



Jean Piaget (1955)

# The Construction of Reality in the Child

**The Elaboration of the Universe.**

**— Conclusion —**

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In our first study of the beginnings of mental life we analysed the origins of intelligence in children and tried to show how the forms of intellectual activity are constructed on the sensori motor level. In the current work we have tried, on the other hand, to understand how the real categories of sensorimotor intelligence are organised, that is, how the world is constructed by means of this instrument. In conclusion, the time has come to show the unity of these various processes and their relations with those of the child's thought, envisaged in their most general aspect.

## § I. Assimilation and Accommodation

The successive study of concepts of object, space, causality, and time has led us to the same conclusions: the elaboration of the universe by sensorimotor intelligence constitutes the transition from a state in which objects are centred about a self which believes it directs them, although completely unaware of itself as subject, to a state in which the self is placed, at least practically, in a stable world conceived as independent of personal activity. How is this evolution possible?

It can be explained only by the development of intelligence. Intelligence progresses from a state in which accommodation to the environment is undifferentiated from the assimilation of things to the subject's schemata to a state in which the accommodation of multiple schemata is distinguished from their respective and reciprocal assimilation. To understand this process, which sums up the whole evolution of sensorimotor intelligence, let us recall its steps, starting with the development of assimilation itself.

In its beginnings, assimilation is essentially the utilisation of the external environment by the subject to nourish his hereditary or acquired schemata. It goes without saying that schemata such as those of sucking, sight, prehension, etc., constantly need to be

accommodated to things, and that the necessities of this accommodation often thwart the assimilatory effort. But this accommodation remains so undifferentiated from the assimilatory processes that it does not give rise to any special active behaviour pattern but merely consists in an adjustment of the pattern to the details of the things assimilated. Hence it is natural that at this developmental level the external world does not seem formed by permanent objects, that neither space nor time is yet organised in groups and objective series, and that causality is not spatialised or located in things. In other words, at first the universe consists in mobile and plastic perceptual images centred about personal activity. But it is self-evident that to the extent that this activity is undifferentiated from the things it constantly assimilates to itself it remains unaware of its own subjectivity; the external world therefore begins by being confused with the sensations of a self unaware of itself, before the two factors become detached from one another and are organised correlatively.

On the other hand, in proportion as the schemata are multiplied and differentiated by their reciprocal assimilations as well as their progressive accommodation to the diversities of reality, the accommodation is dissociated from assimilation little by little and at the same time ensures a gradual delimitation of the external environment and of the subject. Hence assimilation ceases merely to incorporate things in personal activity and establishes, through the progress of that activity, an increasingly tight web of coordinations among the schemata which define it and consequently among the objects to which these schemata are applied. In terms of reflective intelligence this would mean that deduction is organised and applied to an experience conceived as external. From this time on, the universe is built up into an aggregate of permanent objects connected by causal relations that are independent of the subject and are placed in objective space and time. Such a universe, instead of depending on personal activity, is on the contrary imposed upon the self to the extent that it comprises the organism as a part in a whole. The self thus becomes aware of itself, at least in its practical action, and discovers itself as a cause among other causes and as an object subject to the same laws as other objects.

In exact proportion to the progress of intelligence in the direction of differentiation of schemata and their reciprocal assimilation, the universe proceeds from the integral and unconscious egocentrism of the beginnings to an increasing solidification and objectification. During the earliest stages the child perceives things like a solipsist who is unaware of himself as subject and is familiar only with his own actions. But step by step with the coordination of his intellectual instruments he discovers himself in placing himself as an active object among the other active objects in a universe external to himself.

These global transformations of the objects of perception, and of the very intelligence which makes them, gradually denote the existence of a sort of law of evolution which can

be phrased as follows: assimilation and accommodation proceed from a state of chaotic undifferentiation to a state of differentiation with correlative coordination.

In their initial directions, assimilation and accommodation are obviously opposed to one another, since assimilation is conservative and tends to subordinate the environment to the organism as it is, whereas accommodation is the source of changes and bends the organism to the successive constraints of the environment. But if in their rudiment these two functions are antagonistic, it is precisely the role of mental life in general and of intelligence in particular to intercoordinate them.

First let us remember that this coordination presupposes no special force of organisation, since from the beginning assimilation and accommodation are indissociable from each other. Accommodation of mental structures to reality implies the existence of assimilatory schemata apart from which any structure would be impossible. Inversely, the formation of schemata through assimilation entails the utilisation of external realities to which the former must accommodate, however crudely. Assimilation and accommodation are therefore the two poles of an interaction between the organism and the environment, which is the condition for all biological and intellectual operation, and such an interaction presupposes from the point of departure an equilibrium between the two tendencies of opposite poles. The question is to ascertain what forms are successively taken by this equilibrium which is being constituted.

If the assimilation of reality to the subject's schemata involves their continuous accommodation, assimilation is no less opposed to any new accommodation, that is, to any differentiation of schemata by environmental conditions not encountered up to then. On the other hand, if accommodation prevails, that is, if the schema is differentiated, it marks the start of new assimilations. Every acquisition of accommodation becomes material for assimilation, but assimilation always resists new accommodations. It is this situation which explains the diversity of form of equilibrium between the two processes, according to whether one envisages the point of departure or the destiny of their development.

At their point of departure they are relatively undifferentiated in relation to each other, since they are both included in the interaction which unites the organism to the environment and which, in its initial form, is so close and direct that it does not comprise any specialised operation of accommodation, such as the tertiary circular reactions, behaviour patterns of active experimentation, etc., will subsequently be. But they are none the less antagonistic, since, though each assimilatory schema is accommodated to the usual circumstances, it resists every new accommodation, precisely through lack of specialised accommodative technique. It is therefore possible to speak of chaotic undifferentiation. It is at this level that the external world and the self remain

undissociated to such a point that neither objects nor spatial, temporal, or causal objectifications are possible.

To the extent that new accommodations multiply because of the demands of the environment on the one hand and of the coordinations between schemata on the other, accommodation is differentiated from assimilation and by virtue of that very fact becomes complementary to it. It is differentiated, because, in addition to the accommodation necessary for the usual circumstances, the subject becomes interested in novelty and pursues it for its own sake. The more the schemata are differentiated, the smaller the gap between the new and the familiar becomes, so that novelty, instead of constituting an annoyance avoided by the subject, becomes a problem and invites searching. Thereafter and to the same extent, assimilation and accommodation enter into relations of mutual dependence. On the one hand, the reciprocal assimilation of the schemata and the multiple accommodations which stem from them favour their differentiation and consequently their accommodation; on the other hand, the accommodation to novelties is extended sooner or later into assimilation, because, interest in the new being simultaneously the function of resemblances and of differences in relation to the familiar, it is a matter of conserving new acquisitions and of reconciling their. with the old ones. An increasingly close interconnection thus tends to be established between the two functions which are constantly being better differentiated, and by extending the lines this interaction ends, as we have seen, on the plane of reflective thought, in the mutual dependency of assimilatory deduction and experimental techniques.

Thus it may be seen that intellectual activity begins with confusion of experience and of awareness of the self, by virtue of the chaotic undifferentiation of accommodation and assimilation. In other words, knowledge of the external world begins with an immediate utilisation of things, whereas knowledge of self is stopped by this purely practical and utilitarian contact. Hence there is simply interaction between the most superficial zone of external reality and the wholly corporal periphery of the self. On the contrary, gradually as the differentiation and coordination of assimilation and accommodation occur, experimental and accommodative activity penetrates to the interior of things, while assimilatory activity becomes enriched and organised. Hence there is a progressive formation of relationships between zones that are increasingly deep and removed from reality and the increasingly intimate operations of personal activity. intelligence thus begins neither with knowledge of the self nor of things as such but with knowledge of their interaction, and it is by orienting itself simultaneously toward the two poles of that interaction that intelligence organises the world by organising itself.

A diagram will make the thing comprehensible. Let the organism be represented by a small circle inscribed in a large circle which corresponds to the surrounding universe. The meeting between the organism and the environment takes place at point A and at all

analogous points, which are simultaneously the most external to the organism and to the environment itself. In other words, the first knowledge of the universe or of himself that the subject can acquire is knowledge relating to the most immediate appearance of things or to the most external and material aspect of his being. From the point of view of consciousness, this primitive relation between subject and object is a relation of undifferentiation, corresponding to the protoplasmic consciousness of the first weeks of life when no distinction is made between the self and the non-self. From the point of view of behaviour this relation constitutes the morphologic-reflex organisation, in so far as it is a necessary condition of primitive consciousness. But from this point of junction and undifferentiation A, knowledge proceeds along two complementary roads. By virtue of the very fact that all knowledge is simultaneously accommodation to the object and assimilation to the subject, the progress of intelligence works in the dual direction of externalisation and internalisation, and its two poles will be the acquisition of physical experience (→Y) and the acquisition of consciousness of the intellectual operation itself (→X). That is why every great experimental discovery in the realm of exact sciences is accompanied by a reflexive progress of reason on itself (of logico-mathematical deduction), that is, by progress in the formation of reason in so far as it is internal activity, and it is impossible to decide once for all whether the progress of the experiment is due to that of reason or the inverse. From this point of view the morphologic-reflex organisation, that is, the physiological and anatomic aspect of the organism, gradually appears to the mind as external to it, and the intellectual activity which extends it by internalising it presents itself as the essential of our existence as living beings.

In the last analysis, it is this process of forming relationships between a universe constantly becoming more external to the self and an intellectual activity progressing internally which explains the evolution of the real categories, that is, of the concepts of object, space, causality, and time. So long as the interaction between subject and object is revealed in the form of exchanges of slight amplitude in a zone of undifferentiation, the universe has the appearance of depending on the subject's personal activity, although the latter is not known in its subjective aspect. To the extent, on the contrary, that the interaction increases, the progress of knowledge in the two complementary directions of object and subject enables the subject to place himself among objects as a part in a coherent and permanent whole. Consequently, to the extent that assimilation and accommodation transcend the initial state of "false equilibrium" between the subject's needs and the resistance of things to attain a true equilibrium, that is, a harmony between internal organisation and external experience, the subject's perspective of the universe is radically transformed; from integral egocentrism to objectivity is the law of that evolution. The relations of assimilation and accommodation thus constitute, from the time of the sensorimotor level, a formative process analogous to that which, on the plane of verbal and reflective intelligence, is represented by the relations of individual thought and socialisation. Just as accommodation to the point of view of others enables individual

thought to be located in a totality of perspectives that insures its objectivity and reduces its egocentrism, so also the coordination of sensorimotor assimilation and accommodation leads the subject to go outside himself to solidify and objectify his universe to the point where he is able to include himself in it while continuing to assimilate it to himself.

## **§ 2. The Transition from Sensorimotor Intelligence to Conceptual Thought**

This last remark leads us to examine briefly, in conclusion, the relations between the practical universe elaborated by the sensorimotor intelligence and the representation of the world brought about by later reflective thought.

In the course of the first two years of childhood the evolution of sensorimotor intelligence, and also the correlative elaboration of the universe, seem, as we have tried to analyse them, to lead to a state of equilibrium bordering on rational thought. Thus, starting with the use of reflexes and the first acquired association, the child succeeds within a few months in constructing a system of schemata capable of unlimited combinations which presages that of logical concepts and relations. During the last stage of their development these schemata even become capable of certain spontaneous and internal regroupings which are equivalent to mental deduction and construction. Moreover, gradually as objects, causality, space, and time are elaborated, a coherent universe follows the chaos of the initial egocentric perceptions. When in the second year of life representation completes action by means of the progressive internalisation of behaviour patterns, one might therefore expect that the totality of sensorimotor operations would merely pass from the plane of action to that of language and thought and that the organisation of schemata would thus be directly extended in a system of rational concepts.

In reality, things are far from being so simple. In the first place, on the plane of practical intelligence alone, the excellent studies of Andre Rey show that not all the problems are solved by the child by the end of his second year. As soon as the data of problems become complicated and the subjects are obliged to attain their ends by means of complex contacts or displacements, in the solution of these new problems through a sort of temporal displacement in extension we rediscover all the obstacles analysed in this volume apropos of the elementary stages of the first two years of life. Furthermore, and this is valuable to the theory of temporal displacements, these obstacles reappear in the same order despite the gap which separates the ages of birth to 2 years, studied here, from the ages of three to eight years studied by Andre Rey. Thus in Rey's experiments the child begins by revealing a sort of "dynamic realism," "in the course of which the movement (pulling, pushing, etc.) would possess a quality independent of any adaptation to the

particular data of the environment." Then he goes through a phase of "optical realism" analogous to that which we observe among chimpanzees, in which he substitutes for the physical relations of bodies the visual relations corresponding to the apparent data of perception. How is it possible not to compare these two preliminary steps to those which characterise the beginnings of sensorimotor intelligence and of the practical universe resulting from them? Dynamic realism is the residue of the assimilation of things to actions that accounts for practical groups and series, for the magico-phenomenalistic causality and the object-less universe peculiar to our elementary stages. Before being able to structure a complex situation, the child from three to four years of age, like the baby a few months old who is confronted by a situation that is simpler but from his point of view obscure, is limited to assimilating it to the act which should be performed. Because of a residual belief in the power of his personal activity, he still confers upon his gestures a sort of absolute value, which is tantamount to forgetting momentarily that things are permanent substances grouped spatially, seriated temporally, and sustaining among themselves objective causal relations. With regard to optical realism it seems clear that it constitutes a residue of behaviour patterns which are intermediate between the primitive egocentric stages and the stages of objectification, behaviour patterns characterised by subjective groups and series or by transitional behaviour relating to the beginnings of the object and of spatialized causality. Optical realism, too, consists in considering things as being what they appear to be in immediate perception and not what they will become once they have been inserted in a system of rational relations transcending the visual field. Thus the child imagines that a stick can draw an object because it is beside it or touches it, as though optical contact were equivalent to a causal link. It is precisely this confusion of immediate visual perceptions with physical realities that characterises the subjective groups or series, for example, when the baby does not know how to turn over a nursing bottle because he cannot conceive of the object's reverse side, or when he imagines himself able to rediscover objects where he saw them the first time, regardless of their actual trajectory.

Hence, between the sensorimotor intelligence which precedes the advent of speech and the later practical intelligence which subsists under verbal and conceptual realities, there is not only a linear continuity but also there are temporal displacements in extension, so that in the presence of every truly new problem the same primitive processes of adaptation reappear, although diminishing in importance with age.

But above all, even if these obstacles encountered in action by the two- to seven-year-old child are destined to be overcome finally, through the instruments prepared by the sensorimotor intelligence during the first two years of life, the transition from the merely practical plane to that of speech and conceptual and socialised thought brings with it, by nature, obstacles that singularly complicate the progress of intelligence.

At the outset, two innovations place conceptual thought in opposition to sensorimotor intelligence and explain the difficulty of transition from one of these two forms of intellectual activity to the other. In the first place, sensorimotor intelligence seeks only practical adaptation, that is, it aims only at success or utilisation, whereas conceptual thought leads to knowledge as such and therefore yields to norms of truth. Even when the child explores a new object or studies the displacements he provokes [by a sort of "experiment in order to see," there is always in these kinds of sensorimotor assimilations, however precise the accommodation they evidence, the concept of a practical result to be obtained. By virtue of the very fact that the child cannot translate his observations into a system of verbal judgments and reflexive concepts but can simply register them by means of sensorimotor schemata, that is, by outlining possible actions, there can be no question of attributing to him the capacity of arriving at pure proofs or judgments properly so called, but it must be said that these judgments, if they were expressed in words, would be equivalent to something like, "one can do this with this object," "one could achieve this result," etc. In the behaviour patterns oriented by an actual goal, such as the discovery of new means through active experimentation or the invention of new means through mental combinations, the sole problem is to reach the desired goal, hence the only values involved are success or failure, and to the child it is not a matter of seeking a truth for itself or reflecting upon the relations which made it possible to obtain the desired result. It is therefore no exaggeration to say that sensorimotor intelligence is limited to desiring success or practical adaptation, whereas the function of verbal or conceptual thought is to know and state truths.

There is a second difference between these two types of activity: sensorimotor intelligence is an adaptation of the individual to things or to the body of another person but without socialisation of the intellect as such; whereas conceptual thought is collective thought obeying common laws. Even when the baby imitates an intelligent act performed by someone else or understands, from a smile or an expression of displeasure, the intentions of another person, we still may not call this an exchange of thoughts leading to modification of those intentions. On the contrary, after speech has been acquired the socialisation of thought is revealed by the elaboration of concepts, of relations, and by the formation of rules, that is, there is a structural evolution. It is precisely to the extent that verbal-conceptual thought is transformed by its collective nature that it becomes capable of proof and search for truth, in contradistinction to the practical character of the acts of sensorimotor intelligence and their search for success or satisfaction. It is by cooperation with another person that the mind arrives at verifying judgments, verification implying a presentation or an exchange and having in itself no meaning as regards individual activity. Whether conceptual thought is rational because it is social or vice versa, the interdependence of the search for truth and of socialisation seems to us undeniable.



The adaptation of intelligence to these new realities, when speech and conceptual thought are superimposed on the sensorimotor plane, entails the reappearance of all the obstacles already overcome in the realm of action. That is why, despite the level reached by the intelligence in the fifth and sixth stages of its sensorimotor development, it does not appear to be rational at the outset, when it begins to be organised on the verbal-conceptual plane. On the contrary, it manifests a series of temporal displacements in comprehension and no longer only in extension, since in view of corresponding operations the child of a given age is less advanced on the verbal-conceptual plane than on the plane of action. In simpler terms, the child does not at first succeed in reflecting in words and concepts the procedures that he already knows how to carry out in acts, and if he cannot reflect them it is because, in order to adapt himself to the collective and conceptual plane on which his thought will henceforth move, he is obliged to repeat the work of coordination between assimilation and accommodation already accomplished in his sensorimotor adaptation anterior to the physical and practical universe.

It is easy to prove: (1) that the assimilation and accommodation of the individual from the time of the beginnings of speech present a balance less well developed in relation to the social group than in the realm of sensorimotor intelligence; and ( 2 ) that to make possible the adaptation of the mind to the group these functions must proceed again over the same steps, and in the same order, as during the first months of life. From the social point of view, accommodation is nothing other than imitation and the totality of the operations enabling the individual to subordinate himself to the precepts and the demands of the group. With regard to assimilation it consists as before in incorporating reality into the activity and perspectives of the self. Just as on the plane of adaptation to the sensorimotor universe the subject, while submitting to the constraints of the environment from the very beginning, starts by considering things as dependent on his actions and succeeds only little by little in placing himself as an element in a totality which is coherent and independent of himself, so also on the social plane the child, while at first obeying someone else's suggestions, for a long time remains enclosed in his personal point of view before placing it among other points of view. The self and the group therefore begin by remaining undissociated in a mixture of egocentrism and submission to environmental constraints, and subsequently are differentiated and give rise to a cooperation between personalities which have become autonomous. In other words, at the time when assimilation and accommodation are already dissociated on the plane of sensorimotor adaptation, they are not yet dissociated on the social plane, and thus they reproduce there an evolution analogous to that which has already occurred on the former plane.

From this arises a series of consequences very important in the structure of the child's thought at its beginnings. Just as sensorimotor intelligence starts as the assimilation of objects to the schemata of personal activity with necessary accommodation but of inverse

tendency to the preceding accommodation, and subsequently arrives at a precise adaptation to reality through the coordination of assimilation with accommodation, so also thought, at its advent, begins by being the assimilation of reality to the self with accommodation to the thought of others but without synthesis of these two tendencies, and only later acquires the rational unity which reconciles personal perspective with reciprocity.

In the first place, just as practical intelligence seeks success before truth, egocentric thought, to the extent that it is assimilation to the self, leads to satisfaction and not to objectivity. The extreme form of this assimilation to personal desires and interests is symbolic or imaginative play in which reality is transformed by the needs of the self to the point where the meanings of thought may remain strictly individual and incommunicable. But between this ultimate region of egocentric thought (a region in which the symbolic imagination makes it possible to increase tenfold the possibilities of satisfaction offered to the action and consequently to reinforce the tendencies of assimilation to personal activity previously manifested by sensorimotor intelligence) and thought adapted to another person is found an important zone of thought which, while presenting no quality of play, presents analogous characteristics of anomia and egocentrism. To account for this it is enough to demonstrate the difficulty experienced by little children from two to six years of age in participating in a conversation or a discussion, in narrating or explaining, in short, in emerging from personal thought to adapt themselves to the thought of others. In all the social behaviour patterns of thought it is easy to see how much more easily the child is led to satisfy his desires and to judge from his own personal point of view than to enter into that of others to arrive at an objective view. But in contrast to this powerful assimilation of reality to the self we witness during the earliest stages of individual thought the child's astonishing docility with respect to the suggestions and statements of another person; the little child constantly repeats what he hears, imitates the attitudes he observes, and thus yields as readily to training by the group as he resists rational intercourse. In short, assimilation to the self and accommodation to others begins with a compromise without profound synthesis, and at first the subject wavers between these two tendencies without being able to control or organise them.

In the second place, there arises a series of intellectual structures peculiar to these beginnings of infantile thought and which reproduce through temporal displacement the initial sensorimotor structures. Thus the first concepts the child uses are not at the outset logical classes capable of operations of addition, multiplication, subtraction, etc., which characterise the logic of classes in its normal functioning, but rather kinds of precepts proceeding by syncretic assimilations. So also the child who succeeds in handling relationships on the sensorimotor plane begins on the verbal and reflexive plane by substituting for relationships absolute qualities for lack of ability to coordinate the different perspectives and to emerge from the personal point of view to which he

assimilates everything. Thereafter the primitive infantile reasoning seems to return to the sensorimotor coordinations of the fifth and sixth stages: not yet familiar with classes or relations properly so called, it consists in simple fusions, in transductions proceeding by syncretic assimilations. It is only in the course of a laborious development which transforms ego-centric assimilation into true deduction, and accommodation into a real adjustment to experience and to perspectives surpassing the personal point of view, that the child's reasoning becomes rational and thus extends, on the plane of thought, the acquisitions of sensorimotor intelligence.

Thus we see the extent to which the developmental pattern of assimilation and of accommodation characterising sensorimotor intelligence constitutes a general phenomenon capable of being reproduced on this new plane of conceptual thought before accommodation actually extends assimilation. In order better to understand this evolutionary process and this temporal displacement it is fitting to examine more closely a few concrete examples drawn from the facts analysed in this book.

### **§ 3. From Sensori-motor Universe to Representation of the Child's World**

#### **1. Space and Object**

The understanding of spatial relations is a particularly clear first example of the parallelism with temporal displacement between the sensorimotor acquisitions and those of representative thought.

We recall how, starting with purely practical and quasi-physiological groups, the child begins by elaborating subjective groups, then arrives at objective groups, and only then becomes capable of representative groups. But the groups of this last type, if they constitute the culminating point of practical space and thus insert in sensorimotor spatial relations the representation of displacements not occurring within the direct perceptual field, are far from marking the beginning of a complete representation of space, that is, a representation completely detached from action. What will happen when the child is called upon, apart from any current action, to represent to himself a group of displacements or a system of coherent perspectives? It is from this decisive moment that we witness, on the plane of thought properly so called, a repetition of the evolution already accomplished on the sensorimotor plane.

Take, for example, the following problem. The child is presented with a model, about one square meter in size, representing three mountains in relief; he is to reconstruct the different perspectives in which a little doll views them in varying positions that follow a given order. No technical or verbal difficulty impedes the child, for he may simply point

with his finger to what the doll sees, or choose from among several pictures showing the possible perspectives, or construct with boxes symbolising mountains the photograph the doll could take from a given point of view. Moreover, the problem posed to the child consists in representing to himself the simplest of all the spatial relations which transcend direct action and perception, that is, to represent to himself what he would see if he were in the successive positions suggested to him. At first it would seem as though the child's answers would merely extend the acquisitions of the sixth stage of sensorimotor space and arrive immediately at the correct representations.

But interestingly enough the youngest of the children capable of understanding the problem of the mountains and of responding without difficulties of a verbal or technical kind reveal an attitude which, instead of extending the objective and representative groups of our sixth stage, on the contrary, regresses to the integral egocentrism of the subjective groups. Far from representing the various scenes which the doll contemplates from different viewpoints, the child always considers his own perspective as absolute and thus attributes it to the doll without suspecting this confusion. In other words, when he is asked what the doll sees from a particular position the child describes what he himself sees from his own position without taking into account the obstacles which prevent the doll from seeing the same view. When he is shown several pictures from among which he is to choose the one which corresponds to the doll's perspective, he chooses the one which represents his own. Finally, when he is to reconstruct with boxes the photograph the doll might take from its place, the child again reproduces his own view of things.

Then, when the child disengages himself from this initial egocentrism and masters the relationships involved in these problems, we witness a totality of transitional phases. Either the child who begins to understand that the perspective differs according to the doll's position effects various mixtures between those perspectives and his own perspective ("pre-relations"), or else he takes into account only one relation at a time (left-right or before-behind, etc.) and does not succeed in multiplying the interrelations. These transitions correspond to the limited groups of displacements belonging to the fourth of the sensorimotor stages. Finally, complete relativity is attained, corresponding to stages V-VI of the same series.

How then can this temporal displacement be explained, as-well as this return to the phases which have already been transcended on the plane of sensorimotor space? To act in space the child is certainly obliged to understand little by little that the things which surround him have a trajectory independent of himself and that their displacements are thus grouped in objective systems. From a purely practical point of view the child is therefore led to emerge from an initial egocentrism, in which things are considered to depend solely on his personal activity, and to master a relativity which is established between displacements successively perceived or even between certain perceived

moments and others which have simply been represented. But the egocentrism and objective relativity in question here concern only the relationships between the child and things, and nothing in sensorimotor action forces him to leave this narrow realm. So long as the problem is not to represent to himself reality in itself, but simply to use it or to exert an influence upon it, there is no need to go beyond the system of relations established between objects and self or among objects as such in the field of personal perspective; there is no need to assume the existence of other perspectives and to interconnect them in including his own among them. To be sure, the act by which one confers an objectivity on the displacements of things already implies an enlargement of the initial egocentric perspective and it is in this sense that, apropos of the fifth and sixth sensorimotor stages, we have been able to speak of a change in perspective and the mastery of a universe in which the subject locates himself instead of bringing the universe illusively to him. But this is only the first step, and even in this objective, practical universe, everything is related to a single frame of reference which is that of the subject and not that of other possible subjects. Hence there is objectivity and even relativity, but within the limits of a realm which is always considered absolute, because nothing yet induces the subject to transcend it. If we may be permitted to make a somewhat daring comparison, the completion of the objective practical universe resembles Newton's achievements as compared to the egocentrism of Aristotelian physics, but the absolute Newtonian time and space themselves remain egocentric from the point of view of Einstein's relativity because they envisage only one perspective on the universe among many other perspectives which are equally possible and real. On the contrary, from the time when the child seeks no longer merely to act upon things, but to represent them to himself in themselves and independently of the immediate action, this single perspective, in the midst of which he had succeeded in introducing objectivity and relativity, no longer suffices and has to be coordinated with the others.

This is true for two reasons, one relating to the subject's intention in his attempt at representation, the other to the requirements of representation. Why at a given moment in his mental evolution does the subject try to represent spatial relations to himself instead of simply acting upon them? Obviously in order to communicate to someone else or to obtain from someone else some information on a fact concerning space. Outside of this social relation there is no apparent reason why pure representation should follow action. The existence of multiple perspectives relating to various individuals is therefore already involved in the child's effort to represent space to himself. Moreover, to represent to himself space or objects in space is necessarily to reconcile in a single act the different possible perspectives on reality and no longer to be satisfied to adopt them successively. Take, for example, a box or some object upon which the child acts. At the end of his sensorimotor evolution he becomes perfectly capable of turning the box over in all directions, of representing to himself its reverse side as well as its visible parts, its contents as well as its exterior. But do these representations connected with practical

activity, with the "concrete active behaviour" of which Gelb and Goldstein have spoken in their fine studies on space, suffice to constitute a total representation of the box, a pattern of "formal conceptive behaviour?" Surely not, for to achieve that the box must be seen from all sides at once, that is, it must be located in a system of perspectives in which one can represent it to oneself from any point of view whatever and transfer it from one to the other point of view without recourse to action. Now, if it is possible for the child to imagine himself as occupying several positions at one time, it is obvious that it is rather by representing to himself the perspective of another person and by coordinating it with his own that he will solve such a problem in concrete reality. In this sense one can maintain that pure representation detached from personal activity presupposes adaptation to others and social coordination.

Therefore we understand why, in the problem of the mountains which is typical in this respect, the child four to six years of age still reveals an egocentrism reminiscent of the beginnings of sensorimotor intelligence and the most elementary subjective groups; it is because, on the plane of pure representation to which this experiment pertains, the subject must compare various points of view with his own, and as yet nothing has prepared him for this operation. Besides, the attitudes which have already been transcended in the relations between things and himself reappear when connections are established with other persons. Social egocentrism follows sensorimotor egocentrism and reproduces its phases, but as the social and the representative are interdependent there appears to be regression here, whereas the mind simply wages the same battles on a new plane to make new conquests.

Moreover, this temporal displacement in comprehension, which arises when there is transition of thought from a lower to a higher plane, may combine with the temporal displacements in extension (of which we have spoken earlier), which arise when problems located on the same plane present increasing complexity. Thus, on the occasion of movements near at hand, after having constructed the groups of displacements studied above, the child finds himself confronted by analogous problems raised by the observation of more distant movements: displacements relating to bodies situated on the horizon or to celestial movements. For many years we have observed the child's attitude toward the moon and often toward clouds, stars, etc.; until he is about seven years old he believes that he is followed by these bodies and considers their apparent movements real. From the point of view of space, this is only an extension of the behaviour patterns relating to nearby objects observed during the first sensorimotor stages. The child, by taking appearance for reality, links all displacements to himself, instead of locating them in an objective system that includes his own body without being centred on it. Similarly, we have observed in our children analogous illustrations relating to mountains, on an excursion in the Alps or in an automobile going up and down the hills. At four or five years of age the mountains still seem to be displaced and actually to change shape in connection

with our own movements, exactly like the nearby objects in the subjective groups of the baby.

These last remnants of primitive space in the child of school age lead us to the temporal displacements of processes relating to the object. It is self-evident that in proportion as the groups of displacements require new constructive work on the plane of representation or of conceptual thought to complete them, the object, in its turn, cannot be considered as entirely elaborated once it has been formed on the sensorimotor plane. At the time of displacements in extension, of which we have spoken apropos of the moon and the mountains, the matter is clear. The mountains which move and change shape with our movements are not objects, since they lack permanence of form and mass. So also a moon which follows us is not "the" moon as object of simultaneous or successive perceptions of different possible observers. The proof is that at the period in which the child believes he is being followed by the stars he believes in the existence of several moons rising over and over again and capable of occupying different regions of space simultaneously.

But this difficulty in attributing substantial identity to distant objects is not the most interesting residue of the processes of objectification peculiar to the stages of sensorimotor intelligence. Or rather, it constitutes only a residue explainable by the simple mechanism of temporal displacements in extension, whereas, because of the temporal displacements in comprehension that condition the transition from the sensorimotor plane to the plane of reflective thought, the construction of the object seems to be not only a continuous process unremittingly pursued throughout the evolution of reason and still found in the most elaborate forms of scientific thought, but also a process constantly passing through phases analogous to those of the initial sensorimotor series. Thus the different principles of conservation whose progressive formation occupies the whole development of the child's physics are only successive aspects of the objectification of the universe. For example, the conservation of matter does not seem necessary to the child three to six years old in cases of changes of state or even changes of form. Sugar melting in water is believed to be returning to the void, only taste (that is, a pure quality) being supposed to subsist and that only for a few days. So also, when one offers the child two pellets of the same weight and mass and then moulds one of them into a long cylinder, this one is considered to have lost both weight and mass. When one empties the contents of a large bottle of water into small bottles or tubes, the quantity of liquid is conceived as having been changed, etc. On the contrary, the child subsequently arrives at the concept of a necessary conservation of matter, independently of changes of form or of state. But having arrived at this level, he nevertheless continues to believe that the weight of bodies can change with their form; thus the pellet by becoming elongated loses weight while conserving the same quantity of matter. Around eleven or twelve years of age, on the other hand, the child is so convinced of the conservation of weight that he attributes to the particles of sugar dissolved in water the same total weight as to the initial lump.

Thus we see that, from the point of view of conservation of matter and weight, the child again, this time on the plane of conceptual and reflective thought, passes through stages analogous to those he traverses on the sensorimotor plane from the point of view of conservation of the object itself. Just as the baby begins by believing that objects return to the void when they are no longer perceived and emerge from it when they re-enter the perceptual field, so also the six-year-old child still thinks the quantity of matter augments or diminishes according to the form the object takes, and that a substance which dissolves is completely annihilated. Then, just as numerous intermediate stages exist between the level on which the baby is the victim of appearances and that on which he constructs a permanence sufficient to make him believe in objects, so also the child who talks passes over a series of steps before he is able to postulate, independently of any direct experience, the constancy of weight itself despite changes in form, and before he forms, with this objective in view, a sort of crude atomism which reconciles quantitative invariance with qualitative variations.

How then can we explain this temporal displacement; how can we explain why thought, at the moment it gathers up the work of sensori-motor intelligence and in particular the belief in permanent objects, does not at the outset attribute to objects constancy of matter and of weight? As we have seen, it is because three formative processes are necessary to the elaboration of object concept: the accommodation of the organs which makes it possible to foresee the reappearance of bodies; the coordination of schemata which makes it possible to endow each of these bodies with a multiplicity of interconnected qualities; and the deduction peculiar to sensorimotor reasoning which makes it possible to understand displacements of bodies and to reconcile their permanence with their apparent variations. These three functional factors - foresight, coordination, and deduction - change entirely in structure when they pass from the sensorimotor plane to that of speech and conceptual operations, and when systems of classes and thoughtful relations are substituted for simple practical schemata. Whereas the substantial object is a mere product of action or practical intelligence, the concepts of quantity of matter and conservation of weight presuppose on the contrary a very subtle rational elaboration. In practical object concept there is nothing more than the idea of a permanence of qualities (form, consistency, colour, etc.) independent of immediate perception. There is, however, in the concept of the conservation of matter such as sugar, the clay pellet which changes shape, or the liquid poured from a large receptacle into several small ones, a quantitative relation which as soon as it is perceived seems essential; this is the idea that despite changes of state or of form (real form and no longer merely apparent form) something is conserved. This something is not at the outset weight, but it is volume, occupied space, and only later is it weight, that is, a quality that is quantified in so far as it is considered invariant. But for their construction these qualitative relationships do not solely involve a foresight which remains practical in kind (foresight of the water level when the sugar is dissolved, of the weight of the pellet made into a cylinder, etc.); they involve primarily a



coordination of classes and of logical relations as well as true deduction, for on the plane of thought foresight gradually becomes the function of deduction instead of preceding it.

In the case of the sugar which dissolves in water, how does the child succeed in postulating the permanence of matter and even in making the atomic hypothesis of invisible particles of sugar permeating the liquid, particles whose total volume equals that of the initial lump, to the point of explaining that the water level remains above the original level. From all the evidence this is not a simple lesson of experience or, as in the case of the permanence of the practical object, an intelligent structuring of experience, but rather a deduction which is primarily due to thought and in which a complex series of concepts and relations intervenes. So also, the idea that the pellet conserves its weight while becoming a cylinder is a deductive construction which experience does not suffice to explain, for the child has neither the means to perform the delicate weighing that verification of such a hypothesis would necessitate nor, above all the curiosity to attempt such a verification, because its affirmation seems to him self-evident and because as a general rule the problem does not arise for him. What is most interesting in the child's reaction is the fact that, having doubtless never thought about the problem, he solves it at once *a priori* and with such certainty that he is surprised it was raised, whereas a year or two earlier he would have solved it in precisely the opposite direction and would not have had recourse to the idea of conservation!

In short, the development of the principles of conservation can only be explained as the function of an internal progress in the child's logic in its triple aspect of an elaboration of deductive structures, of relations, and of classes, forming a corporate system. This is the explanation of the temporal displacement under discussion here. Through speech the child arrives on the plane of representative thought, which at the same time is the plane of socialised thought; to the extent that he must now adapt himself to other persons, his spontaneous egocentrism, already overcome on the sensorimotor plane, reappears in the course of this adaptation, as we have shown with the examples concerning space. From this arises a series of consequences with regard to the structure of thought, as we have emphasised in § 2. On the one hand, in proportion as the child does not succeed in coordinating with his own perspective the perspectives peculiar to different individuals, he cannot master the logic of relationships, although he knows how to handle practical relations on the sensorimotor plane. Thus the concepts of heavy and light which directly concern the conservation of weight are conceived as absolute qualities long before they are understood as purely relative ones, because, once they have been detached from any personal frame of reference, they are applied to the egocentric point of view of immediate perception before being transformed into relations among different subjects and different objects and into relations among objects themselves. Moreover, and by virtue of this fact, the child begins by utilising only syncretic pseudo-concepts before elaborating true logical classes, because the operations formative of classes (logical addition and multiplication)

require a system of definitions whose stability and generality transcend the personal point of view and its subjective attachments (definitions by usage, syncretic classifications, etc.). From this stems the conclusion that a deductive structure on the plane of reflective thought presupposes a mind freed from the personal point of view by methods of reciprocity inherent in cooperation or intellectual exchange, and that reason, dominated by egocentrism on the verbal and social plane, can only be "transductive," that is, proceeding through the fusion of pre-concepts located midway between particular cases and true generality.

If the conquest of the object on the sensorimotor plane is not at once extended on the conceptual plane through an objectification capable of insuring rational permanence, it is because the egocentrism reappearing on this new plane prevents thought from attaining at the outset the logical structures necessary for this elaboration. Let us try again to define this mechanism by analysing some examples chosen from the periods of the beginning of speech and of reflective thought; these will show us both how difficult it is at first for the child to form true logical classes and how those pseudo-concepts and primitive transductions lead us back to a stage which, from the point of view of the object, seemed to be surpassed by sensorimotor intelligence and which reappears on the conceptual plane.

First of all it is currently observed that the first generic concepts utilised by the child, when they do not designate certain ordinary objects related to daily activity but totalities properly so called, remain midway between the individual and the general. For a long time, for instance, one of my children, to whom I showed slugs on successive walks, called each new specimen encountered "the slug"; I was unable to ascertain whether he meant "the same individual" or "a new individual of the slug species." While it is impossible to furnish definitive proof, in such a case everything seems to indicate that the child himself neither succeeds in answering nor tries to answer the question and that "Slug" is for him a sort of semi-individual and semi-generic type shared by different individuals. It is the same when the child encounters "Lamb," "Dog," etc.; we are confronted by neither the individual nor the generic in the sense of the logical class but by an intermediate state which is precisely comparable on the conceptual plane to the primitive state of the sensorimotor object floating between the unsubstantial perceptual image and permanent substance.

Interpretation may seem hazardous when observations of this kind are involved because one can always attribute them to mere mistakes by the subject, but it becomes more certain when these pseudo-concepts come into operation in transductions properly so called, that is, in the analytical or classificatory reasoning proceeding by fusion of analogous cases. Let us refer, for example, to the explanations given us by the youngest of our subjects concerning the phenomenon of the shadow or the draft: the shadow

produced on a table before their eyes comes, according to them, from "under the trees" or other possible sources of darkness, just as the draft from a fan emanates from the north wind which blows outside the room. The child thus likens, as we do ourselves, the shadow from a notebook to that of the trees, the draft to the wind, etc., but instead of simply placing the two analogous phenomena in the same logical class and explaining them by the same physical law, he considers the two compared terms as participants of each other from a distance and without any intelligible physical link. Consequently, here again the child's thought wavers between the individual and the generic. The shadow of the notebook is not a pure singular object since it emanates from that of the trees, it "is" really that of trees arising in a new context. But an abstract class does not exist either, precisely since the relation between the two shadows compared is not a relation of simple comparison and common appurtenance to the same totality, but of substantial participation. The shadow perceived on the table is therefore no more an isolable object than is, on the sensorimotor plane, the watch which disappears under one cushion and which the child expects to see appear under another. But if there is thus an apparent return to the past it is for an opposite reason to that which obstructs objectification in sensorimotor intelligence; in the latter case the object is difficult to form in proportion as the child has difficulty in intercoordinating perceptual images, whereas on the plane of conceptual thought the object, already elaborated, again loses its identity to the extent that it is coordinated with other objects to construct a class or a relation.

In conclusion, in the case of the object as in that of space, from the very beginnings of verbal reflection there is a return of the difficulties already overcome on the plane of action, and there is repetition, with temporal displacements, of the stages and process of adaptation defined by the transition from egocentrism to objectivity. And in both cases the phenomenon is due to the difficulties experienced by the child, after he has reached the social plane, in inserting his sensorimotor acquisitions in a framework of relationships of logical classes and deductive structures admitting of true generalisation, that is, taking into account the point of view of others and all possible points of view as well as his own.

## **§ 4. From Sensori-Motor Universe to Representation of the Child's World**

### **II. Causality and Time**

The development of causality from the first months of life to the eleventh or twelfth year reveals the same graphic curve as that of space or object. The acquisition of causality seems to be completed with the formation of sensorimotor intelligence; in the measure that objectification and spatialisation of relations of cause and effect succeed the magico-phenomenalistic egocentrism of the primitive connections, a whole evolution resumes

with the advent of speech and representative thought which seems to reproduce the preceding evolution before really extending it.

But among the displacements to which this history of the concept of cause gives rise, distinction must again be made between the simple temporal displacements in extension due to the repetition of primitive processes on the occasion of new problems analogous to old ones, and the temporal displacements in comprehension due to the transition from one plane of activity to another; that is, from the plane of action to that of representation. It seems useless to us to emphasise the former. Nothing is more natural than the fact that belief in the efficacy of personal activity, a belief encouraged by chance comparisons through immediate or phenomenistic experience, is again found throughout childhood in those moments of anxiety or of desire which characterise infantile magic. The second type of temporal displacements, however, raises questions which it is useful to mention here.

During the first months of life the child does not dissociate the external world from his own activity. Perceptual images, not yet consolidated into objects or coordinated in a coherent space, seem to him to be governed by his desires and efforts, though these are not attributed to a self which is separate from the universe. Then gradually, as progress is made in the intelligence which elaborates objects and space by spinning a tight web of relations among these images, the child attributes an autonomous causality to things and persons and conceives of the existence of causal relations independent of himself, his own body becoming a source among other sources of effects integrated in this total system. What will happen when, through speech and representative thought, the subject succeeds not only in foreseeing the development of phenomena and in acting upon them but in evoking them apart from any action in order to try to explain them? It is here that the paradox of displacement in comprehension appears.

By virtue of the "why" obsessing the child's mind, as soon as his representation of the world can be detached without too much risk of error, one perceives that this universe, centred on the self, which seemed abolished because it was eliminated from practical action relating to the immediate environment, reappears on the plane of thought and impresses itself on the little child as the sole understandable conception of totality. Undoubtedly the child no longer behaves, as did the baby, as though he commanded everything and everybody. He knows that adults have their own will, that the rain, wind, clouds, stars, and all things are characterised by movements and effects he undergoes but cannot control. In short, on the practical plane, the objectification and spatialisation of causality remain acquired. But this does not at all prevent the child from representing the universe to himself as a large machine, organised exactly by whom he does not know, but organised with the help of adults and for the sake of the well-being of men and particularly of children. Just as in a house everything is arranged according to a plan,

despite imperfections and partial failures, so also the *raison d'être* for everything in the physical universe is the function of a sort of order in the world, an order both material and moral, of which the child is the center. Adults are there "to take care of us," animals to do us service, the stars to warm us and give us light, plants to nourish us, rain to make the gardens grow, clouds to "make night," mountains to climb on, and lakes for boats, etc. Furthermore, to this more or less explicit and coherent artificialism there corresponds a latent animism which endows everything with the will to play its role and with just the force and awareness needed to act with regularity.

Thus the causal egocentrism, which on the sensorimotor plane disappears gradually under the influence of spatialisation and objectification, reappears from the time of the beginnings of thought in almost as radical a form. Doubtless the child no longer attributes personal causality to others or to things, but while endowing objects with specific activities he centers all these activities on man and above all on himself. It seems clear that in this sense we may speak of temporal displacement from one plane to another and that the phenomenon is thus comparable to the phenomena which characterise the evolution of space and object.

But it is in a still deeper sense that the primitive schemata of causality are again transposed in the child's first reflective representations. If it is true that from the second year of life the child attributes causality to others and to objects instead of reserving a monopoly on them for his own activity, we have still to discover how he represents to himself the mechanism of these causal relations. We have just recalled that corresponding to the egocentric artificialism which makes the universe gravitate around man and child is an animism capable of explaining the activity of creatures and things in this sort of world. This example is precisely of a kind to help us understand the second kind of temporal displacement of which we now speak: if the child renounces considering his actions as the cause of every event, he nevertheless is unable to represent to himself the action of bodies except by means of schemata drawn from his own activity. An object animated by a "natural" movement like the wind which pushes clouds, or the moon which advances, thus seems endowed with purposefulness and finality, for the child is unable to conceive of an action without a conscious goal. Through lack of awareness, every process involving a relation of energies, such as the rising of the water level in a glass in which a pebble has been dropped, seems due to forces copied from the model of personal activity; the pebble "weighs" on the bottom of the water, it "forces" the water to rise, and if one held the pebble on a string midway of the column of the water the level would not change. In short, even though there is objectivity on the practical plane, causality may remain egocentric from the representative point of view to the extent that the first causal conceptions are drawn from the completely subjective consciousness of the activity of the self. With regard to spatialisation of the causal connection the same temporal displacement between representation and action is observable. Thus the child can acknowledge in practice the

necessity for a spatial contact between cause and effect, but that does not make causality geometric or mechanical. For example, the parts of a bicycle all seem necessary to the child long before he thinks of establishing irreversible causal series among them.

However, subsequent to these primitive stages of representation during which one sees reappear on the plane of thought forms of causality relative to those of the first sensorimotor stages and which seem surpassed by the causal structures of the final stages of sensorimotor intelligence, one witnesses a truly reflective objectification and spatialisation, whose progress is parallel to that which we have described on the plane of action. Thus it is that subsequent to the animism and dynamism we have just mentioned, we see a gradual "mechanism" taking form, correlative to the principles of conservation described in § 3 and to the elaboration of a relative space. Causality, like the other categories, therefore evolves on the plane of thought from an initial egocentrism to a combined objectivity and relativity, thus reproducing, in surpassing, its earlier sensorimotor evolution.

With regard to time, concerning which we have tried to describe on the purely practical plane of the first two years of life the transformation from subjective series into objective series, there is no need to emphasise the parallelism of this evolution with that which, on the plane of thought, is characterised by the transition from internal duration, conceived as the sole temporal model, to physical time constituted by quantitative relations between spatial guide-marks and external events. During the first phases of representative thought the child does not succeed in estimating either concrete duration or even rates of speed except by referring them to mere psychological time. Subsequently, on the contrary, he constructs in thought, and no longer only in action, objective series connecting internal duration to physical time and to the history of the external universe itself. For instance, if one draws in front of a child two concentric figures one of which describes a big circle and the other a much smaller one, and if one makes two automobiles of the same dimensions cover these two trajectories at the same time, the youngest subjects cannot avoid believing that the automobile following the small circle went "faster" than the other. "Faster" in this case simply means "more easily," "with less effort," etc., but the child does not take into account the relation between time and the space covered. For adults, on the contrary, speed is measured by this relation, and the expression "faster" loses its subjective meaning. So also, the expressions "more time" or "less time" have no objective meaning for little children and acquire it for adults, etc.

## § 5. Conclusion

The formation of the universe, which seemed accomplished with that of sensorimotor intelligence, is continued throughout the development of thought, which is natural, but is continued while seeming at first to repeat itself, before truly progressing to encompass the

data of action in a representative system of the totality. This is the information we have just gained from a comparison of our present observations with the results of examining the representations of the child of three to twelve years of age.

To understand the scope of such a fact we must amplify what we said in §1 of these conclusions about the relations between intellectual assimilation and accommodation, by applying these reflections to the processes of thought itself.

We have tried to show how, on the sensorimotor plane, assimilation and accommodation, at first undifferentiated but pulling behaviour in opposite directions, gradually became differentiated and complementary. From what we have seen with regard to space, object, causality, and time it is clear that on the plane of representative thought, which is at the same time that of social relationships or coordination among individual minds, new assimilations and accommodations become necessary and these in turn begin with a phase of chaotic undifferentiation and later proceed to a complementary differentiation and harmonisation.

During the earliest stages of thought, accommodation remains on the surface of physical as well as social experience. Of course, on the plane of action the child is no longer entirely dominated by the appearance of things, because through sensorimotor intelligence he has managed to construct a coherent practical universe by combining accommodation to objects with assimilation of objects to intercoordinated structures. But when it is a question of transcending action to form an impersonal representation of reality, that is, a communicable image destined to attain truth rather than mere utility, accommodation to things finds itself at grips with new difficulties. It is no longer a matter only of acting but of describing, not only of foreseeing but of explaining, and even if the sensorimotor schemata are already adapted to their own function, which is to insure the equilibrium between individual activity and the perceived environment, thought is obliged to construct a new representation of things to satisfy the common consciousness and the demands of a conception of totality. In this sense the first contact of thought, properly so called, with the material universe constitutes what may be called "immediate experience" in contradistinction to experimentation which is scientific or corrected by the assimilation of things to reason.

Immediate experience, that is, the accommodation of thought to the surface of things, is simply empirical experience which considers, as objective datum, reality as it appears to direct perception. In the numerous cases in which reality coincides with appearance this superficial contact with the object suffices to lead to truth. But the further one departs from the field of immediate action to construct an adequate representation of reality, the more necessary it is, to understand the phenomena, to include them in a network of relations becoming increasingly remote from appearance and to insert appearance in a new reality elaborated by reason. In other words, it becomes more and more necessary to

correct appearance and this requires the formation of relationships among, or the reciprocal assimilation of, various points of view. In the example we cited in §3 of the groups of displacements relating to mountains, it is obvious that a whole structuring of experience, that is, a rational assimilation and coordination of many possible points of view, is indispensable to make the child understand that, despite appearance, mountains do not displace themselves when one moves in relation to them and that the various perspectives on them do not exclude the permanence of their form. The same applies to attributing stationary banks to a river or a lake when the boat advances and, in a general way, to organising distant space no longer depending on direct action. Concerning objects let us consider the difference between immediate experience relating to the stars, that is, simple accommodation of perception to their apparent size and movements, from the real experience which the mind acquires when it combines that accommodation with an assimilation of the same data to the activity of reason. From the first of these points of view, the stars are little balls or spots located at the same height as clouds; their movements depend on our own walking and their permanence is impossible to determine (even with respect to the sun, there are children who believe in its identity with the moon when they do not, on the contrary, affirm the existence of several suns and moons). From the second point of view, on the contrary, real dimensions and distances no longer have any relation to appearance, the actual trajectories correspond with the apparent movements only through relationships of increasing complexity, and the identity of celestial bodies becomes the function of this system of totality. What is true on a large scale of the stars is always true, on every scale, of objects on which direct action does not bear. With regard to causality, the first example seen, like that of the floating of boats so suggestive to the child, gives rise to the same considerations. By following the course of immediate experience the child begins by believing that small boats float because they are light; but when he sees a tiny piece of lead or a little pebble gliding along at the bottom of the water, he adds that these bodies are doubtless too light and small to be held back by the water; moreover big boats float because they are heavy and can thus carry themselves. In short, if one remains on the surface of things, explanation is possible only at the price of continuous contradictions, because, if it is to embrace the sinuosity of reality, thought must constantly add apparent connections to one another instead of coordinating them in a coherent system of totality. On the contrary, the contact of the mind with real experience leads to a simple explanation, but on condition of completing this elementary accommodation of thought to the immediate data of perception by a correlative assimilation of these data to a system of relationships (between weight and volume, etc.) which reason succeeds in elaborating only by replacing the appearance of things with a real construction. Let us also be satisfied, in the realm of time and duration, with a single example, that of the dissociation of the concept of speed into relations between the concepts of time and the space traversed. From the point of view of immediate experience, the child succeeds very soon in estimating speeds of which he has direct awareness, the



spaces traversed in an identical time or the "before" and "after" in arrival at a goal in cases of trajectories of the same length. But there is a considerable gap between this and a dissociation of the notion of speed to extract a measurement of time, for this would involve replacing the direct intuitions peculiar to the elementary accommodation of thought to things by a system of relations involving a constructive assimilation.

In short, thought in all realms starts from a surface contact with the external realities, that is, a simple accommodation to immediate experience. Why then, does this accommodation remain, in the true sense of the word, superficial, and why does it not at once lead to correcting the sensory impression by rational truth? Because, and this is what we are leading up to, primitive accommodation of thought, as previously that of sensorimotor intelligence, is undifferentiated from a distorting assimilation of reality to the self and is at the same time oriented in the opposite direction.

During this phase of superficial accommodation to physical and social experience, we observe a continuous assimilation of the universe not only to the impersonal structure of the mind - which is not completed except on the sensorimotor plane - but also and primarily to the personal point of view, to individual experience, and even to the desires and affectivity of the subject. Considered in its social aspect, this distorting assimilation consists, as we have seen (§2), in a sort of egocentrism of thought so that thought, still unsubmissive to the norms of intellectual reciprocity and logic, seeks satisfaction rather than truth and transforms reality into a function of personal affectivity. From the point of view of the adaptation of thought to the physical universe this assimilation leads to a series of consequences of interest to us here. In the domain of space, for example, it is evident that, if the child remains dominated by the immediate experience of the mountain which is displaced and by the other superficial accommodations we have discussed, it is because these remain undifferentiated from a continual assimilation of reality to the personal point of view; thus the child believes that his own displacements govern those of the mountains, the sky, etc. The same is true of objects. To the extent the child has difficulty, for example, in constituting the identity of the moon and the stars in general because he does not transcend the immediate experience of their apparent movements, it is because he still believes he is followed by them and thus assimilates the image of their displacements to his own point of view, exactly like the baby whose universe is ill objectified because it is too closely centred on his own activity. With regard to causality, if the child has difficulty in integrating his explanations into a coherent system of relations, this is again because accommodation to the qualitative diversity of reality remains undifferentiated from an assimilation of phenomena to personal activity. Why, for instance, are boats conceived as heavy or light in themselves, without consideration of the relation of weight and volume, if not because weight is evaluated as the function of the subject's muscular experience instead of being transformed into an objective relationship? So also, the primacy of internal duration over external time attests to the existence of a

distorting assimilation which necessarily accompanies primitive accommodation of the mind to the surface of events.

The superficial accommodation of the beginnings of thought and the distorting assimilation of reality to the self are therefore at first undifferentiated and they operate in opposite directions. They are undifferentiated because the immediate experience which characterises the former always, in the last analysis, consists in considering the personal point of view as the expression of the absolute and thus in subjecting the appearance of things to an egocentric assimilation, just as this assimilation is necessarily on a par with a direct perception that excludes the construction of a rational system of relations. But at the beginning, however undifferentiated may be these accommodative operations and those in which assimilation may be discerned, they work in opposite directions. Precisely because immediate experience is accompanied by an assimilation of perceptions to the schemata of personal activity or modelled after it, accommodation to the inner workings of things is constantly impeded by it. Inversely, assimilation of things to the self is constantly held in check by the resistances necessitating this accommodation, since there is involved at least the appearance of reality, which is not unlimitedly pliant to the subject's will. So also, on the social plane, the constraint imposed by the opinion of others thwarts egocentrism and vice versa, although the two attitudes of imitation of others and assimilation to the self are constantly coexistent and reveal the same difficulties of adaptation to reciprocity and true cooperation.

On the contrary, gradually, as the child's thought evolves, assimilation and accommodation are differentiated and become increasingly complementary. In the realm of representation of the world this means, on the one hand, that accommodation, instead of remaining on the surface of experience, penetrates it more and more deeply, that is, under the chaos of appearances it seeks regularities and becomes capable of real experimentations to establish them. On the other hand, assimilation, instead of reducing phenomena to the concepts inspired by personal activity, incorporates them in the system of relationships rising from the more profound activity of intelligence itself. True experience and deductive construction thus become simultaneously separate and correlative, whereas in the social realm the increasingly close adjustment of personal thought to that of others and the reciprocal formation of relationships of perspectives insures the possibility of a cooperation that constitutes precisely the environment that is favourable to this elaboration of reason.

Thus it may be seen that thought in its various aspects reproduces on its own plane the processes of evolution we have observed in the case of sensorimotor intelligence and the structure of the initial practical universe. The development of reason, outlined on the sensorimotor level, follows the same laws, once social life and reflective thought have been formed. Confronted by the obstacles which the advent of those new realities raises, at the

beginning of this second period of intellectual evolution assimilation and accommodation again find themselves in a situation through which they had already passed on the lower plane. But in proceeding from the purely individual state characteristic of sensorimotor intelligence to the cooperation which defines the plane on which thought will move henceforth, the child, after having overcome his egocentrism and the other obstacles which impede this cooperation, receives from it the instruments necessary to extend the rational construction prepared during the first two years of life and to expand it into a system of logical relationships and adequate representations.

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**Further Reading:**

[Genetic Epistemology](#) | [Biography](#) | [Marxist Psychology](#) | [Vygotsky Archive](#)

[Lektorsky](#) | [Stages in Mental Development of Children](#) (Elkonin) [The Child and his Behavior](#) (Luria)

[Origins of Thought in the Child](#) | [Psychological Development of the Child](#), (Wallon)  
[Psychology Reference](#) | [Piaget on Vygotsky](#)

[Philosophy Archive @ marxists.org](#)