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structure of concepts be both infinitely <sup>integrable</sup> ~~connectable~~ ~~assimilable~~ (assimilation) and simultaneously infinitely differentiable (accommodation). We do not seem to be dealing with a process constructible as a graph. (A graph, that is, without circuits). I must develop a "new graph theory" capable of representing the actual dynamics of the system. (This will be a major 'focus area' of the research).

It is also becoming more and more evident that I can not easily model this system w/o incorporating into it a more detailed model of both the faculty of affective judgment and the faculty of practical reason. This entails both the specification of the "essential mental elements" of these systems and the incorporation of these elements in my "new graph theory."

Perhaps my "new graph theory" (NGT) should be thought of as a combination of graph "pictures" and set-theoretic constructs.

Piaget gives a rather vivid description of this same conclusion (except for the math implications) in [3:230-232]. In stage 3, the reciprocal assimilation is, in his words, "simple fusion" of schemata whereas at stage 4 it is a "double assimilation" structured as a sequence (more accurately, it is consciously sequential). He also observes that, up to stage 3, there is only one "object" that need be considered whereas, at stage 4, there are two or more. Stage 4 reciprocal assimilation is no longer "simple fusion" but "diversified operations of inclusion or of hierarchical implication, of interference or even negation, that is to say, to multiple

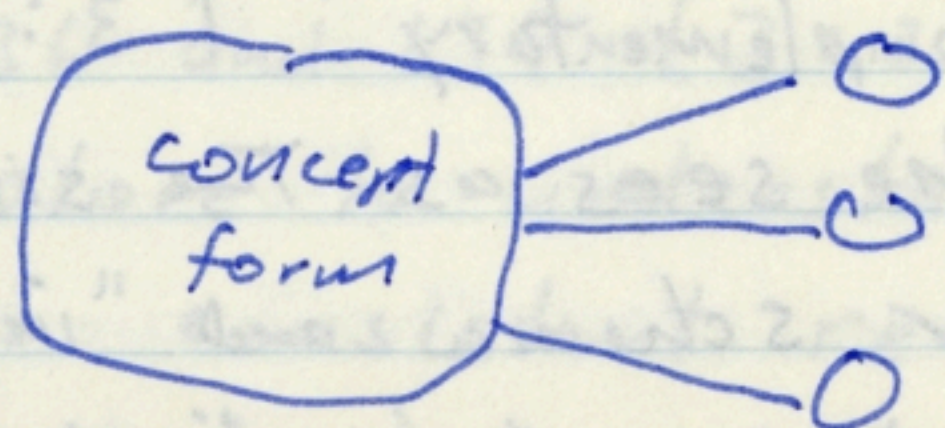


dissociations and regroupings" [3:232],

Yet, as he points out, "elementary intelligence, like all spontaneous activity, is essentially conservative" [3:230]. "Primitive intelligent activity has no other function than that of assimilating the universe to the schemata elaborated by the primary and secondary circular reactions, while accommodating these schemata to the reality of things." [3:320].

Reciprocal assimilation, whether simple fusion or sequential coordination, always connects two heterogeneous structures and, by assimilating, creates a homogeneous totality. There must always be, therefore, something analogous to a 'transcendental schema' that "makes what were heterogeneous elements a homogeneous totality."

It occurs to me that, in a sense, the "topological" process involved in the synthesis of intuition in apprehension is so similar to this that it might, in fact, be the same fundamental process — one which simultaneously builds larger "concept sets" (genera) while also constructing conceptual subsets (specification). For instance, if "spatial forms" (topological structures) are created as "empty forms" that can be filled by various sensational "non-essential" (i.e., 'contingent') sensational matter, could this same topological structure not be true of every concept (e.g. below); This would better support Piaget's Theory



} contingent coordinate concepts acting as "matter" for the forms



Such an explicit "matter-form" structure could be infinitely differentiable (fissioning into subordinate characteristics by separation of matter and form).

One thing is clear: "action intuitions" are every bit as vital a part of the manifold of representations as "objective cognitions" are. The "appearance" that is the "object" of an "action cognition" is a "somatic appearance" rather than an "external" appearance. Kant did not distinguish the two, but such a distinction seems necessary for the possibility of a psyche as described by Piaget.

Piaget draws a distinction between practical intelligence and logical intelligence [3:238]. "The subordination of means to ends is the equivalent, on the plane of practical intelligence, of the subordination of premises to conclusions, on the plane of logical intelligence." (ibid)

⑥ Here's an interesting question: We know from ~~p~~ p2 92 that recognition involves the invocation of one or more schemata that provide meaning to the Thing that is recognized. Might it not be the case that there is no distinction between "practical" and "logical" intelligence other than the matter of the schema involved in the cognitive ~~p~~ process?

Piaget thinks not. He calls them "complementary" [3:238]. In [3:239-240], he discusses what he sees as the similarities and differences between sensori-motor schema and "intelligent acts" of logic, judgment, and so on. The main distinction he



draws is that "Sensori-motor schemata are not 'reflective' but are projected into things themselves --- In the second place, the involvements between the schemata are not yet regulated by a system of internal norms: The only verification of which the child is capable is of the type of success and not of truth." [3:240].

I disagree - or, more accurately, I take "reflective" in the Kantian sense of the word; the schemata can not be projected onto the things themselves, but only onto the things regarded as appearances - and therefore involving the same process of apprehension used by everything else. The only real distinction is the energizing of the motor system in an act of the will. The synthesis of intuition in apprehension and the synthesis of the understanding in comprehension are otherwise identical.

Secondly, "truth" is, in fact, determined by "success"; it is merely accordance of the object with its concept and is aesthetically judged in this way. Success is accordance of an action with a desire - whether the action and desire are sensationally practical or theoretical and intellectual. Both of Piaget's distinctions are artificial.

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Another behavior noteworthy of Stage 4 is "exploration." As obs. 136 and 137 [3:253-255] show, the stage 4 child will "explore to understand" a new object. Piaget notes four consistent reactions (which occur in the following order): (see obs. 137)



- 1) a long visual exploration
- 2) a tactile exploration
- 3) The object is grasped and slowly moved in space, particularly in a direction perpendicular to the glance
- 4) The child then applies his various schemata, one by one, to the object.

It seems to me that this behavior indicates curiosity is a very basic human trait.

If, during exploration, an unforeseen result is obtained, this result sets into motion a secondary circular reaction (immediate and simple repetition) which results in the elaboration of a new schema.

Piaget notes that SCRs "are formed at every age ... but in the midst of new contexts." [3:255]

He also notes that "prevision" is clearly demonstrated in stage 4 behavior [3:247-252].

### Fifth Stage: Tertiary Circular Reactions and active experimentation

During stage 5, a new and unexpected behavior is manifested. Previously, when confronted with something new, the child's SCR behavior ~~was~~ acted to simply repeat the act w/o variation. The behavior was conservative, as if the child were content to merely assimilate the novelty and as if there was, so to speak, 'only one novelty per customer.'



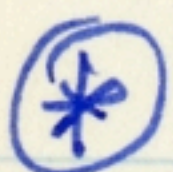
It apparently did not occur to The child that more novelties could exist.

This changes in stage 5. Confronted with a novelty, The child will initiate the usual SCR behavior; however, The child himself will deliberately graduate and vary The movements in such a way as to discover fluctuations in The results [3:266-267]. There is, in this, what Piaget calls "accommodation for the sake of accommodation" [3:264].

In The first 4 stages, The external world more or less forces itself on The infant and The infant's responses to this, while complex, are conservative and - in many ways - are no more remarkable than the behavior of a good servo system. In stage 5, The child's role becomes "proactive" rather than "reactive." It is almost as if The child has discovered in himself the causality of freedom - the notion that he himself can exert an efficient cause on the external world. (To some degree, The child behaves this way previously, but without consciousness of himself as cause; in a way, it's as if "physical causality" and "causality of freedom" were not differentiated previously). To my way of thinking, this proactive behavior and its source are the most profound peculiarities of stage 5.

④ Obs. 141 [3:268-269] is very interesting. Previously, The Subject had discovered The schema of 'letting go' (Obs. 140) but his interest at that time was centered on The schema itself and he paid no attention to the actual fall of The object.





His sole interest was in finding several different ways to 'let go' of the object. (Note: is this not experimentation as well?). Piaget called this a 'derived SCR.' [3: 253-262].

In obs. 141, The Subject studies the fall of the object itself. He applies a number of different ways of 'letting go', and varies the initial state prior to letting go, but he studies the 'final position' of the fallen object. He repeats each 'experiment' several times (his experimentation is actually a series of experiments).

One thing I found to be enormously interesting was the experiment where he let the object fall on or near his mouth. The Subject would open his mouth each time he carried out this 'test' (although, perhaps, not on the first trial). Now, when we previously discussed recognition, we saw that the child "recognized" an object of only fleeting interest by means of a 'partially activated' sensori-motor schema with which the familiar object was associated. In obs. 141, does the opening of the mouth indicate intention or anticipation that the object will fall on or near the mouth? If it does, then this behavior demonstrates the manifestation of a hypothetical conclusion of reason (or, at least, a judgment of reason)! It also demonstrates the beginning of a theoretical understanding of physical (objective) space (albeit at a simple level).



Piaget notes the following characteristics of 'experimenting to see' and the tertiary circular reaction (TCR):

- 1) The new result is always discovered by chance since the child does not know how to proceed except thru groping [3:273]
- 2) The 'experiment' always begins by repetition (ibid)
- 3) But even in repeating his movements, the child varies and graduates them (gradation is also always present in the SCR, but the child conserves the 'framework' - the intent in the SCR is to repeat the result, while in the TCR the interest lies in new results, i.e., in novelty). [3:273-274].
- 4) The child does not know in advance what the result is going to be [3:274]
- 5) SCR behavior is an "almost automatic" selection of the "right" movement to reproduce the result; TCR behavior is a search to determine the conditions essential to the result [3:275]

In [3:275-279], Piaget discusses the question, "How does it happen, ~~that~~ when all the behavior patterns ~~previously~~ hitherto under study are essentially conservative, that at a certain time the child comes to pursue novelty?"

He does not at all, in this discussion, touch on the question



of the "causality of freedom." His "explanation" is of a descriptive rather than truly explicative nature.

His main contention is that "This interest in novelty... results from assimilation itself." He says that, "to the extent (the results) are almost assimilable, they rouse an interest and an attempt at accommodation still greater than if they were assimilable immediately." [3:276]

His contention is that the greater the number of schemata the child has available, the more opportunity exists for assimilation and, consequently, the greater the interest.

"Accommodation becomes an end in itself, separate from assimilation but complementary. [3:277]. The development of mobile schemata and the conceptualization of the objective external world promote this increasing interest.

In the case where objects "thwart" assimilation, Piaget maintains that the child directs his effort at discovering the "properties of these centers of forces," i.e., the external objects. [3:277]. He further states that, "the objectification of causality is the source of experimentation" [3:278].

Now, all this is fine as far as it goes, but I don't think it goes far enough ('necessary but not sufficient' reason). It is true, as Piaget says, that stage 5 experimentation always involves at least two differentiated things (the object and the child's own body) and oftentimes more than two things (multiple objects).



I also have no trouble imagining a "host" of "almost assimilable" mobile schemata available to the Subject (and, consequently, "much more to do" in ~~assim~~ accommodation).

But, as there is no "obstacle" present here, what causes the child to deliberately vary the conditions of his experiment? He accommodates his own schemata prior to the result and his interest is "novelty for the sake of novelty." Why does this occur?

It is true that this experimentation supports an increase in the perfection of concepts (both aesthetical and logical). But the fact remains that causality has reversed itself. Previously, the child was the "patient" and the world was the "agent." Now that order is reversed. The child has discovered that he can be the "agent" and the object the "patient."

The child's deliberate variation, within a single experimental series, is a creative act. This creativity is actually manifested in stage 4, in which the development of various schemata for 'letting go' is but one example. Does the increase of the "sense" of conceptual perfection carry with it a fundamental "satisfaction" that the child learns to increase by means of the hypothetical relation notion of conjunction & H? Does the fundamental logical process of reason contain within it a reflexive function  $(a, b) \Rightarrow (b, a)$ ? Or are we simply seeing a more sophisticated manifestation of the Relational momentum of "reciprocal" that has always been present but now finds "fertile ground" in more opportunity for exercise?



It is not unlikely that all of these factors are present, but it seems to me that the ground for all of this must still, in some way, involve consciousness of the causality of freedom.

If so, this consciousness can only be a supersensible idea of freedom. Perhaps it is the establishment of Reciprocal relations between this idea and the schemata and objects of experience, this process of establishment arising from the process of reason, that is the true source of the behavior at the end of stage 4 and on into stage 5.

If so, the idea of freedom must first arise in connection with a sensori-motor schemata, Perhaps it even serves as the efficient cause of mobility in schemata? Freedom certainly acts from the very beginning, in the development of the PCR's impressed on reflexes. But the willful reversal of the "agent and patient" roles (even in stage 4) can only arise through consciousness of freedom as a concept of the understanding.

This issue is, I think, at the very foundation of autonomous intelligence. It is "The Keystone" of the entire issue.

Here is a hypothesis on how the concept of freedom (and causality of freedom) might arise. The notion of cause and effect is clearly at work from the very beginning. Otherwise, even PCR's could not arise. Now, the Subject is certainly aware, subjectively, of the existence of "wants." Furthermore, thanks to the possession



of innate reflexes, The Subject is aware that wants are often satisfied later and can clearly connect this feeling of satisfaction with primitive schemata. Since want (or need or desire) precedes satisfaction, a relation of cause and effect can be established.

Now, since C&E is a notion of the understanding, it can only join to concepts of the understanding. A primitive dissatisfaction, such as "hunger," is clearly not an "external object" but it is a somatic object recognizable through sensation. The "state of hunger" can, therefore, be presented in intuition - provided that the pure intuition of space is topological (rather than 'geometrical' and applicable only to the world external to the soma).

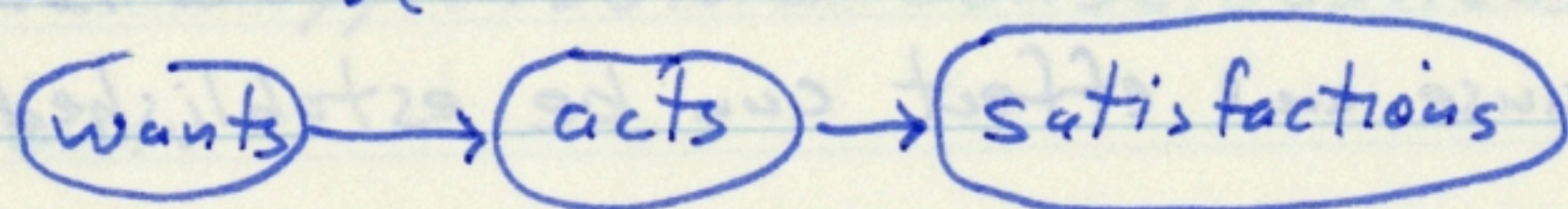
Likewise, "satisfaction of hunger" is a recognizable 'final state' following feeding. It likewise has an intuitive representation. Therefore, the notion of cause and effect can be applied.

Now, if state-of-hunger is cause and satisfaction-of-hunger is effect, the schema linking the first to the second is a series of actions; this is the sucking reflex. Now, sucking is a schema that is not always linked to hunger as a cause and ~~state~~ non-hunger as effect. Therefore, other somatic states can be "attached" at either end of this same schema. The initiating states generalize under the genus of "wants" and the final states generalize under the genus of "satisfactions" (both ideas of reason).

Since other primitive schemata also initiate in needs that can be conceptualized under "wants" and terminate in final states of "satisfactions," consciousness of wants and satisfactions (as ideas) can



come to be dissociated from schema early in life. Likewise, the set of schema generalize  $\Rightarrow$  under a genus ("acts") and the linkage



at the level of conjunction H can be established categorically.

(Clearly, the instantiations subsumed under these ideas have their own web of complex connections of experience; what is significant here is the genera of higher ideas)

Piaget maintains that, since the early stages are marked by the absence of self-consciousness (more accurately, it is the absence of a concept of the non-self), the child regards the universe as a solipsist. However, the "cause and effect chain" illustrate above is, *ipso facto*, an idea of the self as efficient cause, i.e., the idea of the causality of freedom. This idea only becomes interesting to the subject when the idea of physical causality arises. Experimentation might therefore be nothing other than the manifestation of reason applied to the act of dissociating the idea (not the notion) of causality of freedom from ~~causality~~ the idea of physical causality.

In order for this to come about, some "wants" must be initially thwarted. During early motor development, certain muscle sensations are likely to be vague (contained in a common subset but not distinguished by degree). The accidental assumption of different postures, one of which is thwarted, the other of which succeeds, will lead to the distinction of species of subschemata under a common main schema. (Could it be that primitive groping is an early form of hypothetical reasoning that underlies accommodation?) The multiplication



of subschemata will lead, quite early, to the need for The Subject to make primitive choices (which is an exercise of freedom).

Now, teleological judgment makes choices, but is The Subject conscious of his act of choosing, i.e., does he have an idea that he chooses? Or is "choice" simply an innate 'mental reflex'? Clearly, an adult is aware that he chooses. Whence comes this knowledge?

Choice can only be the result of an act of elective will. The Willkür is presented with options (from the rational will, <sup>certainly,</sup> and from the association of the feelings of the Pleasant and the ~~unpleasant~~ schemata to which this feeling is attached ~~to~~ as well?). I can see only two possibilities by which "awareness of choice" can become a concept of the understanding. Either,

1) This awareness is ex post facto: a subsequent awareness that a choice has been made from consciousness that one possible act has been actuated and others have not, or;

2) This awareness is felt and is thereby <sup>representable</sup> ~~repres~~ in sensation and representable in intuition.

In The first case, we would need some curiosity-producing mechanism to draw attention to the fact. In The second case, we would need some direct sensation that does not seem to have any reason for being other than "to make (2) true."

Choice is an innate act of practical reason. An adult is consciously aware that he chooses in only a fraction of all his practical choices.  $\therefore$  (2) seems to be very unlikely relative to (1). Yet awareness of



choice is necessary for the possibility of deliberate experimentation.

Well, I'm not going to solve this issue here. It will have to be deferred to the "Epistemology / Psycho-Practical Reason notebook."

Piaget's closing ~~at~~ comment in §1 of The Stage 5 chapter is

"The accommodation peculiar to the 'experiments in order to see' is always the accommodation of a schema, and that the act of accommodating an earlier schema of assimilation consists in differentiating it according to the variation of the actual experiment. There is never, in effect, a 'pure' experiment." [3:279].

Piaget summarizes the 'elements' of stage 5 experimentation (wrt the 'support' problem) as follows [3:288]:

- 1) The child tries to attain a goal, but obstacles prevent success
- 2) The situation is 'new' and the 'means of success' are unfamiliar
- 3) Innovation thru groping: a familiar schema is attempted and, if the child perceives the outcome to be "more favorable" (but not yet successful), there is accommodation of and continuation of that schema. Prior experience w/ this schema provides "meaning" to the actions. This continues until "success" is achieved or the schema is abandoned thru frustration.