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Piaget – Vygotsky
The Social Genesis of Thought

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CHAPTER SIX

Units of analysis in psychology and their interpretation: Social interactionism or logical interactionism?¹

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SOCIAL INTERACTIONISM

The Vygotskyan project
In a paper entitled The historical meaning of the crisis in psychology (1926/1982), Vygotsky studied at length the status of the discipline at the end of the first quarter of this century. He observed the existence of many "schools" (Watsonian behaviourism, Gestalt, Stern's personalism, psychoanalysis, Pavlovian reflexology, Kornilov's reactology, etc.) which, according to him, were about to make up just as many distinct sciences (or psychologies). He also emphasised the struggle that these different schools were going through in order to establish their supremacy over the whole discipline; they were all engrossed in an 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 conditioned reflex applied to the salivation. The explanatory principle, for its part, is intrinsic to the process of generalisation itself: it keeps in line with the theoretical framework in which it operates; in our example, it consists in considering the reflex as conditioned, in others words, in imputing the cause of the salivation behaviour to the sound stimulus artificially associated with the natural stimulus.

(b) Vygotsky 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 eventually break away from the facts that originated them, losing 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) Vygotsky maintained that what appeared in this case, when an explanatory idea was converted into an ideology, was in fact the philosophical options underlying, 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 made the presumption that no psychical phenomenon exists without a corresponding physical phenomenon and therefore adopted the explanatory procedure of natural sciences. The latter considered that because of their immateriality (their non-registration in space) psychical phenomena were irreducible to physical phenomena; they were only reachable through a subject's conscious self-examination. 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, because the subdisciplines adhered to Cartesian dualism, to 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 status of the discipline, Vygotsky suggested a new positive procedure, a project, characterised by the resolution to approach the entire domain of psychology through a unique process, unifying both the object of psychology and the interpretative process. As humankind obviously encompasses both bodily activity (behaviour) and 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. It is worth pointing out that this term, especially for Vygotsky, means 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.

Vygotsky's purpose was mainly to put forward analysis units in which both the behavioural and the psychic aspects appeared, hence the necessity, particularly stressed later in Thought and language (1934/1985) not to use on "higher 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 Vygotskian project, the interpretive process must be explanatory and that this explanation as such must be genetic. However in The crisis (1926/1982) the status itself of this genetic explanation is scarcely specified; we will come back to this point later.

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

It is convenient, but also not inaccurate, to oppose Spinoza to Descartes, of whom he was the disciple and from whom he took many concepts.

On the ontological side, the Cartesian "dualism" consists in stating that the world of material bodies (including the human body) and the world of the spiritual Self are of radically different essence, and that they are absolutely independent. On the genealogical side it implies furthermore that the Self has, in full autonomy, the capacity to know itself as a regulating process of its states; that therefore the Self is, essentially, consciousness.
The Spinozistic process on the other hand is, as we just mentioned, part of the monist tradition and it is also pantheistic: Reality (or nature) is unity; God is in nature; He is Nature (Deus sive Natura). From the eminently complex thought of the "free thinker of Amsterdam" we will only retain the few elements that have plainly influenced the Vygotskyan process:

(a) There is only one reality, Nature, which is one and homogeneous; this nature is submitted to the rules of a universal determinism, which is coherent and perfect because it is nothing other than the manifestation of divine activity, itself unlimited and perfect. What is asserted here is that all testified phenomena in the world are "natural" in that they refer to the same and unique matter in perpetual activity.

(b) Human understanding only has access to this matter through two of its attributes; space on one side and thought on the other. First of all this means that natural matter includes extended matter and thought: therefore thought pre-exists in matter and should not be considered as referring to a purely spiritual substance; this is the thesis of "objective idealism". This also means that extended matter and thought are, ontologically speaking, active and generative processes: they define what Spinoza named natura naturans.

(c) However human understanding is incapable of grasping this natura naturans as such: the attributes of space and thought can only be perceived as "modes", in other words as finite "things" that constitute the products of the general activity of matter. These finite elements that define natura naturae are bodies or particular objects on the level of extended matter, and ideas, will or feelings on the level of thought. Two elements of this third theme should be emphasised. First of all the prevalence of natura naturans (extended matter in motion and thought in action) on natura naturae: The finite beings or objects under which these attributes manifest themselves to our understanding are only secondary products. Second and consequently, the affirmation according to which the "discretisation" of extended matter and thought is altogether a product of human understanding: especially concerning extended matter where the introduction of time, the use of numbers, and of measuring instruments are the results of this use of "abstract instruments" by which humans apprehend in a determined and finite manner the infinite object about which they are inquiring.

(d) Taking into account the foregoing, humankind can only be considered as a particular aspect of natura naturae composed of certain modes included in the two attributes of natura naturans: its motions (its behaviour) are only modes of the extended matter attribute, and its thoughts are only modes of the thinking attribute recognised in Nature. We wish to acknowledge here that if Spinoza accepts the Cogito (man thinking), he rejects its Cartesian consequence (ergo sum: the existence of a Self or thinking substance that is specifically human). Mankind in the Spinozistic conception is only an "accident", a secondary product of the total activity of matter, but a product within which appear nevertheless the "marks" of extended matter and the "marks" of thought in action.

(e) In addition, Spinoza attests, in the famous VIIth proposition of the second part of the Ethic (1665), that "The order and the connections of ideas are the same as the order and connections of things (bodies)". And he adds that precisely in so far as they are only two parallel aspects of a unique substance, ideas and bodies can not explain each other. Ideas are explained by other ideas; bodies by the action of other bodies. The Spinozistic parallelism is in no way a first version of the "psychophysical parallelism" that later many clearly dualistic psychologists will sustain. Truly it is very close to the thesis defended by Piaget of an isomorphism between implication systems and causality systems.

Hegel's work explicitly takes place in the Spinozistic line of objective idealism and pantheism: the world is a product of divine idea in perpetual activity. In The phenomenology of the mind, Hegel (1807/1947) in particular proposes recapitulating the steps of this "self-actualisation of the world", starting with the emergence of the self, separate from the "other", and following with successive differentiations in order to end up with the set of material, social, and cultural achievements of humanity. Without going into the details (and with reason!) of this phenomenal work, let us acknowledge that Hegel, more clearly than Spinoza, states the question of the relation between the continuing infinity of natura naturans and the finite character of the objects of natura naturae, and it is this relation that is at the heart of the famous dialectic. Dialectic is first of all the process by which the mind, as an unlimited potential, meets other and limited objects that deny it, and then reorganises itself into a superior synthesis that retains the moment of the negation. But dialectic is also for Hegel a method in so far as the evolution of thought and of science can only reproduce the dialectic of reality. According to his own terms, "the concept is indivisibly motion of thing and act of understanding". Moreover it should be pointed out that Hegel, in his analysis of the genealogy of consciousness, imputes a decisive importance to the conflictual encounter of cultural objects and their reabsorption within consciousness: he therefore grants a capital importance to interaction with this part of nature constructed through work and human language.
Although he was explicitly inspired by the main philosophical theses we have just developed (albeit in dramatically simplified form), Vygotsky could not however 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 pre-existence, in all eternity, of idea in matter. He therefore had to find a conception of the status and origin of the psyche that was different, while 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 (Marx, 1845/1951) and in German ideology (Marx & Engels, 1846/1972) 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. They also assert that the specificity of human essence, particularly the capacity for active thinking, cannot ensue directly from properties of the human body; it can only proceed, as Engels pointed out in Dialectics of Nature (1886/1971), 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 perhaps it only revealed the deliberately 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 psychic and then how the psychic interacts with the corporal.

Vygotsky's psychology

If we exclude the astute attempt developed in Consciousness as a problem for psychology of behaviour (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 returned directly or explicitly to his initial issues; owing to his short scientific life he could not elaborate a strictly theoretical synthesis of his many experimental researches. We are therefore compelled, on the basis of the last chapters in Thought and language to infer the status of the solution he proposed (see Schneuwly & Bronckart, 1985).

The thesis of the two roots of development is well known but worth restating. 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 to 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 recomposition within practical actions). Testifying to 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 "nothing in common with the development of thought" (Vygotsky, 1934/1985, p.126, our translation). 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 it has arisen, language develops (in a third stage) according to two separate functional directions. The child's verbal productions fulfill, in the first place, a "social" function of communication and interaction with the setting; and, second, as they are interiorised, they fulfill a function of planning and monitoring one's own action for oneself. This interiorised language then becomes (in a fourth stage) the fundamental organiser of the psychological functioning of the child. All of the 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 or she 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 development to which we adhered 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 cognisance of goal-oriented actions, then consciousness is independent from any social mediation and stems from 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 that he claims to be against. 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 of 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 the empirical work of Moro and Rodriguez (1989), such a conception cannot be defended.

These difficulties and contradictions result, as has often been asserted, from the absence of accuracy about what actually comprises the analysis units and the explanatory principles of Vygotskyan
psychology. Two problems in particular arise. What is actually "interiorised": is it language as such (words) or general properties of communicative interaction, or even 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 fundamental, but circumstances compel us to observe that this distinction is not clearly established in the strictly psychological work; the three components mentioned earlier seem sometimes to play the part of analysis units and at other times of explanatory principle.

LOGICAL INTERACTIONISM

Piaget's philosophical questioning

Is the philosophical questioning to which Piaget's work is connected in line with the monist channel of thought or with the dualist channel of thought? It seems difficult to give a clear and definite answer to this question, however a few helpful elements can be introduced. We will first of all underline that even the main propositions of the monist tradition are hardly discussed by Piaget, and that there is scarcely an allusion to Spinoza or to the contributions, on this precise question, of the Hegelian or Marxist process.

During his adolescence, Piaget took an interest in the Bergsonian issue which indisputably assumes a monist and pantheist outlook and therefore leads (almost inescapably) to an objective idealistic position. For Bergson "God is life" and the scientific study of the biological facts of evolution and adaptation should enable a return to the very foundations of living beings, or even "to recapture the creative consciousness organising matter". But as Ducret (1990) noted, Piaget rapidly rejected the metaphysical and religious features of the Bergsonian issue in order to concentrate on the only problem that was scientifically approachable in his eyes, that of the development of forms of life. And Ducret, in this same work, underlines the phases of Piaget's withdrawal from "any philosophical claim" leading, in the middle of the 1940s, to exclusive attention to the issue of the growth of human knowledge.

If we can admit with Ducret this progressive retreat of Piaget regarding metaphysical issues (in particular, regarding the status of human beings) we cannot fail to note the emergence, at the same time, of the omnipresence of reference to Kant. This is a reference that can be explained easily, in so far as from now on the main issue of the Piagetian process is nothing other than the construction of the categories of understanding analysed in The critique of pure reason. But the Kantian process falls in clearly with the Cartesian line, from which it resumes the fundamental body–mind dualism, otherwise heightened by secondary dualism such as perception–reasoning and "pure reason"—"practical reason". We could then infer that the mature Piaget accepted the basic postulate of this philosophical trend—that of subjective idealism: the existence, at the heart of mankind itself, of the capacity of thinking sui generis, or in Cartesian terms, a specific psychical substance that is purely immaterial. But obviously things are not so simple. Besides the fact that his work comprises a masterly dismissal of the sensation–reasoning dualism, Piaget seems to have adopted a doubting attitude towards the question of the status of the psyche, as the following quotation (from the inaugural lesson in the Chair of Philosophy of Science he occupied at the time in Neuchâtel testifies) (Piaget, 1929, p.210, our translation):

... genetic analysis in psychology is impartial. It is possible (that it rehabilitates) the notion of the a priori. It is also possible that such a method leads to the idea of a radically contingent spiritual development. It is also possible that such a method enforces the notion of a sort of ideal directing reason, both an active and unachieved ideal.

As evidenced in other later positions, Piaget not only left open the issue of the ontological status of psyche but he also indicated that this question cannot in fact 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 this overview of the Piagetian and the Vygotskyan 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 issue 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" [The human experience and physical causality] indicates, the Piagetian programme tries to elucidate the construction of reality "not by human mind but by one given mind at a given stage of mental development" (Piaget, 1924, p.600, our translation). We emphasise here that during the 1920s Piaget firmly rejected the hypothesis of a creative role of society; for him language and social interactions were mere adjuncts, necessary indeed 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 a hesitation, or better still a contradiction. The most striking example is that of the issue of 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. As an example of the first kind of assertion, Piaget (1929, p.147, our translation) writes:

Through mathematics, the mind explains the physical reality, but through biology, physical reality reveals mind and mathematics themselves.

Later, (1972, p.177, our translation) he also stated:

The operations of thought and the logical-mathematical structures, broadly speaking, rely on general co-ordinations of action (inclusion, order, correspondences, etc.) and not on language or on any particular social transmission, these general co-ordinations of action themselves relying on nervous and organic co-ordinations ... 

As an example of the second kind of assertion, Piaget (1972, p.211, our translation) stated:

The operatory structures of intelligence are not innate ... They are not preformed within the nervous system, neither are they in the physical world where they would only have to be discovered. They therefore testify a real construction ...

Piaget can henceforth assert that operatory structures are both “natural” and “spontaneously” constructed, and that they are none the less “non-innate”.

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 factor of equilibration (self-regulation) that was endowed with this explanatory status. But the Piagetian project nevertheless cannot 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 cannot really dismiss the matter that is at the centre of the Vygotskyan problematique: How is the physical transformed into the psychical? It is on the “psychological” side of his work, in three main books—The origin 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.

Piaget’s developmental psychology

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

Everyone knows the theses presented in the three works previously mentioned, and in particular the two main locations of Piaget’s demonstration. First of all, at the sensorimotor stage, the transformation of the innate interaction processes (reflex schemata), and the progressive appearance of a practical system of action co-ordination; a system that is already cognitive but which remains, in Vygotskyan 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 on the properties of the world (objects, events) and reconstructs them in even more stable mental images. But also reflexive abstraction bearing on the properties of the sensorimotor 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 or she 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 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 (p.9, our translation), 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 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 on which thought will be able to operate. 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 furthermore that of differentiated and unmotivated signifier (or signs in Saussurian terms). The clues form a part of the signifier, or a causal result of that which is signified; as opposed to signs and symbols specifically produced by the subject in order to invoke these. The main point here is first of all to demonstrate that the first forms of meaning are established through sensorimotor schematicism, through direct (and non-mediated) interaction of the baby with the world of objects. It is then to disclose how access to verbal meanings, which Piaget accepts as decisive for the later evolution of thought, is carried out in direct continuity with this first process, and to establish that the use of differentiated signifiers proceeds from the internal and necessary evolution of the cognitive system established through mankind’s solitary interaction with reality. As Piaget wrote (1972, p.344, our translation) “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”. This concession is obviously not without significance, and so we can draw a few intermediary conclusions.

First of all we would like to emphasise, in concordance with Piaget, that the essential step in psychological development is the one that leads to the discretisation of psychical functioning, to the stabilisation of mental units on which to operate, and we would like to add that this same discretisation compromises the major element of differentiation between animal psyche and human psyche. We then notice, still in agreement with 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 an 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, as 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 co-ordinations and finds himself in the de facto position of objective idealism from which Vygotsky was trying to escape.

**Piaget and explanation in psychology**

As opposed to Vygotsky yet again, Piaget often proposed a detailed analysis of what should have been for him the interpretative processes of psychological facts. In various explicitly methodological papers, Piaget considers that psychology should combine causal explanations and explanations based on abstract models.

Following the pattern of natural sciences, psychology should, first of all, try to provide an explanation for behaviour by seeking out the cause, in Humean terms, that is, by trying to identify an event, logically independent of the behaviour to be explained, whose occurrence is necessary and sufficient to provoke the appearance of this same behaviour. Whereas, for behaviourists, causes are to be searched for in the environment (reinforcement contingencies) or possibly in certain internal marks of the effect of the environment on the organism (the history of reinforcement), for Piaget, causes are internal and in fact proceed from the modalities of the central nervous system’s functioning (cf the quotation given earlier from 1972, p.177). It is obvious however that this mode of interpretation is reductionist: it explains phenomena existing at a certain level of organisation (human behaviour referring to psychology) by appealing to an inferior level of organisation (the nervous system referring to biology), and so it necessarily dodges the specific properties of the phenomenon to be interpreted.

Aware of the limits of this first mode of interpretation, Piaget favoured a second one: explanation through construction of models, which involves drafting hypotheses on the structure of mental organisation underlying behaviour, then proceeding to the validation of these hypotheses. This interpretative paradigm is unfolded in three steps. First by collecting data and establishing possible “empirical laws” testifying to the generality of the dependency of a phenomenon on another and so enabling predictability (“if X, then generally Y”). Then by linking up the observed regularities and deducing new laws. As opposed to the former these “deductive laws” are not confined to the
observation of the generality of certain facts; they introduce a feature of necessity, linked with the logical-mathematical properties of the activity of deduction itself. The process is completed by assembling a mathematical model (group of displacement, INCR group, etc.), and integrating the different laws according to its own norms of composition and in such a way as to enable a linking-up of transformations that characterise it and the transformations as observed in the subject's behaviour. Such a model can be validated by "going back to empirical data" and is considered as explanatory only "in so far as it enables one to attribute to the objective 'processes' themselves a structure that is isomorphic to itself." (Piaget, 1972, p.113, our translation)

Without being able to discuss here the weakening, or better still the impaired state, of this process brought about by the so-called "cognitive" sciences, we note that the interpretative schema proposed by Piaget is an interesting reformulation of the Spinozistic parallelism mentioned earlier. As the author himself indicates in the same extract (p.116, our translation), "consciousness is an implication system ... the nervous system is a causal system and psyche-physiological parallelism is only a specific case of isomorphism between implication systems and causality systems ...."

As with Spinoza the series of causes acting on the bodies and the series of connections that are established between ideas remain radically separate; an idea cannot explain a bodily behaviour, but a physical action can explain the transformation of an idea; only a general isomorphism between these two series is explanatory. But it is obvious that the assumption of this version of psycho-physical parallelism implies that the origin of ideas can only be found in ideas themselves, which pre-exist in all eternity, and so we come back to the position of objective idealism. In other extracts which do not offer explicitly meta-methodological features, Piaget also proposes, in almost identical terms to Vygotsky, another form of interpretation—that of genetic explanation. He states (1972, pp.171 & 173, our translation):

The study of relations between individual psychology and social life ought not to be reduced to the study of mature or adult behaviour ... Genesis alone is explanatory and the source of controllable information.

Again, Piaget states (1972, p.201, our translation):

The main future of psychology lies in comparative and psycho-genetic methods as it is only by observing the development of behaviour and its mechanisms in children and in animals ... that we can understand its nature and its functioning in adults.

In the concluding part of this chapter, we will try to elucidate the link between this "unofficial" form of explanation and the two "official" forms mentioned earlier.

A FEW SUGGESTIONS

Analysis units and explanatory principles in psychology

Our reflection on this theme has been inspired by propositions stemming 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 similar problematique, particularly as they are centred around the event-action distinction drawn up by the first author mentioned. Four propositions originating from these trends catch our attention.

We will 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. In it, two phenomena are explained (the wind blowing and the tiles falling); they are logically distinct (or 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. However 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 effect 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 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 the "cause" of the factual chain that is triggered off, even if, later on, the synchronic or historical phenomena that are themselves the causes of this setting-off are questioned. This is the solution adopted by Behaviourism, which only takes into account the natural observables and which only acknowledges as ultimate causes the contingencies of reinforcement and the history of reinforcement. But such an interpretation explicitly refrains from posing the question of the role that the agent's pro-active (intentions) and retro-active (motives) representations play in this setting-off; it doesn't enable, in other words, the liability of the agent to be questioned. Has he or she 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 can be 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, human action, in so far as 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 many agents generally take part within the structural setting of one or several social formations. 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 context. 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 one 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 how to measure correlativey the part played by determinations outside of the agent). The distinction of these two viewpoints would benefit, it seems to us, from reliance on a terminological distinction (which however is not taken up by the authors to whom we refer). The phenomenon under analysis appears first of all as a "collective activity" within the context of a social formation; it is at this level that it becomes a subject of sociology. But this same phenomenon becomes a matter of psychology when questioning about the responsibility taken by an individual agent in the setting-off of an activity is introduced; it is this questioning itself that defines the part of activity under individual responsibility or even "human action".

According to Habermas, as it unfolds, every collective activity objectively exhibits claims to validity regarding the world. This means that activity, by its very production, presupposes a network of common knowledge about the world, as well as contributing to its creation and transformation (for Habermas this knowledge has three forms and defines the objective, social, and subjective worlds). This also means that this activity is permanently a subject of evaluation, that it can actually only be certified within and by the evaluations of the group; evaluations of claims to truth concerning the objective world; of claims to appropriateness concerning the social world; of claims to truthfulness concerning the subjective world. And the Habermasian thesis carries on with the affirmation that communicative activity (or language activity) is a 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 human 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 designated earlier as a "human action" is, to begin with, 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 an action is therefore demarcated and assigned to an agent. The second consequence is that the agent, because he or she takes part in the activity of the group, also takes part and contributes to the social evaluations. The interpretation that the agent gives of his or her 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 or her share of responsibility, therefore building up intentions and motives. The rationality assigned by the agent to his or her own action is henceforth only a secondary product of the social rationality built within the evaluation of the collective activity.

Despite the fact that yet again they are greatly summarised here, 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 us to assert that the analysis unit in Piagetian psychology is of the order of event, whereas the unit of Vygotskyan psychology is of the order of 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 human action as previously defined. To limit ourselves to the analysis of sensorimotor practical actions, if there is truly an agent acting on 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 very heart 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. 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 noted 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, which Zinchenko (1985) recorded as “meaning of the word”, “instrumental behaviour”, or even “action mediated 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 human action.

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

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 essentially 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, as we have already noted, 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 is mysterious to us: How and why is this causal system transformed into a unification system?

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 (1971) affirmed, a matter of “understanding”.

Thus, it seems more reasonable to consider that the implication system within which logical-mathematical thought develops, stems from the implication system formed by human activity. This also implies that individual rationality is only a secondary consequence of the rationality at work in social interactions, which yet again 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 reanalysed. 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, as we are contriving to do, re-read in this perspective the corpus of Piaget’s three major works. We can also—as Bruner and his school more bravely attempt to do—try to provide new empirical data, whose analysis enables us 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 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 whose 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 goal of developmental psychology: combining the richness of the empirical data and the analytic rigour of the Piagetian corpus with the exactness of the Vygotskyian questioning and positioning.

**Can an explanation be genetic?**

In this context how should we deal with the genetic explanation firmly claimed by Vygotsky and unofficially referred to by Piaget? As there is no space for a detailed argument, we will have to be content with answering with a few suggestions that may be considered provocative.

Piaget's work, as well as Vygotsky's, is characterised by putting into place a genetic method, which is necessitated, in both authors, by the complexity and the interpenetration of the levels of psychological functioning on one side, and by the acknowledgement of the dialectic feature of the psychological development on the other side. But a method does not constitute an explanation.

Actually when interpretation of psychological facts aims to seek causes, strictly speaking, explanation ensues, but this explanation therefore, as Piaget emphasised, discloses an inescapably reductionist feature. When interpretation of facts aims at the elucidation of the corresponding relationship between causality systems and implication systems, as Piaget also proposed, then perhaps it is an explanation, but an explanation that may have to remain synchronous, as shown by the contemporary cognitivist drifts, as well as the difficulties presently encountered by the Piagetian movement on this point; the difficulty of coming forward with an effective model of *Filiation des Structures*.

Although the ontogenetic process is, as both our authors accurately emphasised, of a capital importance, it does not allow, according to us, either a causal explanation, or an explanation through models; it can only be linked up with an interpretation of a hermeneutic or understanding type. This position will, no doubt, be contested, but we think it is the inescapable consequence of the social interactionist position: the development of mankind is inextricably linked up with the effect permanently exerted on it by social activity and language meanings already present and in perpetual evolution. In our opinion, the locus of explanatory principles to the human condition is to be found in the very construction of its social and semantic dimension. Thus, we understand literally Blonski's statement endlessly reproduced by Vygotsky: "behaviour can only be explained by the history of behaviour". Behaviour can only be explained by history, strictly speaking, that is to say through the construction and the coming into being of social organisations.

**REFERENCES**


Ricoeur, P. (1986). *Du texte à l'action; essais d'herméneutique II* [From text to action; Essays on hermeneutics II]. Paris: Seuil.

**NOTE**

1. This chapter was translated from the French by Nicole Rege Collet.