last brings us to the empirical functions. Function $f_{e,1}$ is inclusion in the curriculum of non-frustrating failure experiences involving dead-matter objects. I call this the *non-frustrating technical failure*

function. Function $f_{e,2}$ is inclusion in the curriculum of non-frustrating failure experiences involving live-matter objects, specifically, other people who help the learner find the solution. I call this the **non-frustrating social failure function**. In these labels, the terms technical and social refer to *the method by which the learner learns how to achieve success*. Technical failure denotes failure provoking experiences in which re-equilibration is possible by development of technical maxims of personal skill. Social failure denotes failure provoking experiences in which re-equilibration is possible through development of maxims for seeking the aid of other people. The function labels refer to the class of lesson in relationship to the two learner dimensions. The object of the $f_{e,1}$ function is development of maxims of seeking technical maxims of skill. The object of the $f_{e,2}$ function is development of maxims of seeking cooperative social maxims of skill. The social functions of the next section pertain to how the lesson is taught.

Lessons of the first class pertain to the learner learning how to deal with hindrances to and limitations of his personal liberty of action. It is in this context that these lessons belong to justice education because the concept of justice pertains at its roots to the civic scope of personal liberty. Lessons of the second class pertain to the learner learning how to employ liberty cooperatively in associations with others, and in this context these lessons belong to enterprise education because they pertain to the employment of liberty in Society.

§ 6. Social Intellect Education

§ 6.1 The Metaphysical Axiom

The final minor acroam μ_Δ is the practical acroam of Quality in the physical Idea. Kant named this acroam the Anticipations of Perception. In the practical Standpoint the acroam states: the degree of perception is a consequence of the regulation of sensibility through validation of acts of reflective judgment. Subsumed under the regulative principle of good choice, $MA_\Delta = \mu_\Delta \subset M$ is an axiom of learning based on discoveries of compensations for disturbing factors that do not involve the simple ignorance of type- α compensation behavior but, on the contrary, negate the disturbance through a series of scheme adaptations that convert disturbance factors into mere variations dealt with by modifications or variations of the original action scheme. For this reason I call this axiom the **axiom of variations**. The new compensation behavior developed through the motivational dynamic was called type- β compensation by Piaget [Piaget (1975), pp. 67-68].

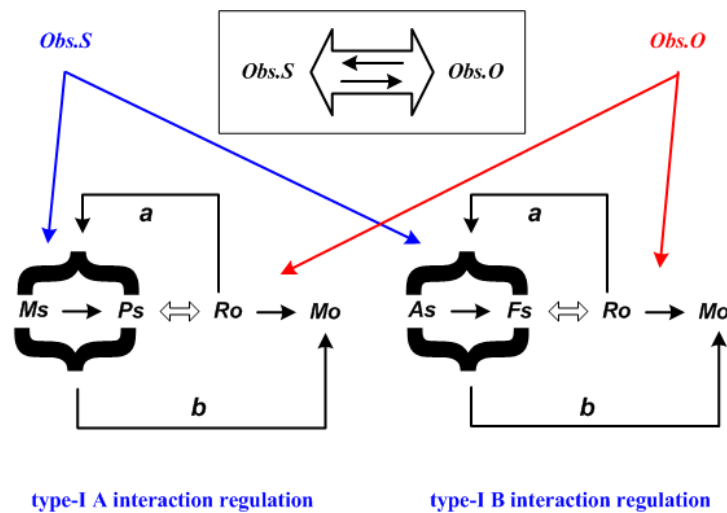


Figure 7.8: Regulation by type-I interactions. Type-I A depicts sensorimotor schemes. Type-I B involves rational schemes of thinking. The inset is a simplified schematic depiction of type-I interaction.

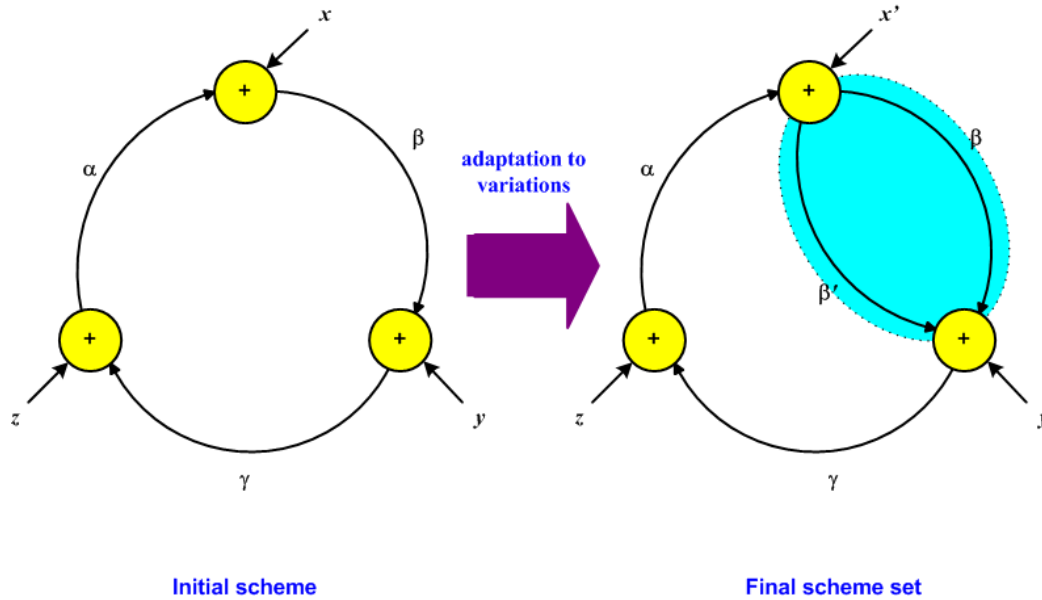


Figure 7.9: Illustration of scheme adaptation restoring equilibrium by means of type- β compensation.

Human beings require no instructional assistance to produce maxims of type- α compensations. Syncretism in reflective judgments of perceptions, lack of distinctness in the manifold in an intuition, and the impatient character of practical Reason all favor satisficing by ignorance. In a great many cases differences between the object of anticipation and the phenomenal object can be cancelled by a simple adjustment in a type-I interaction regulation (figure 7.8) [Piaget (1975), pp. 47-51]. The distinguishing feature of a type-I regulation is the absence of inferential coordination in scheme observables (*Obs.S*) and object observables (*Obs.O*). In type-I A regulation *Obs.S* is a physical action scheme observable by means of kinaesthetic feedback from the person's own body and *Obs.O* is his perception of the object's appearance. *Mo* represents the object's movement and *Ro* depicts a perceived resistance of the object to move as the Subject desires. *Ms* represents the Subject's sensorimotor scheme and *Ps* represents the Subject's perception of the effort he is applying in executing the scheme. Functions *a* and *b* are comparison functions. Type-I B is similar except now the scheme observable is a mental scheme of operation with *As* depicting the mental activity, *Fs* depicting the application of the operation, *Mo* depicting modification of the object, and *Ro* depicting the object's resistance to being put into a desired form. Formation of type-I regulations always precedes formation of type-II interactions because the latter improves on the former through the addition of inferences of coordinations.

Equilibrium achieved by type- α compensation is non-robust. A relatively small change in the situation can be enough to provoke a new failure because neither accommodation of the manifold of concepts nor accommodation of the manifold of rules is needed to effect ignorance. Type- α compensation is what is referred to when some speaks of "seeing only what one wants to see." It involves merely judgments of taste and not improvement of cognitive knowledge. In contrast, type- β compensation produces a real improvement in equilibrium robustness because it involves accommodation of one and often both manifolds and brings inferences of coordination (type-II regulations) into play. There is an accommodation of the scheme and, if the disturbance is of sufficiently large intensive magnitude, a Classification of the scheme into sub-schemes based on perceived variations among divers but similar situations. Figure 7.9 illustrates re-equilibration by scheme adaptation in type- β compensation. Let α , β , and γ represent schemes and let x , y , and z represent aliments of the problem or task situation (object and environment factors). In equilibrium the aliments are assimilated into the schemes such that the sequence forms a stable

closed cycle, e.g.,

$$\begin{aligned}x + \alpha &\rightarrow \beta; \\y + \beta &\rightarrow \gamma; \\z + \gamma &\rightarrow \alpha; \text{ etc. [Piaget (1952), pp. 5-7].}\end{aligned}$$

Now suppose there is some variation in aliment x such that the new version of the aliment, x' , can not be immediately assimilated. One of two things then happens. Either the cycle is ruptured *or* an accommodation transforming scheme β into a modified scheme β' is effected. This form of accommodation is the object of instructional education. The restored equilibrium cycle becomes

$$\begin{aligned}x' + \alpha &\rightarrow \beta'; \\y + \beta' &\rightarrow \gamma; \\z + \gamma &\rightarrow \alpha; \text{ etc.}\end{aligned}$$

Schemes are structures and scheme accommodation is conservative. The latter means the person does not lose his capacity to assimilate the old aliment x when he learns to accommodate to the variation x' . Thus β and β' are scheme variations within the original scheme structure.

Piaget provided the following description, which is congruent with mental physics, of type- β compensation:

Another behavior will consist of integrating into the system the disturbing element arising from without. The compensation then no longer consists in canceling the disturbance or rejecting the new element, so that it will not intervene within the whole set already organized, but in modifying the system by "equilibrium displacement" so that the unexpected fact is made assimilable. The description will thus be improved; the classification will be recast to coordinate the new category with the others; the seriation will be extended or distributed in two dimensions, etc. Or a causal explanation contradicted by an unexpected fact will be completed or replaced by another explanation which takes the new factor into consideration. In short, what was disturbing became a variation within a reorganized structure, thanks to the new relations which make incorporating the element possible. . . .

It is not playing with words to speak here of a compensation mechanism, although now we refer to essentially conceptual compensations which follow the displacement of equilibrium produced by the integration of the disturbance . . . The rehandling which is part of the conceptualization modifies, more or less profoundly, the initial system; for example, the subject will substitute for the predicative opposites (such as "small" and "large") reciprocal relations ("more or less large" or "more or less small"), or he will introduce solidarities (such as perceived unity between the extension and thinning out of a sausage, and inversely between its shortening and the enlargement of its diameter), or in a general way he will reason about the increase or decrease of the value of a function's variables which express any dependency of significance or are inserted in a causal model, etc. In short, by integrating or internalizing the disturbances at play in the cognitive system, these type β behaviors transform them into internal variations which are capable of being compensated, still partially but nevertheless in a manner quite superior to that of type α behaviors.

Let us note, moreover, that these type β compensations extend, in a way, the cancellation of type α (when weak disturbances are involved) by an equal and opposite modification. But here the new modification is not meant to cancel the one which the disturbing object introduces; on the contrary, it alters the assimilation scheme itself to accommodate the object and follows its orientation. In this situation there is, therefore, equilibrium displacement but with minimization of the cost (as much as possible of the assimilation

scheme is conserved and with maximal gain the disturbance is integrated as a new variation in the scheme). In addition, since this integration by scheme accommodation conserves the maximum assimilation compatible with the new variation, the disturbance is eliminated as disturbance. [Piaget (1975), pp. 67-68]

The axiom of variations says all this is achievable. However, there is one subtle supposition contained in the above discussion. The supposition is that the learner can actually make use of subschemes such as $\{\beta, \beta'\}$ in figure 7.9, i.e. he can recognize empirical *options* and choose from among them. This is not automatic and it takes more effort on the part of the learner to recognize options than to ignore variations. This brings us to the social functions of intellect education.

§ 6.2 The Functions of Social Intellect Education

Schematic $\Sigma_{2\Delta}$ can be regarded as a differentiating schematic in the following sense. Under the schematic some motoregulatory expressions go forward and become expressed actions while others are vetoed and blocked by appetitive power (figure 7.3). Now, all actions of motoregulatory expressions arise from presentations in *nous* represented in the manifold of Desires. Actions that are said to be volitional inasmuch as they are consciously directed toward a goal and are goal dependent must, furthermore, depend upon cognitive presentations as partial causes of the action. This is because the manifold of Desires is not a structure and its judgment is not conservative.

An action scheme actualized in motoregulatory expression is exhibited in appearances as a temporal sequence. Schemes, by definition, must be applicable to divers objects and situations in the external environment and this means that accommodation of the sequence in motoregulatory expression occurs (figure 7.9). This character of motoregulatory expression is made possible by the schematic of the rule of exception because there is no means by which external variations can be said, with objective validity, to *cause* accommodation of volitional acts. Yet it is a fact of experience that such types of accommodation do occur. Piaget's early theory of assimilation and accommodation was, correctly, criticized on this point because the theory provided no explanation for this fact. This was a shortcoming in the theory that Piaget and his coworkers were working to address near the end of Piaget's life. They obtained a partial success in this which appeared in a two volume work, Piaget (1981) and Piaget (1983). However, the theory presented in these works is not quite satisfactory when critiqued by mental physics. In this section the correct Critical explanation of the phenomenon is presented.

Piaget presented two new ideas in Piaget (1981), namely, the ideas of presentative schemes and procedural schemes. He described what he meant by these terms, but his descriptions were rather too vague to merit being called explanations because getting from them to specific predictions of behavior proves to be elusive. However, there is little room for any reasonable doubt that Piaget *et al.* were hard on the trail of an important finding. Piaget wrote,

Our new observations not only extend our general model, which had seemed sufficient until now and which attempted to explain the operational structures by the mechanism of self-regulation, but also provide the key we were looking for to find a simple, direct answer to the most difficult question raised by our interpretations: By what mechanism do cognitive reequilibrations bring about, simultaneously and of necessity, compensations and novel productions – that is, an equilibrium leading to advances (augmentative equilibration)? [Piaget (1981), pg. 150]

To clear up some nagging ambiguities that cling to Piaget's extended model it is necessary to provide Critical real-explanations for his new terms. In doing so, it also turns out to be necessary to introduce some new technical terms as well.

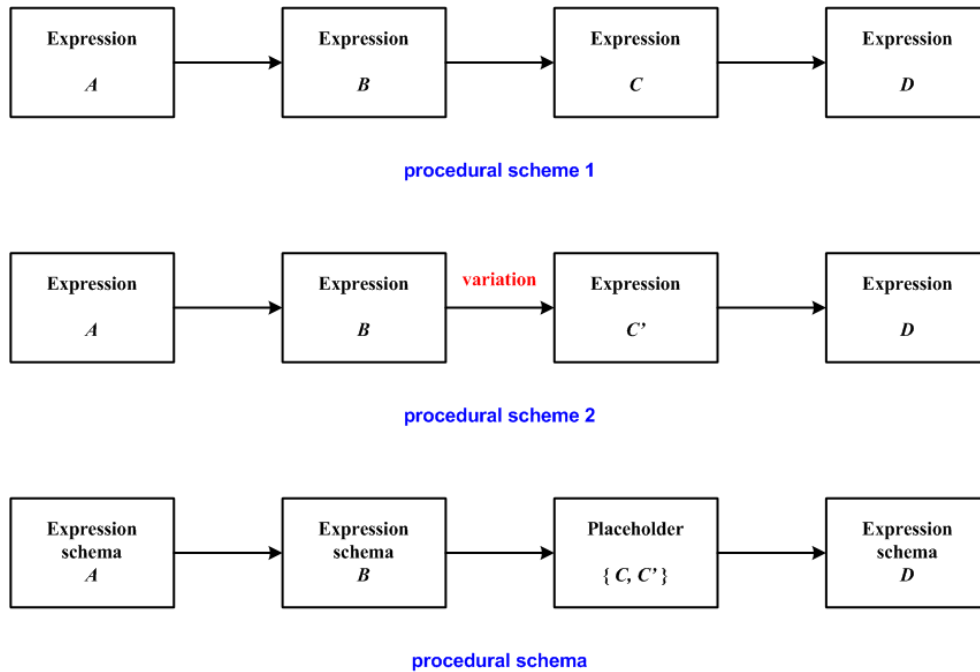


Figure 7.10: Illustration of procedural schemes and a procedural schema.

A **procedural scheme** is a specific temporal sequence of action expressions. Figure 7.10 illustrates two similar procedural schemes of expression. This is the *Realerklärung* for Piaget's notion of a procedural scheme. As it is directly defined by action sequence appearances, a procedural scheme is a principal quantity in Critical mathematics. For purposes of convenience, I will sometimes use the briefer term **procedure** to mean a procedural scheme.

By definition, a scheme can always be repeated. To repeat one at will in the absence of an external stimulus to evoke it, and to be able to correctly communicate its description to another person, the *Dasein* of communicable procedural schemes necessarily requires the construction in the manifold of concepts of a concept of that scheme. Such a concept I call a *presentative scheme*, and this is the *Realerklärung* of Piaget's idea. More precisely, a **presentative scheme** is a concept of a succession of intuitions¹¹ that have been connected in a specific temporal order structure and which regenerates a specific sequence of motoregulatory acts in the manifold of Desires to reproduce a procedural scheme. A presentative scheme has the peculiarity that it is not itself immediately depicted in the manifold of rules. It does not have to be. All that is required is: (1) a rule of ratio-expression in the manifold of rules directing determining judgment to construct one; and (2) a rule of ratio-expression in appetitive power directing determining judgment to re-introduce it into the synthesis of apprehension. The process of determining judgment (figure 7.3) does not globally determine its own employment. Rather, it is under the regulation and command of the process of speculative Reason, which orients and directs its activities via acroams.

These real-explanations give procedural schemes the non-conservative character Piaget ascribed to them (the manifold of Desires is not conserved) and, at the same time, gives the presentative scheme the conservative character Piaget ascribed to it (the manifold of concepts is a structure and this structure is conserved during accommodation). As an illustration of this, figure 7.10 presents procedural scheme 2 as a scheme almost identical to scheme 1. However, during the

¹¹ An intuition is symbolic of a meaning implication, which means that intuitions always have a mediate connection with the manifold of rules through teleological reflective judgment of desirations.

expression of scheme 2 at the expression *B* step a variation is encountered that evokes an accommodation of the scheme-in-progress. The relationship between these two schemes and figure 7.9 is, I think, likely to be more or less obvious to you. Note that the *possibility* of this sort of scheme accommodation is *grounded* in the rule of exception in appetitive power. Note, too, that prior to any cognitive elaboration within the manifold of concepts a presentative scheme is a unitary concept. By this I mean that although this concept contains a manifold of concepts (in the technical terminology of Critical Logic it is called a prosyllogism) this manifold is not made distinct in understanding.

However, because a presentative scheme is a concept this means that that presentative schemes sharing some of the same concepts within their manifolds can be further generalized to produce abstract concepts that represent *species* of presentative schemes. This type of higher concept, under which stand two or more presentative schemes, is called a **procedural schema**. An example of a procedural schema for presentative schemes conceptually corresponding to the two procedural schemes in figure 7.10 is given at the bottom of the figure. A procedural schema coordinates particular presentative schemes, retaining what the presentative schemes in its sphere have in common and making abstraction of those places within them where they differ. This act of abstraction, however, does not *eliminate* the positions in the order structure where the lower schemes differ; that would effectively amount to "cutting the scheme in two" – an action that destroys the scheme structure rather than conserving its unitary character. This means that the conceptualization of a procedural schema is made using disjunctive inferences of Reason [Wells (2012b)]. Concepts at the points in the sequence where two presentative schemes differ are classified under the procedural schema so that inclusion of one of these concepts in a particular procedural schema precludes the placement of the others in that scheme. The members of the disjunction are called **options** because they can be chosen in determining particular expressions of a procedural schema according to the action of the rule of exception. The positions within a procedural schema where options can be inserted are called **placeholders**. The members of the disjunction taken collectively constitute **option sets**, e.g. $\{C, C'\}$ in figure 7.10.

This logical organization of schemes explains another of Piaget's notions, which he called a pseudo-necessity. A presentative scheme that has undergone no combinations with other such schemes, and is therefore not placed under a procedural schema, is in effect its own procedural schema – but a schema without placeholders. This means the scheme has no options available; if it is presented, it will simply reproduce the particular procedural scheme it represents. The person will, in this case, have literally *no concept that he can act any other way than as depicted in the presentative scheme*. This is precisely what Piaget meant by the term pseudo-necessity:

We must also specify the role of the limitations of which subjects need to liberate themselves. These limitations have to do with an initial lack of differentiation between reality, possibility, and necessity. In fact, any object or substance in a presentative scheme will first appear to subjects not only as what they are, but also as being that way of necessity, excluding the possibility of variation or change. These convictions, *pseudo-necessities* or *pseudo-impossibilities*, as we shall call them, are not only specific to children but can be found at all stages in the history of science. [Piaget (1981), pg. 5]

Piaget's occasional slips back into ontology-centered prejudices shows a bit in this quote, but if we make allowance for it, it is easy to see what he is talking about. A **pseudo-necessity** is *a presentative scheme that has not been coordinated under a procedural schema, functions as its own procedural schema, and lacks placeholders*.

The organizing process in judgmentation whereby procedural schemes and presentative schemes are constructed is called *chunking*. Chunking is a psychological term that has been in use since it was introduced by George A. Miller, but the official description of what the term means

in psychology is utterly vague because it uses the (psychologically) undefined notion of "bits of information." Psychologists do acknowledge information theory's abstract definition of the word "information," but psychologists almost never mean that definition when they refer in their work to "information" by such phrases as "information processing." What they mean instead is, loosely, "any material with content." Because that usage takes in pretty much everything, the usage is poetic rather than scientific. The proper real-explanation of **chunking** is *the organizing process whereby distinct intuitions are connected in a temporal order structure to synthesize a unitary sequence*. The unitary sequence is called a **chunk**.

The first unequivocal behavioral exhibition of the formation of presentative schemes occurs in children at around age 8 to 9 months in developmental stage IV of sensorimotor intelligence [Piaget (1952), pg. 210]. By stage VI, ages 18 to 24 months, there is unequivocal behavioral exhibition of the formation of procedural schema. This peculiar species of concept structuring – itself a product of judgmentation – therefore develops relatively early in life.

Understanding all this, we are now ready to carry out the synthesis of the schematic with the axiom of variations within the context of the specifying concept of intelligence building. Progress in the intellectual power of the person in this context is characterized by the person's fecundity in forming procedural schemata because the greater the sphere of these concepts becomes in the person's manifold of concepts the less his liberty of action is restricted to pseudo-necessities. This is to say *his planning capacity is augmented* by his development of a greater store of placeholders in higher procedural schemata and a greater store of options he can apply in his schemata. The function of intellect social education is therefore called *the planning function*. More specifically put, $f_{\Delta,1}$ is *inclusion in the curriculum of exercises that stimulate the learner's development of procedural schemata applied to technical objects*. Similarly, $f_{\Delta,2}$ is *inclusion in the curriculum of exercises that stimulate the learner's development of procedural schemata applied to social situations*. I call these, respectively, the **civics planning function** and the **civil planning function**.

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