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ACTION, THE UNIT OF ANALYSIS OF PSYCHOLOGY: VYGOTSKY OR PIAGET?

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I. SOCIAL INTERACTIONISM

1. The Vygotskyan Project

In a paper entitled The Historical Significance of the Crisis in Psychology (1926/1982), Vygotsky studied at length the status of the discipline at the first quarter of this century. He observed the existence of various “schools” (Watsonian behaviourism, Gestalt, Stern’s personalism, psychoanalysis, Pavlovian reflexology, Kornilov’s reactology, etc.) who, according to him, were about to make up just as many distinct sciences (or psychologies). He also emphasised the struggle these different schools were going through in order to establish their supremacy on the whole discipline; they were all engrossed in a expanding process that led them to interpret every psychological phenomenon, some in terms of sexuality, some as a conditioned reflex, some in terms of Shape, and yet others in terms of manifestation of the Person.

From Vygotsky’s complex analysis of this situation we have selected the following elements:

a) First of all, he introduced three “analysing” concepts: the “real fact”, the “primitive concept” and the “explanatory principle”. The real or “crude” fact results from a discovery; it is a new event made obvious through scientific research; for instance, the salivation of the dog when hearing a particular noise. The primitive concept results from the reading and the naming of this discovery, the word codifying the phenomenon necessarily being the result of a “primary abstraction” and generalisation: in our example, the term of “conditioned reflex” applied to the salivation. The explanatory principle, for its part, is intrinsic to the process of generalisation itself: it keeps along in line with the theoretical framework in which it operates; in our example, it consists in considering the reflex as conditioned, in other words in imputing the cause of the salivation behaviour to the sound stimulus artificially associated with a natural stimulus.

b) He then demonstrated that each school tries to extend both the primitive concept and the explanatory principle to all new facts, first of all in its own field, then in neighbouring fields, and finally in all the fields of psychology. During this process the explanatory principles end up by bleaching away from the facts that originated them, loosing their strictly scientific nature, and finally revealing their real status, that of ideological constructions (very fragile and likely henceforth to "burst as soap bubbles").

c) He lastly defended that what appeared in this case when an explanatory idea was converted into an ideology, was in fact the philosophical options underlying, as from the beginning, the subdiscipline involved. Therefore analysing these options he considered that the different schools could be assembled into two principal domains: on one side the
supporters of a "natural" or "materialistic" psychology (reflexology, behaviourism); on the other side the supporters of a spiritual psychology (introspective psychology, psychoanalysis). The former assumed the presumption that no psychical phenomenon exists without a corresponding physical phenomenon and therefore adopted the explanatory procedure of the natural sciences. The latter considered that because of immateriality itself (their non-registration in space) psychical phenomena were irreducible to physical phenomena; that they were only reachable through a conscious come back of the subject on oneself. They henceforth adopted a methodology with introspectionist qualities, providing data (the subject's verbalisations) that could not, strictly speaking, be explained, but only "described and/or understood". This duality in psychology could be explained, according to Vygotsky, on account of the subdisciplines adhering to Cartesian dualism, the radical opposition between what comes under the body (what is extended matter) and what comes under the soul (what is only mind). The former only dealt with the physical expressions of the body (the observable) and the latter only dealt with the psychical expressions of the mind (the unobservable) because both had accepted the dualism, in other words the fully immaterial status of psyche.

At the end of this process of reconsidering the object of the discipline, Vygotsky suggested a new positive procedure, a project, characterised by the resolution to approach the entire object of psychology through an unique process, unifying both the object of psychology and the interpretative process. Humankind obviously testifying of both a bodily activity (behaviour) and a mental activity (thought), the purpose was to take into consideration these two aspects, and it is in this context that the importance given by the author to the problem of consciousness can be understood. By pointing out that this term means, especially for Vygotsky, the objective psychical operations (the mental processes), consciousness strictly speaking (the awareness of one's own psychical functioning) being considered, as with Piaget, as a secondary or centrifugal process, the purpose was mainly to be endowed with analysis units in which appeared both the behavioral aspects and the ideaed aspects, hence the necessity, particularly stressed later in Thought and Language (1934/1985) not to operate on "superior psychological functions" physicalist reductions that would dissolve them as such. Lastly the aim was to identify an "explanatory principle" adapted to these analysis units, in other words to seek out the causes of their appearance and their development. One wishes to emphasise that, in the Vygotksyan project, the interpretative process must be explanatory and that this explanation as such must be genetic. However in The Crisis the status itself of this genetic explanation is scarcely specified.

2. The Philosophical Sources of the Vygotksyan Project

In his wish to go beyond the dualist positions, Vygotksky was inspired by three works which, despite being remote in their historical context and their aims, are linked and which objectively extend the defense and the explanation of a monist conception of the world: Spinoza's philosophy, then Hegel's and finally Marx' and Engels'.

Although he was explicitly inspired by the main philosophical theses of Spinoza and Hegel, Vygotksky could however not admit their point of departure, that of "objective idealism", an inescapable consequence of pantheism. In other words he could not accept the thesis of the preexistence, in all eternity, of idea over matter. He therefore had to be endowed with a conception of the status and the origin of the ideaed that was different, whereas remaining compatible with Spinozistic monism and Hegelian dialectic, and it was in Marx' and Engels' writings that he identified the solution to this issue. In Theses on Feuerbach and
in *German Ideology* these authors, while keeping track with the principles of Hegelian dialectic, reverse the initial postulate: it is not the dialectic of consciousness that explains material life and the history of people, but it is the material life of mankind that explains its history and human consciousness is only a product of this material life. Besides, they assert that the specificity of human essence, particularly the capacity of active thinking, can not ensue directly from properties of the human body; it can only proceed as Engels pointed out in *Dialectic of the Nature* from a reintegration, in mankind, of the properties of objective social life in praxis, action and language features. By standing “Hegel on his feet”, according to the famous expression, Marxism at the same time put Spinoza back on his feet, or maybe it only revealed the voluntary hidden meaning of the Spinozistic work.

Vygotsky’s track was therefore marked out: the purpose was to demonstrate how the social breaks out into the ideaed and then how the ideaed interacts with the corporal.

3. Vygotsky’s Psychology

If we exclude the astute attempt developed in *Consciousness as a Problem for Behaviour Psychology* (1925/1982), centred on the analogy between the self-releasing property (or circularity) of human reflexes and the self-releasing property of verbal dialogues, Vygotsky never came back directly or explicitly on his initial issues; for reasons we know of he could not elaborate a strictly theoretical synthesis of his many experimental researches. We are therefore compelled, on the grounds of the last chapters in *Thought and Language*, to infer the status itself of the solution he proposed (see Schneuwly & Bronckart, 1985).

The thesis of the two roots of development is well known but we don’t consider it useless to restate it. As a first stage of the ontogenesis the co-existence of two separate roots can be observed, one described as the “pre-verbal stage of intelligence” and the other as the “pre-intellectual stage of language”. Testifying the existence of the first root are the capacities of children aged less than 15 months to solve various cognitive problems without resorting to language (especially the distinction between means and ends and their recombination within practical actions). Testifying the existence of the second root is the development of the successive patterns of interaction with social partners, monitored by vocal productions (largely semiotic: mimic and gesture playing a considerable part), but which should have “noting in common with the development of thought” (1934/1985, p. 126). In a subsequent stage the advent of language, in other words the emergence of the capacity to produce sound units acknowledged by the human setting as “signs” of a natural language, proceeds from the fusion of these two roots. When arisen, language develops (in a third stage) according to the two separate functional directions. The child’s verbal production fulfill, on one hand, in the first place, a “social” function of communication and interaction with the setting; and as they are interiorised, on the other hand and in the second place, they fulfill an “individual” function of planning and monitoring one’s own actions. This interiorised language then becomes (in a forth stage) the fundamental organizer of the psychological functioning of the child. All these mental constructions originating from the pre-verbal root of intelligence are henceforth taken care of and controlled by the language units which the child knows are significant and on which he will therefore be able to operate. The psychological functioning thus becomes a conscious functioning and thought, strictly speaking, is established as a product of the interiorisation of units and structures of the language of the social setting.

This “Y” conception of the development to which we adhere for a long time creates serious problems that we discuss elsewhere (Bronckart, in press). In particular, if the preverbal development of intelligence, defined as remote from all social and semiotic interaction, results in a form of cognizance of goal-orientated actions, then consciousness
is independent from any social mediation, and stems out of a process of abstracting and interiorising properties of action schemata directly. At this point, Vygotsky contradicts his main thesis and comes very close to the Piagetian position against which he claims to be. Regarding the other genetic root, that of pre-intellectual language, we note that it is also characterised by the development of action structure but now immediately socialised and semiotic actions (interactions mediated through signs). Can we admit that there is no relation between these socialised actions and those "pure" actions that ought to develop in parallel, within pre-verbal intelligence? As evidenced in Moró's and Rodríguez' empirical work (1989, 1994) such a conception can not be defended.

These difficulties and contradictions result, as it has often been asserted, from the absence of accuracy about what actually comprise the analysis units and the explanatory principles of Vygotskian psychology. Two problems in particular arise.

- What is actually "interiorised": is it a language as such (words) or general properties of communicative interaction, or yet still properties of "action mediated through signs"?
- What is, in other words, the established link between communication, action and language?

In *The Crisis* Vygotsky considered that the distinction between analysis units and explanatory principles was capital but circumstances compel to observe that this distinction isn't clearly established in the strictly psychological work: the three components mentioned above seem to play the part sometimes of analysis units and at other times of explanatory principle.

II. LOGICAL INTERACTIONISM

1. Piaget's Philosophical Questioning

Is the philosophical questioning to which Piaget's work is connected in line with the monist channel of thought or rather the dualist channel of thought? It seems difficult to give a clear and definite answer to this question.

As evidenced in different positions, Piaget not only left open the issue of the ontological status of psyche but he also indicates that this question as a matter of fact cannot be solved by philosophy because only a scientific, impartial method can settle the question once and for all.

We disclose here a first fundamental aspect of the mutual viewing of the Piagetian and the Vygotskian processes. Vygotsky's first questioning is related to the status of psyche and it sustains a clear hypothesis: psyche is of social origin. With Piaget the first matter is downstream: it is related to the genesis of knowledge and he leaves in abeyance the question on the status of psyche. As this quotation from the 1924 article *L'expérience humaine et la causalité physique* (p. 600) indicates, the Piagetian program tries to elucidate the construction of reality "not by human mind but by one given mind at a given stage of mental development". We emphasise here that during the twenties Piaget firmly rejected the hypothesis of a creative role of society; for him language and social interactions were mere adjuvants, indeed necessary but secondary.

Therefore the remaining doubt about the origin and the status of psyche is often expressed in Piaget's later works by what appears strongly as an hesitation, better still a contradiction. The most striking example is that of the issue on reductionism, in the usual meaning of the term: the reduction of the psychical to the physical or the biological. On the one hand we record many assertions indicating that all psychical organisation actually relies on the co-ordination of the nervous system; on the other hand, we find assertions rejecting the innate character of this same psychical organisation.
In this context the Piagetian project is therefore to put forward a non-innate explanatory factor progressively asserting itself during the functional development of the co-ordination of actions, and we know that on the “genetic epistemology” side of his work it is the equilibration factor (self-regulation) that was endowed with this explanatory status. But the Piagetian project can nevertheless not dismiss the problem of the emergence of psyche, of the transformation of the co-ordinations of practical actions, biologically based, into mental, logical and operatory co-ordinations. In other words, Piaget can not really dismiss the matter that is at the centre of the Vygotskian problematic: how is the physical transformed into psychical? And it is on the “psychological” side of his work, in three main books that are Origins of Intelligence (1936/1952), The Construction of Reality (1937/1968) and Play, Dreams and Imitation (1945/1962) that a solution to this problem is actually proposed.

2. Piaget’s Developmental Psychology

Contrary to Vygotsky, Piaget proposed a developmental psychology in complete abidance with the postulates of his epistemological questioning.

Everyone knows the theses presented in the three works previously mentioned, and in particular the two main moments of Piaget’s demonstration. First of all, at the sensorimotor stage, the transformation of the innate interaction processes (reflex schemata), and the progressive appearing of a practical system of action co-ordination, a system that is already cognitive but that remains, in Vygotskian terms, “unpenetrated by consciousness”, or rather, unpenetrable by consciousness. Then a phase characterised by the interiorisation of this sensorimotor schematism and by its reorganisation, at the representational level under the effect of abstraction. Empirical abstraction on one hand that acts upon the properties of the world (objects, events) and recombines them in stabler and stabler mental images. But also reflexive abstraction bearing on the properties of the sensorimotoric schematism itself and contributing to transposing, onto the representational side, the objective structures of action co-ordination, transforming them by the same token into operatory structures, sketching out the logical structures of reasoning. Henceforth the subject does not only operate on the world but operates on the representations he has devised, and the operative system has therefore become a real “thinking system”.

The process that is thus described is actually that of the “precipitation” of the physical into the psychical, and two factors were regularly invoked by Piaget as candidates for the explanation of this transformation: on the one hand the role of imitation and on the other hand the role of “differentiated signifier”. For us both raise problems.

In his 1935 paper, Piaget defined imitation in the following terms:

“[it] can be considered as a differentiation of assimilation, in the sense of accommodation as such, that is, a need to conserve and to reproduce one’s own actions (pure assimilation), their progressive differentiations (circular reactions or imitation of oneself), as well as their accommodation to objects themselves, considered as models to which schemata are identified”. [The Theories of Imitation, 1935]

The question here is that of the status of this “need”, which actually, as Piaget indicated later in the article, is to dispose of “stable copies” of the world’s objects, copies thought will be able to operate upon. At first sight this need can only proceed from functional regulations themselves in biology.

Regarding the signifier, we also know about the subdued transition Piaget proposed between the role of undifferentiated signifier (or clues), and that of differentiated and motivated signifier (or symbols) and yet still that of differentiated and unmotivated signifier
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(or signs in Saussurian terms). The clues form a part, a feature or a causal result of their signified; as opposed to signs and symbols specifically produced by the subject in order to invoke these same signified. The main point here is first of all to demonstrate that the first forms of meaning are established through the sensorimotor schematism, through direct (and non-mediated) interaction of the baby with the world of objects. It is then important to disclose how access to verbal meanings, that Piaget accepts as decisive for the later evolution of thought, is carried out in direct continuity with this first process, and that the use of differentiated signifier proceeds from the internal and necessary evolution of the cognitive system established through mankind’s solitary interaction with reality. As Piaget wrote “the initial character of symbols is that the subject can make them up himself”. But the author nevertheless adds, in the same sentence, “despite the fact that their formation generally coincides with language” (1970, p. 344). This concession is obviously not without significance, and forthright we devise a few intermediary conclusions.

First of all we would like to emphasise, in abidance with Piaget, that the essential stage of psychological development leads to the discretisation of the psychical functioning, to the stabilisation of mental units upon which to operate and we would like to add this same discretisation compromises the major element of differentiation between animal psyche and human psyche. We then emphasise, still according to Piaget, that this discretisation relies on imitation and that it is achieved when the child reproduces the language of the human setting.

However the thesis of a non-social semiology, a so-called sui generis product of organism’s functioning, remains doubtful, and this regarding both its main aspects. First of all, referring to the sensorimotor stage, the idea that meaning proceeds directly from the individual-object interaction, without social mediation, adult’s actions and their attribution of meanings playing any part. Then the idea that the discretisation of thinking units is only linked to the emergence of language through a simple coincidence relationship.

Actually, since Piaget denies a decisive role to language and social interactions in the evolution of mental functioning, and considers them as secondary products of the general development of action co-ordinations, he can only denote the emergence of psyche through these same coordinations and finds himself in the de facto position of objective idealism from which Vygotsky was trying to escape.

III. A Few Suggestions to Work on

1. Analysis Units and Explanatory Principles in Psychology

Our reflection on this theme is inspired by propositions coming from various trends in philosophy and/or sociology, especially represented by Anscombe (1957), von Wright (1971), Ricoeur (1986) and Habermas (1987) who all develop a set of problems we consider convergent, specially since they are centred on the distinction event-action drawn up by the first author mentioned. Four propositions originating from these trends catch our attention.

Let’s start by reconsidering the key distinction on the grounds of the analysis of Anscombe’s two famous statements.

a) “two tiles fell of the roof due to the effect of the wind”
b) “I arranged for two tiles to fall off the roof in order to damage my neighbour’s car”.

The statement a) describes an event, that is, a chain of natural phenomena. As it is, two phenomena are explained (the wind blowing and the tiles falling); they are logically distinct (in other words definable and identifiable independently from each other) and a relationship

"..."
of determination can be established between the two: the wind blowing is a necessary and sufficient condition for the tiles falling; the first phenomenon is therefore the cause of the second. The statement b) is more complex in so far as it refers to two different types of relationship. If we only take into consideration the tiles falling and the car's damage, it describes a simple natural event. But this statement also describes a human involvement in the world: an organism endowed with the capacity of representation triggers off the event (I arranged for) and this interference seems to be determined both by the representation of the (hated) neighbour and the representation of the event (the car will be damaged). This intervention in the world defines the action, considered as an organised sequence of events imputable to an agent (an organism endowed with capacities of action), to which a motive (or a reason for acting: I hate my neighbour) and an intention (a representation of the effect) can be assigned. In Spinozistic terms the event is a chain of causes in extended matter, whereas human action is a mixture combining matter and thought.

Associated with these two such distinguished units are two totally different ways of interpreting. Given the logical independence between antecedent and consequent, the event can easily be accounted for by a causal explanation. But there are two ways to interpret the action. The first one considers the agent as an exclusively natural entity that can be called "cause" of the factual chain triggered off, even if, later on, the synchronic or historical phenomena which are themselves the causes of this setting off are questioned. This is the solution adopted by Behaviourism, which only takes into account the natural observable and which only acknowledges as ultimate causes the contingencies of reinforcement and the history of reinforcement. But such an interpretation explicitly refrains from stating the question of the role that the agent's pro-active (the intentions) and retro-active (the motives) representations play in this setting off; it doesn't enable, in other words, to question the liability of the agent: has he voluntarily triggered off the event? If so, why? When this question is tackled one can observe, with Anscombe, that neither the intentions nor the motives are certified independently from the actual event that they are supposed to have set off; these representations of the agent can only be inferred from the event itself. The condition of the logical independence of the antecedent (the intention, for example) and the consequent (the event) not being respected, the intentions and the motives cannot be considered as causes. Consequently sensible action, in so far that it summons up the conscious and active representations of the agent, cannot become the subject of a causal interpretation; according to von Wright's wording, it can only be the subject of a "comprehensive" interpretation, which Ricoeur would add is hermeneutic.

As emphasised by Ricoeur, human actions can be understood from two embedded viewpoints. According to the first, sociological viewpoint, what is certified is a stream of continuous actions in which generally take part many agents within the structural setting of one or several social formations. And one of the main problems of this discipline is the analysis of the relationship of interdependency between the properties of actions and the properties of the social formations that build up the framework. According to the second, psychological viewpoint, in order to define human action, one should cut the flow of social actions, to isolate an organised sequence of behaviour that can be imputable to one and only agent. The problematic of this discipline becomes how to measure the part that these conscious representations in the agent (intentions and motives) take in the unfolding of the action thus isolated (and to measure correlatively the part played by determinations outside of the agent). The distinction of these two viewpoints would benefit, according to us, from relying on a terminological distinction (which however isn't taken up by the authors we refer to). The phenomenon under analysis appears first of all as a "collective action" within the context of a social formation; it is at this level that it becomes a subject of sociology. But
this same phenomenon becomes the matter of psychology when a questioning on the responsibility taken by an individual agent in the setting off of an action is introduced; it is this questioning itself that defines the part of activity under the individual responsibility or even the “sensible action”.

According to Habermas, as it unfolds, every collective action objectively exhibits claims to validity regarding the world. This means that activity, by its very production, presupposes a network of common knowledge to which it belongs, as well as it contributes to its creation and transformation. (For Habermas this knowledge has three forms and defines the objective, social and subjective worlds.) This also means that activity is permanently a subject of evaluation, actually that it can only be certified within and by the evaluations of the group; evaluations of the claims to truth concerning the objective world; evaluations of the claims to appropriateness concerning the social world, evaluations of the claims to truthfulness concerning the subjective world. And the Habermasian thesis carries on with the affirmation that communicative action (language activity) is the medium through which these evaluation processes are built and developed. The evaluations expressed within language activity give to a sequence of behaviour a status of validity with respect to the knowledge constituting the three worlds, which provide, in other words, its meaning and its rationality. Further still it is the social evaluations that transform a sequence of behaviour from the form of natural event into the form of sensible action. Thus language activity is constitutive both of social activity and the formal worlds that build up the context. Two consequences follow. The first is that the psychological unit designed above as a “sensible action” to begin with is a product of social evaluations. Indeed these can apply to the group activity as a whole, but they can also concern the part played by an individual agent during its unfolding. In this case it is necessary to cut the flow of general activity, and a sensible action is therefore demarcated and assigned to an agent. The second consequence is that the agent, since he takes part in the activity of the group, also takes part and contributes to the social evaluations. The interpretation that he gives of his own actions can only proceed from the appropriation and the interiorisation of this mechanism of social evaluations. The agent constructs an individual representation of the co-ordinates of the three formal worlds and applies these criteria systems to the evaluation of his share of responsibility, therefore assembling intentions and motives.

The rationality assigned by the agent to his own action is henceforth only a secondary product of the social rationality built within the evaluation of the collective activity.

Despite the fact that they are monstrously summarised, these complex philosophical propositions seem, to us, to contribute to the clarification of certain issues in the Piaget-Vygotsky debate.

First of all, they enable to assert that the analysis unit in Piagetian psychology is of the order of event, whereas the unit of Vygotskian psychology is of the order of sensible action. However the two terms of this proposition must be taken cum grano salis.

First, for Piaget, action, either practical or mental, is explicitly proposed as the main analysis unit. But what comes under this term seems to be completely different from the sensible action as previously defined. To limit ourselves to the analysis of the sensorimotor practical actions, if there is truly an agent acting in the environment, then it is perceived as an organism producing (or “causing”) objective effects on the objects. Cognitive capacities are worked out through abstraction only of the properties of this causal chain of events to which the agent belongs. At the basis itself of the agent’s reason are the logical properties of the interaction between two physical entities, the organism and the environment, and not the properties of the social activity such as it is (re-)defined and (re-)negotiated in language. The Piagetian interactionism takes place within a solitary organism and the only objective
world, free from social evaluations and their mediatory role, and it is in this sense that action according to Piaget is only in fact event.

The slight difference that should be made concerning our second proposition is that Vygotsky, as we have previously mentioned, could not make a definite statement regarding the question of analysis units, hesitating between three candidates to this status, that Zinchenko (1985) especially recorded: “meaning of the word”, “instrumental behaviour” or yet still “mediated activity through signs”. In the light of what comes before, it is obviously the last proposition that should be retained in as much as it corresponds potentially to the notion of sensible action.

These propositions enable to go beyond the main contradiction of Vygotskyan psychology, that we mentioned above: the non-distinction, in point of fact, between the analysis unit and its explanatory principle. Indeed “action mediated through signs” seems, according to Vygotsky, to be endowed with both status. Referring to Ricoeur’s thesis on the double status of actional phenomena, we therefore assert that collective activity in it’s social context is the explanatory principle of the analysis unit called sensible action. This sensible action can be temporarily redefined as modality of participation by an agent (or person) whose social activities are regulated, or even still as the setting in motion of various potentialities of an individual agent within this same activity. This proposition leaves open the problem of the existence of other analysis units, especially related to “inferior psychological functions”.

2. The Problematique of Development

At this point we consider Habermas’ and Ricoeur’s theoretical contributions as decisive.

We should keep in mind that, for Piaget, explanation in terms of models consists mainly in establishing an isomorphic relationship between a causality system, based on the nervous system, and an implication system, at work in thought as in the development of logic and mathematics. If we can only admit the merits of this parallelism, the question of the very origin of logical-mathematical thought is left unanswered. According to Piaget, it proceeds directly (without social mediation) from an interiorisation and a reconstruction at the mental level of the causal systems as such, which remains mysterious for us. However the propositions just mentioned assert that human activity, whether dealt with from a sociological (explanatory) or a psychological (as a unit of this discipline) viewpoint, always arises as an implication system: the relations between the constitutive ingredients of activity are never of the form of causality strictly speaking, but of the form of involving connections, and it is in this sense that the analysis of their internal structure is, as von Wright affirmed, a matter of “understanding”.

Thus, it seems more reasonable to consider that it is from the implication system, formed by human social activity, that the implication system within which logical-mathematical thought develops, stems out. This also implies that individual rationality is only a secondary consequence of the rationality at work in social interaction, which implies that the rules and laws of “pure reason” are only a secondary product of the rules and laws of “practical reason”.

In the light of these postulates the stages of construction of human thought can be reanalyzed.

Our first purpose is to demonstrate that the constitutive regularities of action schemata are constructed before the appearance of language, within and through social mediation. We can also, as we are contriving to do, re-read in this perspective the corpus of Piaget’s three major works. We can also, as Moro and Rodriguez (among others) more bravely attempt
to do, try to provide new empirical data, whose analysis enables to put forward this precocious actional and semiotic mediation.

Our second purpose is then to demonstrate, that after the appearance of language, the long "latency period" that separates the stage of the displacement groupings from that of strictly operatory thought, is fundamentally characterised by the unfolding of a double process of abstraction and generalisation out of the properties of social interaction and language, processes which final outcome is precisely operatory logic.

We have to admit that a lot of work remains to be accomplished in order to carry out such a demonstration to the level of the Piagetian argument. But we think that this is the fundamental stake of developmental psychology: combining the richness of the empirical data and the analysis rigour of the Piagetian corpus with the exactness of the Vygotskian questioning and positioning.

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