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SEMIOTIC INTERACTION AND COGNITIVE CONSTRUCTION

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After the publication of La Genèse du nombre chez l’enfant [The child’s conception of number] (1941/1952, with Alina Szeminska) and Le Développement des quantités chez l’enfant [The child’s construction of quantities] (1941/1974, with Bärbel Inhelder), two books which describe and formalize the coherent reasoning system elaborated by children of about seven years of age (« concrete operations »), Piaget published La Formation du symbole chez l’enfant [Play, dreams and imitation in childhood] (1946/1951), using observational data collected during the infancy of his own three children. These data had already been treated in two earlier publications, La Naissance de l'intelligence chez l’enfant [The origins of intelligence in children] (1936/1952) and La Construction du réel chez l’enfant [The construction of reality in the child] (1937/1954). In this later work Piaget describes and explains the start of the representational process, trying to determine the conditions for transformation of the practical intelligence constituted during the sensori-motor stage into representational and potentially conscious thinking of the concrete operational stage.

The work is of major significance in that Piaget here clarifies, more directly than in other publications, the epistemological orientation of his developmental psychology, and because he contrasts his position with that of Wallon and Guillaume, and more generally to the position of social interactionists. Piaget defends two general and complementary theses.

The first thesis concerns the continuity of the process of construction of intelligence and thought: « Our first thesis, a continuation of that in La naissance de l'intelligence, will therefore be that there is functional continuity between the sensory-motor and the representational, a continuity which determines the construction of the successive structures » (1946/1951, p. 3).

More specifically, the thesis is concerned with showing that operatory intelligence is a direct transposition, at the mental level, of the action schemes available at the sensori-motor stage: « It is possible to trace the continuous transition from sensori-motor assimilation and accommodation to the mental assimilation and accommodation which characterise the beginnings of representation » (ibid, pp. 2-3).
The second thesis concerns the uniqueness of the symbolic function, defined as a common mechanism for different systems of representation, or as a general function on which the acquisition of language depends: «The problem we shall discuss in this volume is therefore that of the symbolic function itself considered as a mechanism common to the various systems of representation and as an individual mechanism whose existence is a prerequisite for interaction of thought between individuals and consequently for the constitution or acquisition of collective meanings» (ibid, p. 4).

Piaget's second thesis thus has two supplementary postulates: (a) The symbolic function is an individual mechanism; (b) this individual mechanism is primary and is an essential condition for the further development of socially imposed symbols of various kinds and collective representations, which Piaget admits contribute in a «decisive manner» to the emergence of thought as normally defined.

According to these theses and postulates, Piaget challenges the assertion that social factors, adult interventions and language in particular, could be the causes of the development of the symbolic function. As he points out, this hypothesis raises the question of

«why and how the child is influenced at certain definite moments by this or that social action. Language, for example, is acquired at this age and not at that, in this order and not in that, and therefore only modifies thought in so far as thought is susceptible of being modified. It is therefore not 'social life' as a whole that psychology must invoke, but a series of relationships established in all possible combinations between individuals of distinct levels of mental development, and as a consequence of various types of interaction (coercion, co-operation, imitation, discussion, etc.). [...] Though obviously social life plays an essential role in the elaboration of concepts and of the representational schemas related to verbal expression, it does not in itself explain the beginnings of the image or the symbols as they are to be seen in the deferred imitation or in the imaginative games of the one year-old child» (ibid, p. 4).

For Piaget, the social fact is a fact to be explained, not to be invoked as an extra-psychological causal factor, and the verbal interventions of adults have no effect until the initial symbolic function has reached a specific point in the natural individual development.

Despite the great wealth of data and the force of Piaget's argumentation, his position seems to raise five general questions or problems.

1. Can the data furnished by Piaget concerning the evolution of imitation and symbolic play during the sensori-motor sub-stages be considered as examples of individual mechanisms of development?

2. In what way does Piaget's demonstration really explain how language plays a decisive role in the development of concepts and representational thought?

3. Has the thesis of the uniqueness of the symbolic function been demonstrated? Is it not possible to establish a distinction between a primary symbolism, founded «in nature» and constructed during the sensori-motor phase, and a secondary symbolism, founded socially in human language?

4. If two types of symbolism can be distinguished, to what extent can the passage from practical intelligence to representative thought be viewed as continuous?

5. Why cannot social facts be considered as causes of psychological development, just as biological functions of assimilation and accommodation can?

To reply to the first question, we use extracts of examples and commentaries from the first two parts of the text.

*Imitation; sub-stages I and II.*

At 0:4(9), for the first time, T. kept up, though circular reaction, a whimpering which usually preceded tears. I imitated him just at the moment when the whimpering turned into crying. He stopped crying, and resumed the earlier sound.

[...]

At 0:5(11) after he had made ba, ba, etc., I reproduced them. He repeated them seven times out of nine, slowly and distinctly. The same day, I reproduced the sounds he usually made when he himself had not made them for more than half an hour. He smiled silently, then began to babble, and stopped smiling. He did not reproduce each individual sound, but uttered sounds under the influence of my voice when I confined myself to sounds with which he was familiar:

[...]

At 0:5(12) I had been silent for some time when I made 'trat' two or three times. She gazed at me attentively and suddenly began to croon without imitating the exact sound.

[...]

Vocal contagion is merely stimulation of the child's voice by another voice, without exact imitation of the sounds he hears.

[...]

At 0:5(4) T. was in his mother's arms, upright and motionless. I bent my head to left and right. He followed me with his eyes, making slight movements, and when I stopped, clearly imitated me. On the following days, there was the same reaction. From 0:5(21) onwards, more especially, T. moved his head when I moved mine or moved my hands.

[...]

In normal circumstances, i.e., when the activity of the object does not directly engage that of the subject, this tendency to repetition shows itself merely as a need to prolong perception, but ceases with, or shortly after, the disappearance of the perceived object. When, however, the object provides an external stimulus to the subject's assimilating activity, accommodation to the object continues beyond perception, and it is this phenomenon which constitutes the beginning of imitation.

Piaget, 1946/1951, pp. 8-13

*Imitation; sub-stages IV et V.*

At 0:8(9), I put out my tongue in front of J., thus resuming the experiment interrupted at 0:8(3) which up till then had given only negative results [...]. J. watched me without react-
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ing, but at about the eighth attempt, she began to bite her lips as before [...]. The same evening her reaction was immediate: as soon as I put out my tongue, she bit her lips.

[...] In the case of T, there was no reaction to movements of the mouth and eyes until about 0.9. At 0.9 (21), however, he looked at me attentively when I opened and closed my mouth (without making any noise) and then said tata and papa.

[...] These somewhat lengthy observations [...] confirm [...] Guillaume’s thesis (1927) that training in imitation is necessary, especially when it is a case of imitation of movements which the child cannot see himself.

[...] Moreover, the intelligent co-ordinations of this fourth stage lead to the construction of the first characteristics of the ‘object’ and to the beginning of objectification of space and causality. This general progress will obviously have repercussions on imitation, in that it gives rise to investigation into the correspondence between the bodies of others, viewed as autonomous sources of causality, and the child’s own body, which he perceives to be similar to other bodies.

Piaget, 1946/1951, pp.31-45

The beginnings of play.

At 0.7 (13), after learning to remove an obstacle to gain his objective, T began to enjoy this kind of exercise. When several times in succession I put my hand or a piece of cardboard between him and the toy he desired, he reached the stage of momentarily forgetting the toy and pushed aside the obstacle, bursting into laughter. What had been intelligent adaptation had thus become play, through transfer of interest to the action itself, regardless of its aim. (Piaget, 1946/1951, p. 92)

The examples chosen are taken from some sixty observation units, some quite long, noted by Piaget. In almost all of the observations dealing with the start of the imitation phase, and in a good number of observations concerning the start of symbolic play, the dominant characteristic is that of a constant interaction between the child and the adult (who is almost always Piaget himself).

- The adult is constantly intervening: «I imitated him; I do it again; I say ‘rca’; I lower my head; I break off; I start again; under the influence of my voice», etc.

- The interventions are frequent and insistent: «at about the eighth attempt; I interrupted several times running» etc.

- The interventions are made by the adult with the aim of guiding the child: «I reproduce the sounds which he is used to; I take up again the interrupted experiment; I make suggestions» etc.

In other words, these examples show that the adult continually stimulates and guides the child’s activity, and that he also adjusts his interventions according to his evaluation of the actual behavioural capacity of the child. Piaget’s comments are at least as clear as the examples. Especially with regard to imitation, one has to admit that the author convincingly validates his thesis of the continuity of the developmental process; imitation in the presence of a model really follows the initial forms of accommodation evidenced in the first two sub-stages, and this is effectively extended to sub-stage 6, in a delayed form of imitation that constitutes the first appearance of representation in the proper sense of the word. But, as Piaget himself notes, the continuous process is also a process of learning, which requires stimulations from the surroundings. What stimulations and what surroundings? Still keeping to Piaget’s own words, it is an «abnormal» environment («artificial» as Vygotsky would have said); an environment which, by a “special convergence”, «responds to the assimilating process of the subject, by maintaining it from the outside». In other words, it is a social environment, which exercises a deliberate training activity in the learner, or, put another way, which organizes social learning. And again as Piaget notes, it is from a practical understanding of the fact that the body of another constitute an autonomous source of causality that the child becomes able to think of his own body as a source of causality. To use once more a Vygotskian expression, the self builds on the social model of the other.

Using the commentary that he himself provided, Piaget’s examples can thus be re-read and re-analyzed, without difficulty, in terms of joint activity patterns, in which the adult adjusts his interventions to the child’s capacities, to guide them, to orient them in a definite direction. It could also be said that Piaget created and re-created favourable situations, or «zones of proximal development», in Vygotsky’s terms. In joint activity, the child first reproduces simple movements, as noted by Piaget, then mini-actions (successions of movements producing an effect), and finally mini-actions are interiorized as «practical (or unconscious) operations», making delayed imitation possible.

In view of these examples and comments, it is difficult to maintain the postulate of the individual character of this development of primary symbolism. (A postulate that Piaget never set out explicitly except in the introduction and the conclusion of the chapter on imitation). As was already noted, Piaget clearly demonstrates the continuous development of the child’s primary symbolism, but he also shows, without drawing theoretical consequences, that this continuity is itself the consequence of the continuity of the deliberate interventions of human surroundings. And if Piaget is right to challenge the Wallonian thesis of an ex abrupto intervention of social life at the sixth sensori-motor sub-stage, it is only because the social factors are intervening from the start. In reality, the forms of primary symbolism emerge through the effect of constant social training which builds on and redirects natural or biological development.

Let us now turn to the question of the acquisition of language and of its decisive role in the constitution of representational thought.

When he treats this question, Piaget, following the linguist de Saussure, points out the difference that exists between human language and various other means of evoking absent entities, such as mental images, certain ges-
tutes, drawings, etc. The latter show relations of resemblance between the signifying elements and what is signified; in language no such relation exist, the elements are arbitrary and conventional (except for a small number of onomatopoeics). Piaget then emphasizes the temporal coincidence (during the last phase of the sensori-motor stage) of imitation in the absence of a model, of symbolic evocation in pretend play and of the first verbal (re)productions that are recognizable by the adult as belonging to the child's parental tongue.

In discussing this coincidence, Piaget rejects what appears to the present writer as a first social hypothesis; Piaget argues that, since it has been shown that chimpanzees have capacities for symbolic behaviour and for representational memory, the acquisition of language cannot cause or explain the child's capacities for delayed imitation and pretend play. These must be derived from the continuous internal and individual process of transformation and accommodation in imitation, followed by the interiorization of this imitation: «Deferred and representative imitation does not therefore necessarily require the intervention of conceptual representations nor of verbal elements, since symbols such as images, memories, symbolic objects, etc., are inherent in the individual mechanisms of thought» (Piaget, 1946/1951, pp. 69-70).

As to the rejection of this first social hypothesis, one can only agree with Piaget, but a second problem, completely distinct from the previous one, arises: How do symbolic activities common to the child and the anthropoids, which, as Piaget repeatedly emphasized, remain personal and particular, transform into conceptual thinking, active and potentially accessible to itself, in other words, conscious? Symbolic pretend activity cannot ensure this transition. In play, the symbol is in no way a concept, either by its form, the 'signifier', or by its content, the 'signified'. In its form it does not go beyond the level of the imitative image or deferred imitation [...] In its content, it is not adapted generalisation but distorted assimilation, i.e., there is no accommodation of the schemas to objective reality, but distorsion of the latter for the purpose of the schema» (ibid, pp. 99-100).

At the start of the chapter on play, Piaget appears to defend what we qualify as the second social hypothesis: It is the social interaction and the beginning use of language which is the cause of the transformation of late sensori-motor schemes into conceptual thought. Several passages in this chapter are quite explicit on this point.

«The normal end of a schema is a concept, since schemas, being instruments for adaptation to ever varying situations, are systems of relationships susceptible of progressive abstraction and generalisation. But in order to acquire the fixity of meaning of concepts, and in particular their degree of generality, which is broader than that of individual experience, schemas must rest in an inter-individual communication and then be expressed verbally. It is thus legitimate to consider the intervention of language as a decisive turning-point in the direction of representation even though the schema at stage VI is already of itself representa-

1. In several passages it seems clear that Piaget's conception of human language does not really fit its conventional and arbitrary dimension, its radically unnatural, social, foundations.
of the statement $4 \cdot 2 = 2 \ldots$, the truth of $2 + 2 = 4$ (the word 'truth' depends on the consciousness of the statements' author) implies the truth of $4 \cdot 2 = 2$. The implication is characterized by a feeling of necessity, which is very different from a causal determination to which there can be no exceptions; a feeling of necessity constitutes an obligation which should be but is not always respected. With reference to implication, the logician Lalande said: 'p implies q for an honest man', emphasizing the implication's normative character. Similarly, the value of a goal leads to the value of the means to attain it, and in the person's consciousness this implication corresponds to the causal sequence of goal-directed actions, without the two being identical. In law Kelsen called the relation between a particular juridical act and the general rule that conforms validity to the act a relation of 'implication', which is a 'ollen' (should) and not a 'sein' (is).

Early in life, the relation between meanings attributed to perceptions and movements is already, in a very general sense, an implicative relationship. When an object is perceived as being close, its localization 'implies' the possibility of grasping it.

We will call this very general relation, of which the logical implication is a particular instance, a meaning-implication, and this relation governs the relation between signifier and signified in all categorizations and designations, even at the level of perception. Now, neither the relation between meanings nor that between signifier and signified is causal phenomena; our hypothesis is thus that the type of connection that characterizes phenomena of consciousness is that of meaning-implication, whose special forms discussed above are special cases.» (Piaget, 1974, pp. 155-157, our translation).

In conclusion, let us go back to our questions 3, 4, and 5, that we left open.

Is the symbolic function one, unique, or is it necessary to distinguish, as we propose, a primary, naturally based, and a secondary, socially founded, function? As there are manifestly points in common and differences between the early symbolic functioning and the functioning of language, both views can be legitimately held. Piaget insists, with reason, that the development of an internal, personal symbolic function is a necessary condition for the appropriation of a semiotic function of social origin. But this condition is not sufficient to explain the emergence of systems of implication characteristic of conscious thought; this emergence is not possible unless the child has appropriated and interiorized the conventional-arbitrary status of the historic construction that is the human language.

Is the development of the representative process really continuous? Piaget was clearly right to reject the thesis of an ex abrupto intervention of social factors at the end of the sensorimotor stage; and one must also definitely reject Vygotsky's thesis of two roots of development that are separate until the acquisition of language. But if any ex abrupto intervention has to be rejected, it is because, as was shown, the social interactions intervene from birth on, to guide and direct all aspects of development. And it is inside this process of social intervention that a cleavage can be identified, when the acquisition of language transforms the cognitive, practical-causal-natural activity of the infant into an implicative-artificial functioning derived from social and language norms which have been historically constructed.
Why cannot these social factors be considered to be causes of development? Here we touch on the problem of Piaget's deep-seated epistemological (even ideological) orientation. Inspired by Descartes and Kant, rather than by Spinoza and Hegel, he remained fundamentally convinced that human rationality is founded in nature, and that it develops on the model of embryology.

"The attitude of the psychologist who wishes to profit from the findings of experimental embryology must be based on a closer comparison between psychogenesis and organogenesis. The various stages which embryology shows to exist in the construction of a living body are characterised not only by a sequence of quite distinct and discontinuous structurations, but also by a dynamics involving both continuity and a certain direction, the latter being a tendency towards equilibrium or state of completion of growth." (Piaget, 1946/1951, p. 6).

It is this belief that, in our eyes, prevented him from taking account of facts that he described so clearly elsewhere: the developmental environment of the child is from the start an artificial social environment, responsive or intentional, and it is the interventions of this environment that reorient the natural environment. Finally, in contradiction to what Piaget declares, we believe that psychology will not find its autonomy, relative to sociology on the one hand and the neurosciences on the other, unless it is accepted that the human being is shaped by the interaction of biological and social factors.

**SUMMARY**

In Play, dreams and imitation in childhood (PDI), Jean Piaget provided an extensive corpus of situations in which children and adults interact, both verbally and non-verbally. These examples are the foundation upon which he builds his theory of the early levels of development, upholding the thesis of a cognitive continuum between accommodation, imitation and symbolic representation, and firmly criticizing the hypothesis, sustained by Wallon, of the decisive role of the "social life" in this evolution. Our paper proposes a reinterpretation of the corpus contained in PDI, which brings to light that Piaget does not sufficiently take into account the adult's interventions at work during these interactions. Our re-analysis, on the one hand, confirms the primacy of accommodation on imitation, and agrees with Piaget that "social life" does not intervene, as such, in the development. On the other hand, however, it shows that it is only adult activity which proposes the social significations whose internalization will give rise to the symbolic representation, and which transforms the elementary psychological functioning (common to other species) into the specific functioning of human thought.

**Résumé**

Dans La Formation du symbole chez l'enfant (FS), Jean Piaget a analysé un impressionnant corpus de situations dans lesquelles enfants et adultes interagissent, à la fois verbalement et non verbalement. Et c'est sur la base de ces exemples qu'il a construit sa théorie des premiers stades du développement, selon laquelle la représentation symbolique dérive directement des mécanismes cognitifs d'assemblage et d'accommodation, et qu'il a également fermement rejeté la thèse de Wallon, selon laquelle la "vie sociale" jouerait un rôle déterminant dans l'accès au langage et à la pensée. Cet article propose une re-interprétation du corpus présenté dans FS, qui montre que Piaget n'accorde aucun statut aux multiples interventions des adultes qui y sont observables. Cette re-étude confirme d'une part la primauté des processus d'accommodation et d'imitation, et nous conduit donc à admettre, avec Piaget, que la "vie sociale" n'intervient pas, ex abrupto, dans cette évolution. Mais elle montre, d'autre part, que ce sont bien les interventions des adultes qui proposent des significations sociales, significations dont l'intériorisation donnera lieu à l'émergence de la fonction symbolique, et qui transforme le fonctionnement psychique élémentaire de l'enfant en un fonctionnement psychique spécifiquement humain.

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