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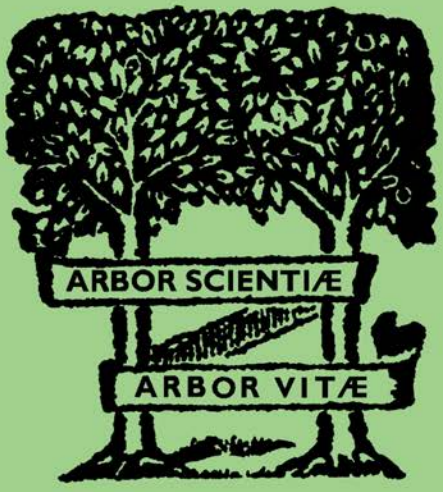
THE CONSTRUCTION OF REALITY IN THE CHILD



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THE CONSTRUCTION OF REALITY IN THE CHILD

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Introduction

The study of sensorimotor or practical intelligence in the first two years of development[1] has taught us how the child, at first directly assimilating the external environment to his own activity, later, in order to extend this assimilation, forms an increasing number of schemata which are both more mobile and better able to intercoordinate.

Side by side with this progressive involvement of the assimilatory schemata runs the continuous elaboration of the external universe, in other words, the convergent development of the explicatory function. The more numerous the links that are established among the schemata of assimilation, the less it remains centered on the subjectivity of the assimilating subject, in order to become actual comprehension and deduction. Thus, at the beginnings of assimilatory activity, any object whatever presented by the external environment to the subject's activity is simply something to suck, to look at, or to grasp: such assimilation is at this stage centered solely on the assimilating subject. Later, however, the same object is transformed into something to displace, to set in motion, and to utilize for increasingly complex ends. The essential thus becomes the totality of the relationships elaborated through personal activity between this object and other objects; to assimilate means, thereafter, to understand or deduce, and assimilation is intermingled thereby with the formation of relationships. By virtue of the fact that the assimilating subject enters into reciprocity with the things assimilated, the hand that grasps, the mouth that sucks, or the eyes that look are no longer limited to an activity unaware of itself even though self-centered: they are conceived by the sub-

[1] J. Piaget, *The Origins of Intelligence in Children* (New York: International Universities Press, 1952).

ject as things among things and as sustaining relations of interdependence with the universe.

It is therefore apparent that a development of explicatory accommodation corresponds to the progress of implicatory assimilation. The increasing coherence of the schemata thus parallels the formation of a world of objects and spatial relationships, in short, the elaboration of a solid and permanent universe.

We must now study the second aspect of the evolution of sensorimotor intelligence. This new phase of mental development is of course inseparable from the first; object and causality are nothing other than accommodation to the reality of the schematism of assimilation. But it is justifiable to study them separately, for the description of behavior no longer suffices to account for these new products of intellectual activity; it is the subject's own interpretation of things which we must now try to analyze.

But, if the study of object concept and the spatial field and of causality and the temporal field requires that one take the point of view of awareness and no longer only that of observer, the description we shall give of the child's image of the world characteristic of his preverbal stage will be less venturesome than one might fear; in order to reconstruct the subject's point of view it is enough to reverse in some way the picture obtained by observation of his behavior. Through an apparently paradoxical mechanism whose parallel we have described apropos of the egocentrism of thought of the older child, it is precisely when the subject is most self-centered that he knows himself the least, and it is to the extent that he discovers himself that he places himself in the universe and constructs it by virtue of that fact. In other words, egocentrism signifies the absence of both self-perception and objectivity, whereas acquiring possession of the object as such is on a par with the acquisition of self-perception.

The symmetry between the representation of things and the functional development of intelligence enables us from now on to glimpse the directional line of the evolution of the concepts of object, space, causality, and time. In general it may be said that during the first months of life, as long as assimilation remains centered on the organic activity of the subject, the universe presents neither permanent objects, nor objective space, nor time interconnecting events as such, nor causality external to

the personal actions. If the child really knew himself, we should have to maintain that solipsism exists. At the very least we may designate as radical egocentrism this phenomenalism without self-perception, for the moving pictures perceived by the subject are known to him only in relation to his elementary activity. At the other extreme, at the moment when sensorimotor intelligence has sufficiently elaborated understanding to make language and reflective thought possible, the universe is, on the contrary, formed into a structure at once substantial and spatial, causal and temporal. This organization of reality occurs, as we shall see, to the extent that the self is freed from itself by finding itself and so assigns itself a place as a thing among things, an event among events. The transition from chaos to cosmos, which we shall study in the perception and representation of the world in the first two years of life, is brought about through an elimination of egocentrism comparable to that which we have described on the plane of the child's reflective thought and logic. But it is in its elementary and primordial form that we shall now try to grasp this component process of understanding; we shall thus comprehend how it depends on the mechanism of intellectual assimilation.

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CHAPTER I

The Development of Object Concept

To understand how the budding intelligence constructs the external world, we must first ask whether the child, in its first months of life, conceives and perceives things as we do, as objects that have substance, that are permanent and of constant dimensions. If this is not the case, it is then necessary to explain how the idea of an object (object concept) is built up. The problem is closely connected with that of space. A world without objects would not present the character of spatial homogeneity and of coherence in displacements that marks our universe. Inversely the absence of "groups" in the changes of position would be equivalent to endless transformations, that is, continuous changes of states in the absence of any permanent object. In this first chapter, then, substance and space should be considered simultaneously, and it is only through abstraction that we shall limit ourselves to object concept.

A question of this sort conditions all other questions. A world composed of permanent objects constitutes not only a spatial universe but also a world obeying the principle of causality in the form of relationships between things, and regulated in time, without continuous annihilations or resurrections. Hence it is a universe both stable and external, relatively distinct from the internal world and one in which the subject places himself as one particular term among all the other terms. A universe without objects, on the other hand, is a world in which space does not constitute a solid environment but is limited to structuring the subject's very acts; it is a world of pictures each

one of which can be known and analyzed but which disappear and reappear capriciously. From the point of view of causality it is a world in which the connections between things are masked by the relations between the action and its desired results; hence the subject's activity is conceived as being the primary and almost the sole motive power. As far as the boundaries between the self and the external world are concerned, a universe without objects is such that the self, lacking knowledge of itself, is absorbed in external pictures for want of knowing itself; moreover, these pictures center upon the self by failing to include it as a thing among other things, and thus fail to sustain interrelationships independent of the self.

Observation and experimentation combined seem to show that object concept, far from being innate or given ready-made in experience, is constructed little by little. Six stages can be discerned, corresponding to those of intellectual development in general. During the first two stages (those of reflexes and the earliest habits), the infantile universe is formed of pictures that can be recognized but that have no substantial permanence or spatial organization. During the third stage (secondary circular reactions), a beginning of permanence is conferred on things by prolongation of the movements of accommodation (grasping, etc.) but no systematic search for absent objects is yet observable. During the fourth stage ("application of known means to new situations") there is searching for objects that have disappeared but no regard for their displacements. During a fifth stage (about 12 to 18 months old) the object is constituted to the extent that it is permanent individual substance and inserted in the groups of displacements, but the child still cannot take account of changes of position brought about outside the field of direct perception. In a sixth stage (beginning at the age of 16 to 18 months) there is an image of absent objects and their displacements.

§ 1. THE FIRST TWO STAGES: NO SPECIAL BEHAVIOR RELATED TO VANISHED OBJECTS

Among all the impressions which assail his consciousness, the child distinguishes and quickly recognizes certain stable groups

which we shall call pictures. That is why we have stated (*O.I.*)[1] that every schema of reproduction assimilation is extended sooner or later in generalizing assimilation and recognitory assimilation combined, recognition being derived from assimilation.

The most elementary example of this process is incontestably that of sucking. The nursling, from the second week of life, is capable of finding the nipple and differentiating it from the surrounding teguments; therein is proof that the schema of sucking in order to nurse begins to be dissociated from the schemata of empty sucking or of sucking at random, and thus results in recognition through acts. So also, after the fifth to the sixth week of life, the child's smile reveals that he recognizes familiar voices or faces whereas strange sounds or images astonish him. In a general way, every functional use (hence all primary circular reaction) of sucking, of sight, of hearing, of touch, etc., gives rise to recognitions.

But none of that proves or even suggests that in the first weeks of life the universe is really cut up into objects, that is, into things conceived as permanent, substantial, external to the self, and firm in existence even though they do not directly affect perception. In itself, recognition is not at all a recognition of objects and it can be affirmed that none of the characteristics mentioned here defines recognition in its beginnings, for they are the product of an extremely complex intellectual elaboration and not of an elementary act of simple sensorimotor assimilation. True, in the associational theory of recognition it could be asserted that recognition merely confers upon the recognized qualities the constitution of the object itself: if, in order to recognize a thing, it is really necessary to have retained the image of that thing (an image capable of being evoked, and not simply the motor schema readapting at each new contact), and if recognition results from an association between this image and actual sensations, then naturally the conserved image will be able to act in the mind when the object itself is absent and thus suggest the idea of its conservation. Recognition will thenceforth be extended into belief in the permanence of the object itself.

[1] J. Piaget, *The Origins of Intelligence in Children* (New York: International Universities Press, 1952); hereafter referred to as *O.I.*

But in the elementary examples now under consideration, recognition does not necessitate any evocation of a mental image. For recognition to begin, it is enough that the attitude previously adopted with regard to the thing be again set in motion and that nothing in the new perception thwart that process. The impression of satisfaction and familiarity peculiar to recognition could thus stem only from this essential fact of the continuity of a schema; the subject recognizes his own reaction before he recognizes the object as such. If the object is new and impedes action, there is no recognition; if the object is too well known or constantly present, the automatism of habit suppresses any opportunity for conscious recognition; but if the object resists the activity of the sensorimotor schema sufficiently to create a momentary maladjustment while giving rise soon after to a successful readjustment, then assimilation is accompanied by recognition. The latter is only the realization of mutual conformity between a given object and a schema all ready to assimilate it. Recognition accordingly begins by being subjective before it becomes object recognition, which of course does not prevent the subject from projecting recognized perception into the undifferentiated universe of his adualistic consciousness (since in the beginning nothing is experienced as subjective). In other words, recognition is at first only a particular instance of assimilation: the thing recognized stimulates and feeds the sensorimotor schema which was previously constructed for its use, and without any necessity for evocation. If this is true, it is self-evident that recognition does not, by itself and without further complication, to lead object concept. In order that the recognized picture may become an object it must be dissociated from the action itself and put in a context of spatial and causal relations independent of the immediate activity. The criterion of this objectification, hence of this rupture in continuity between things perceived and the elementary sensorimotor schemata, is the advent of the behavior patterns related to absent pictures: search for the vanished object, belief in its permanence, evocation, etc. But primary assimilation only implies total continuity between action and environment and does not lead to any reaction beyond the immediate and actual excitation.

Furthermore, independently of recognition, there is no

proof that direct perception is at first a perception of objects. When we perceive a motionless thing we place it in a space in which we are ourselves and thus conceive it according to the laws of perspective; the particular point of view from which we see it does not at all prevent us from imagining its depth, its reverse side, its possible displacements, in short, everything that makes it an object characterized by its form and constant dimensions. When we perceive it in motion or simply removed from its initial location we distinguish between these changes of position and changes of state and thus contrast at every moment the thing as it is with the thing as it appears to our sight; again, this dual distinction leads to the permanence characteristic of object concept. But does the child do the same from the very beginnings of his activity? It is permissible, not to say necessary, to doubt it. Regarding the motionless object, only little by little will a suitable spatial structure make it possible to attribute to it the relief, the form, and the depth characteristic of its objective identity. With regard to the thing in motion, the child has not been given the power from the outset to differentiate between changes of position and changes of state and thus to endow flowing perceptions with the quality of geometric "groups," consequently of objects. On the contrary, failing to locate himself at the outset in space, and to conceive an absolute relativity between the movements of the external world and his own, the child at first does not know how to construct either groups or objects and may well consider the changes in his image of the world as being simultaneously real and constantly created by his own actions.

True, from the earliest stages, certain operations herald the formation of the object: they are, on the one hand, the intercoordinations between heterogeneous schemata which precede the coordination of prehension and of sight (coordination of which creates a special problem) and, on the other hand, the sensorimotor accommodations. These two types of behavior lead the child to transcend the absolutely immediate, and assure a beginning of continuity of pictures perceived.

With regard to the intercoordination of schemata, that of sight and hearing may be mentioned. From the second month of life and the beginning of the third, the child tries to look

at the objects he hears (*O.I.*, obs. 44-49), thus revealing the relationship he is establishing between certain sounds and certain visual pictures. It is clear that such coordination endows sensory pictures with a greater degree of solidity than when they are perceived through a single kind of schemata: the fact of expecting to see something instills in the subject who listens to a sound a tendency to consider the visual image as existing before the perception. So also every intersensory coordination (between sucking and prehension, prehension and sight, etc.) contributes to arousing the anticipations which are assurances of the solidity and coherence of the external world.

But that is very far from object concept. The intercoordination of heterogeneous schemata is explained, as we have seen (*O.I.*, Chap. II, §3-4), by a reciprocal assimilation of the presenting schemata. In the case of sight and hearing, therefore, there exists at the outset no objective identity of the visual image with the auditory image (which can also be a tactile or gustatory picture, etc.), but simply a sort of subjective identity; the child tries to see what he hears because each schema of assimilation seeks to encompass the whole universe. Thereafter a coordination of this kind does not yet imply any permanence conceived as independent of present action and perception; discovery of the visual picture announced by the sound is only the extension of the act of trying to see. However, if the act of searching with the glance is, in us adults, accompanied by a belief in the firm existence of the object looked at, we are not justified in assuming that this relation has been obvious from the outset. Just as lip movement or any other functional exercise creates by itself its own object or its own result, so also the nursling may consider the picture which he contemplates as the extension, if not the product, of his effort to see. Perhaps one can reply that the localization of the sound in space, combined with the localization of the visual picture, confer an objectivity on the thing which is simultaneously heard and seen. But as we shall see, the space involved here is still only a space dependent on the immediate action and not precisely an objective space in which things and actions are placed in relation to each other in groups which are independent of the body itself. In short, intersensory coordi-

nations contribute to solidifying the universe by organizing actions but they do not at all suffice to render that universe external to those actions.

Sensorimotor accommodations of every kind often lead not only to anticipations concerning perception (such as the above-mentioned coordinations), but also to extensions of the action related to the image perceived, even after the image has disappeared. Here again it may seem at first that object concept has already been acquired, but a more stringent examination dispels this illusion.

The clearest example is that of visual accommodations; when the child knows how to follow with his eyes an image which is being displaced, and above all when he has learned how to extend that movement of the eyes by an appropriate shift of head and torso, he very quickly reveals behavior patterns comparable to a search for the thing seen which then vanished. This phenomenon, particularly distinct in the case of sight, is also found in connection with sucking, prehension, etc.

OBS. 1. Laurent, as early as the second day, seems to seek with his lips the breast which has escaped him (*O.I.*, obs. 2). From the third day he gropes more systematically to find it (*O.I.*, obs. 4-5, 8, and 10). From 0;1 (2) and 0;1 (3) he searches in the same way for his thumb, which brushed his mouth or came out of it (*O.I.*, obs. 17, 18, etc.). Thus it seems that contact of the lips with the nipple and the thumb gives rise to a pursuit of those objects, once they have disappeared, a pursuit connected with reflex activity in the first case and with a nascent or acquired habit in the second case.

OBS. 2. In the realm of sight, Jacqueline, as early as 0;2 (27) follows her mother with her eyes, and when her mother leaves the visual field, continues to look in the same direction until the picture reappears.

Same observation with Laurent at 0;2 (1). I look at him through the hood of his bassinet and from time to time I appear at a more or less constant point; Laurent then watches that point when I am out of his sight and obviously expects to see me reappear.

Noteworthy too are visual explorations (*O.I.*, obs. 33), alternate glances (*O.I.*, obs. 35) and reversed glances (*ibid.*, obs. 36) which attest to a sort of expectation of some familiar picture.

OBS. 3. Analagous behavior is observable with respect to hearing from the time coordination exists between this function and that of sight, that is to say from the time movements of eyes and head objectively bear witness to some searching. Thus at 0;2 (6) Laurent finds with his glance an electric kettle whose lid I shake (see *O.I.*, obs. 49). When I interrupt the noise, Laurent looks at me a moment, then again looks at the kettle even though it is now silent; hence we may assume that he expects new sounds to come from it, in other words, he behaves with regard to the interrupted sound as he does with regard to the visual pictures which have just disappeared.

OBS. 4. Prehension gives rise to behavior patterns of the same kind. Just as the child seems to expect to see again that which he has just seen and to hear again the sound which has just ceased, so also, when he begins to grasp, he seems to be convinced of the possibility that his hand will rediscover the object it has just relinquished. Thus during the behavior patterns described in *O.I.*, obs. 52-54, Laurent, considerably before knowing how to grasp what he sees, constantly lets go and recaptures the objects he is handling. At 0;2 (7) in particular, Laurent holds a sheet in his hand for a moment, then lets it go and grasps it again soon afterward. Or he holds his hands together, separates them, holds them together again, etc. Finally it may be recalled that as soon as coordination between prehension and sight has been established, the child brings before his eyes everything he grasps outside the visual field, thus revealing expectation comparable to that which we have noted in connection with hearing and sight (See *O.I.*, obs. 85, 89, and 92).

OBS. 5. A reaction slightly more complex than these is that of the child who stops looking at a certain picture and directs his glance elsewhere and who then returns to the first picture; that is the equivalent, in the realm of primary circular reactions, of the deferred reactions which we shall analyze in connection with the second stage.

Thus Lucienne, at 0;3 (9) sees me at the extreme left of her visual field and smiles vaguely. She then looks in different directions, in front of her and to the right, but constantly returns to the place in which she sees me and dwells on it every time for a moment.

At 0;4 (26) she takes the breast but turns when I call her and smiles at me. Then she resumes nursing, but several times in succession, despite my silence, she turns directly to the position from which she can see me. She does it again after a pause of a few min-

utes. Then I withdraw; when she turns without finding me her expression is one of mingled disappointment and expectation.

At 0;4 (29) same reaction; she is on my lap but with her back to me, and sees my face by turning very much to the right. She then constantly returns to that position.

At first these facts and analogous ones which it would be easy to accumulate seem to indicate a universe similar to ours. The gustatory, visual, auditory, or tactile images that the child ceases to suck, see, hear or grasp seem to exist for him in the capacity of permanent objects which are independent of the action and which the action simply finds again. But in comparing these same behavior patterns with those we describe in connection with subsequent stages, it is apparent how superficial this interpretation would be and how phenomenalistic this primitive universe remains, far from constituting from the outset a world of substances. An essential difference contrasts these early behavior patterns with the true search for objects. True search is active and causes the intervention of movements which do not solely extend the interrupted action, whereas in the present behavior patterns either there is simple expectation, or else the search only continues the earlier act of accommodation. In these latter two cases the expected object is still related to the action itself.

True, in several of our examples there is simply expectation, that is to say passivity and not activity. In the case of the disappearing visual image the child limits himself to looking at the place where the object vanished (obs. 2): thus he merely preserves the attitude of the earlier perception and if nothing reappears, he soon gives up. If he had object concept, on the contrary, he would actively search to find out where the thing could have been put; he would remove obstacles, change the position of the presenting objects at hand, and so on. Lacking prehension, the child could search with his eyes, change his perspective, etc. But that is precisely what he does not know how to do, for the vanished object is not yet for him a permanent object which has been moved; it is a mere image which reenters the void as soon as it vanishes, and emerges from it for no objective reason.

When, on the contrary, there is a search (obs. 1, 3, 4, and 5) it is noteworthy that the search merely reproduces the earlier act of accommodation. In the case of sucking, it is a reflex mechanism which allows the child to grope until he encounters the objective. With regard to observations 3, 4, and 5, the child is content with repeating the act of accommodation just performed. In none of these acts is it possible to speak of the object as existing independently of the activity. The objective is in the direct extension of the act. It is as though the child did not dissociate one from the other and considered the goal to be attained as depending on the action alone and, more precisely, on only one type of action. In the event of failure the child promptly gives up instead of attempting, as he will later do, special steps to complete the initial act. True, during these first stages, the child does not know how to grasp and consequently his potentialities for active searching amount to very little. But if the motor unskillfulness of these initial stages sufficed to explain the child's passivity, in other words, if the child, while not knowing how to search for the absent object, nevertheless believes in its permanence, we should state that search for the vanished object begins as soon as the habits of prehension have been acquired. But we shall now see that this is not the case.

In short, the first two stages are characterized by the absence of any special behavior related to vanished objects. Either the image which disappears immediately sinks into oblivion, that is to say, into the affective void, or else it is regretted, desired, and again expected, and the only behavior pattern utilized to rediscover it is the mere repetition of earlier accommodations.

The latter case applies chiefly to persons, when they have paid too much attention to the nursling and he can no longer bear solitude; he stamps and cries at the disappearance of every image, thus revealing his keen desire to see it reappear. But does this mean that the baby conceives of the vanished image as an object existing in space, remaining identical to itself and escaping sight, touch and hearing because it has been displaced and is masked by various solid substances? In such an hypothesis it would be necessary to attribute to the nursling a most improbable power of spatial representation and intellectual con-

struction, and it would no longer be possible to understand the difficulty he will have, until about 9 or 10 months of age, in searching actively for objects when they are covered by a cloth or a screen of some kind right before his eyes (see the third and fourth stages). But the hypothesis is neither necessary nor does it conform to observations. It is not necessary because it suffices, for the child to hope for the return of the interesting image (of his mother, etc.), that he attribute to it a sort of affective or subjective permanence without localization or substantiation; the vanished image remains, so to speak, "at disposal" without being found anywhere from a spatial point of view. It remains what an occult spirit is to the magician; ready to return if one catches it successfully but obeying no objective law. How does the child go about bringing to himself the image of his desires? Merely by crying at random or by looking at the place where it disappeared or where it was last seen (obs. 2 and 5). It is here that the hypothesis of an object situated in space is contrary to the findings of observation. The child's initial search is not at all an effort to understand the displacements of the vanished image; it is only an extension or repetition of the most recent acts of accommodation.

§ 2. THE THIRD STAGE: BEGINNING OF PERMANENCE EXTENDING THE MOVEMENTS OF ACCOMMODATION

The behavior patterns of the third stage are those which are observable between the beginnings of prehension of things seen and the beginnings of active search for vanished objects. Hence they still are earlier than object concept but mark progress in the solidification of the universe depending on action.

Between three and six months of age, as we have seen elsewhere (*O.I.*, Chap. II, §4), the child begins to grasp what he sees, to bring before his eyes the objects he touches, in short to coordinate his visual universe with the tactile universe. But not until the age of 9 or 10 months does active search for vanished objects occur in the form of the use of grasping to remove solid objects that may mask or cover the desired object. This intermediate period constitutes our third stage.

But, if this long lapse of time is necessary for transition from prehension of an object at hand to true search for a missing ob-

ject, it is because the interim is filled with the acquisition of a series of intermediate behavior patterns all of which are necessary to proceed from the mere perceived image to the concept of permanent object. In this connection we can distinguish these five types of behavior: 1) "visual accommodation to rapid movements"; 2) "interrupted prehension"; 3) "deferred circular reaction"; 4) the "reconstruction of an invisible whole from a visible fraction," and 5) the "removal of obstacles preventing perception." The first of these behavior patterns merely extends those of the second stage, and the fifth fulfills those of the fourth stage.

Visual accommodation to rapid movements makes possible the anticipation of future positions of the object and consequently endows it with a certain permanence. This permanence of course remains related to the act of accommodation itself, and thus the behavior patterns merely extend those of the second stage; but there is progress in the sense that the anticipated position of the object is a new position and not one observed a moment earlier to which the eyes merely return. Two particular instances are of special importance: reaction to the movement of bodies which disappear from the visual field after having induced a lateral turn of the head, and reaction to falling movements. Both these behavior patterns seem to have developed under the influence of prehension.

OBS. 6. Laurent's reaction to falling objects still seems to be nonexistent at 0;5 (24): he does not follow with his eyes any of the objects which I drop in front of him.

At 0;5 (26), on the other hand, Laurent searches in front of him for a paper ball which I drop above his coverlet. He immediately looks at the coverlet after the third attempt but only in front of him, that is, where he has just grasped the ball. When I drop the object outside the bassinet Laurent does not look for it (except around my empty hand while it remains up in the air).

At 0;5 (30) no reaction to the fall of a box of matches. The same is true at 0;6 (0), but then when he drops the box himself he searches for it next to him with his eyes (he is lying down).

At 0;6 (3) Laurent, lying down, holds in his hand a box five centimeters in diameter. When it escapes him he looks for it in the right direction (beside him). I then grasp the box and drop it myself, vertically and too fast for him to be able to follow the trajectory. His

eyes search for it at once on the sofa on which he is lying. I manage to eliminate any sound or shock and I perform the experiment at his right and at his left; the result is always positive.

At 0;6 (7) he holds an empty match box in his hand. When it falls his eyes search for it even if they have not followed the beginning of the fall; he turns his head in order to see it on the sheet. Same reaction at 0;6 (9) with a rattle, but this time he has watched the initial movement of the object. The same is true at 0;6 (16) when his eyes have followed the beginning of the fall, at 0;6 (20) etc., etc.

At 0;7 (29) he searches on the floor for everything I drop above him, if he has in the least perceived the beginning of the movement of falling. At 0;8 (1) he searches on the floor for a toy which I held in my hand and which I have just let drop without his knowledge. Not finding it, his eyes return to my hand which he examines at length, and then he again searches on the floor.

OBS. 7. At 0;7 (30) Lucienne grasps a small doll which I present to her for the first time. She examines it with great interest, then lets it go (not intentionally); she immediately looks for it in front of her but does not see it right away.

When she has found it, I take it from her and place a coverlet over it, before her eyes (Lucienne is seated); no reaction.

At 0;8 (5) Lucienne searches systematically on the floor for everything that she happens to drop. When an object is released in front of her, sometimes she searches for it also with her eyes, but less often (an average of one out of four times). The need to grasp what was in her hand therefore plays a role in this reaction to movements of falling; the permanence belonging to the beginnings of the concept of tactile object (of which we shall again speak in connection with interrupted prehension) thus interferes with the permanence arising from visual accommodation.

At 0;8 (12) I again observe that Lucienne tries harder to find fallen objects with her eyes when she has previously touched the objects.

At 0;9 (25) she looks at my hand which I at first hold motionless and then suddenly lower; Lucienne searches for it on the floor for a long time.

OBS. 8. Jacqueline's search for the fallen object took place later. At 0;8 (20) for example, when she tries to reach a cigarette case hanging above her and it drops, she does not search in front of her at all but continues to look up in the air.

At 0;9 (8), same negative reaction with her parrot, which is bulky; it falls on her quilt while she is trying to reach it above her; she does not lower her eyes and continues to search in the air. However the parrot contains a rattle and makes a noise in falling.

At 0;9 (9) on the other hand, Jacqueline makes the same parrot fall by chance on the left of the bassinet and this time, because of the noise, she looks around for it. As the parrot has entered between the quilt and the wicker, Jacqueline perceives only its tail; however she recognizes the object (an instance of "reconstitution of invisible totalities" of which we shall subsequently speak) and tries to grasp it. But by trying to grasp it she wedges it down until she can see it no longer. However, still hearing the rattle inside the parrot, she taps the quilt which covers it and the sound ensues (this is a mere utilization of circular reaction related to this toy). But it does not occur to her to search under the quilt.

OBS. 9. The same day, at 0;9 (9), Jacqueline is seated in her bassinet and looks at my watch which I hold 20-30 centimeters away from her eyes and which I let drop by its chain.

At the first attempt, Jacqueline follows the trajectory, but with a certain tardiness, and finds the watch on the quilt covering her lap. The noise of the fall doubtless helps her and above all the fact that I lower the watch without yet letting it go.

Second attempt; she does not follow the movement, looks at my empty hand with surprise and seems to look around it (this time I have merely let the object go).

Third attempt: she again searches around my hand, then looks on my lap and takes possession of the object.

In order to eliminate the role of sound, I continue with the chain alone; in eight new sequential attempts Jacqueline only once searches on the floor. The other times she was content to examine my hand.

Then I lower the chain slowly, but quickly enough to precede the child's glance; Jacqueline searches on the floor. Then I recommence, merely letting the chain go; six negative attempts. The next two times Jacqueline searches on her lap but with her hand only while looking in front of her. Finally, during the last attempts, she gives up this tactile search and only examines her hands.

OBS. 10. At 0;9 (10) a new experiment with Jacqueline, but using a little notebook of 8x5 centimeters which I let fall from high up (above her eye level) on to a cushion placed on her lap. This time Jacqueline immediately searches on the floor, although she has not

had time to follow the trajectory; she sees only the point of departure and my empty hands.

At 0;9 (11) same experiment with her parrot: she again looks immediately at the floor. With the watch chain, on the other hand, the reaction is completely negative, evidently because the object is less bulky; Jacqueline examines my empty fingers in astonishment. Hence object concept does not yet exist: in the case of the parrot or the notebook it is simply the movement of accommodation which continues, and when the object is too small for the eyes to follow at its point of departure nothing happens.

At 0;9 (16) Jacqueline, seated on my arm, plays with her celluloid duck and lets it fall behind my shoulder. Then she immediately tries to find it again but, and this is very interesting, she does not try to look around my back; she pursues her investigations in front. We shall understand the reason for this error by proving, later on, how difficult it is for the child to take account of screens and to conceive that an object can be "behind" another object.

From 0;9 (18) reaction to falling movements seems to be acquired; falling objects, even when the child has not held them just beforehand, immediately cause the child to look at the ground.

OBS. 11. At 0;9 (6) Jacqueline looks at her duck which I hold level with her eyes and which I move horizontally to the back of her head. She follows it for a moment with her eyes, then loses sight of it. Nevertheless, she continues this movement of accommodation until she finds the duck again. She has searched assiduously for quite a while.

Then I replace the duck before her and repeat the experiment, but in the other direction. Same reaction at first, but then during the search she forgets what she wants and takes possession of another object.

OBS. 11a. In this connection we may mention Lucienne's progress since obs. 5 in remembering positions. It involves a behavior pattern bringing us back to the behavior patterns of the second stage but more complex than they and contemporaneous with those of the third. At 0;8 (12) Lucienne is seated next to me; I am at her right. She sees me, then plays with her mother. Then she looks at me while her mother slowly goes away, on the left, to the door of the room and disappears. Lucienne follows her with her eyes until she ceases to be visible, then, all at once, she turns her head in my direction. She looks at my face at once; she knew that I was there even though she had not looked at me for a few minutes.

OBS. 12. So also Laurent, at 0;6 (0), looks at a rattle which I move horizontally from left to right, at the level of his face. He manages to follow the beginning of the trajectory, then loses sight of the moving object; then he abruptly turns his head and turns it back again 50 centimeters farther. Then I make the object describe the reverse trajectory and he searches for it a moment without recovering it, then gives up.

In the following days the reaction becomes more definite and Laurent rediscovers the object in any direction whatever. Same observation at 0;6 (30), at 0;7 (15), at 0;7 (29), etc.

This capacity for rediscovering the object by following its trajectory develops in Laurent as did the memory of positions in Lucienne (obs. 11a). Thus at 0;7 (11) I am playing with Laurent when his mother appears above him. After she disappears, he throws his head back in order to find her again. He catches sight of her just as she is leaving the room (before he hears the sound of the door). Then he returns to me but always turns around again to see if his mother is still there.

However commonplace these facts may be they are important in forming object concept. They show us that the beginnings of permanance attributed to images perceived arise from the child's action in movements of accommodation. In this respect the present behavior patterns merely extend those of the second stage but reveal essential progress: the child no longer seeks the object only where he has recently seen it but hunts for it in a new place. He anticipates the perception of successive positions of the moving object and in a sense makes allowance for its displacements. But precisely because this beginning of permanence is only an extension of the action in progress, it could only be very limited. The child cannot conceive of just any displacements or just any objective permanence. He is limited to pursuing, more or less correctly, with his eyes or with his hand the trajectory delineated by the movements of accommodation peculiar to the immediately preceding perception; and it is only in the measure in which, in the absence of the objects, he continues the process begun in their presence that he is able to endow them with a certain permanence.

Let us look at this more closely. With regard to Laurent (and to Lucienne, although we have not had the opportunity of under-

standing the origins of her reaction to falling movements), we prove that at first a search for the fallen object takes place more often when it is the child himself who has let it drop; the permanence attributed to the object is consequently greater when the action of the hand interferes with that of the eyes. Jacqueline's apprenticeship is among the most suggestive. At first (obs. 8) there is no reaction to the fall because the child has not observed the initial movement of the falling object. Then Jacqueline observes that initial movement but instead of extending it when the object perceived leaves the visual field, she returns to the point of departure to search for the toy (obs. 9); however, when the movement is slow or a concomitant sound helps the child in her search, she manages to reconstitute the exact trajectory. In the next phase (beginning of obs. 10), the reaction is positive when the object is sufficiently bulky to have been followed with the eyes long enough, but it remains negative with too slender a chain. Finally only the positive reaction becomes generalized.

It therefore seems clear that the displacement attributed to the object depends essentially on the child's action (movements of accommodation which are extended by looking) and that permanence itself remains related to that very action.

As far as the first point is concerned, it would be impossible to give to the child the concept of autonomous displacements. When we are following an object with our eyes and when, after having lost sight of it, we try to find it again, we have the feeling that it is in a space independent of ourselves; consequently we accept as true that the movements of the object occur without relationship to our own, outside our area of perception, and we strive to move ourselves so as to be reunited with it. On the other hand, everything takes place as if the child, when witnessing the falling movement from the start, is not aware that he moves himself about, in order to follow the movement, and consequently is not aware that his body and the moving object are located in the same space; if the object is not found within the exact extension of the movement of accommodation, the child will give up hope of finding it again. Thereafter, in his consciousness, the object's movement is one with the kinesthetic or sensorimotor impressions which accompany his own movements of eyes, head, or torso; when he loses sight of the moving object the only procedures suitable for finding it

again therefore consist either in extending movements which have already been delineated or in returning to the point of departure. Nothing forces the child to consider the object as having been displaced in itself and independently of its movement; all that he is given is an immediate connection between his kinesthetic impressions and the reappearance of the object in his visual field, in short a connection between a certain effort and a certain result. There does not yet exist what we shall later call (Chap. II) an objective displacement.

Then regarding the second point, that is to say the permanence attributed to the object as such, it is self-evident that this permanence remains related to the subject's action. In other words, the visual images the child pursues acquire in his eyes a certain solidity to the precise extent that he tries to follow them, but they do not yet constitute substantial objects. The mere fact that the child does not imagine their displacement as being an independent movement and that he often searches for them (that is to say, when he has not been able to look at them long enough) at the very point where they made their departure, reveals that for him, these images still remain at the disposal of the action itself, and in certain absolute situations. True, that is a beginning of permanence, but such permanence remains subjective; it must produce in the child an impression comparable to that which he experienced in discovering that he could suck his thumb when he wished, see things move when he moved his head, hear a sound when he rubbed a toy against his bassinet or pulled the strings attached to the rattle hanging from its hood, etc. The nature of the primitive object conceived as being at disposal is therefore on a par with the whole of the behavior patterns of this stage, that is to say, with the primary and secondary circular reactions during which the universe presents itself to the subject as depending on his activity. There is progress over the first stages during which the object is not distinguished from the results of reflex activity or mere primary circular reaction (that is to say, the actions exerted by the subject on his own organism to produce some interesting result), but it is a progress in degree and not in quality; the object still exists only in connection with the action itself.

As we shall see later, the proof that the object is still nothing more than this is that the child at this age still manifests no

particular behavior pattern related to vanished objects. Lucienne's reaction at 0;7 (30) when I cover her doll with a piece of cloth (obs. 7) already makes this apparent.

This dependence of the object on the action is found again in the second group of acts which we can now emphasize: the acts of interrupted prehension. These observations are in the same relation, in comparison to obs. 4 of the first stages, as are the visual accommodations to rapid movements in comparison to obs. 2 and 5. In other words, the permanence peculiar to the beginnings of the tactile object is still only an extension of accommodation movements, but henceforth the child will try to grasp the lost object in new positions and no longer only in the same place. As soon as prehension becomes a systematic operation, interest in which surpasses all else (between the ages of four to six months), the child learns at one stroke to follow with his hand objects which escape him, even when he does not see them. It is this behavior pattern which permits the subject to attribute a beginning of permanence to tactile objects.

OBS. 13. At 0;8 (20) Jacqueline takes possession of my watch which I offer her while holding the chain in my hand. She examines the watch with great interest, feels it, turns it over, says *apff*, etc. I pull the chain; she feels a resistance and holds it back with force, but ends by letting it go. As she is lying down she does not try to look but holds out her arm, catches the watch again and brings it before her eyes.

I recommence the game; she laughs at the resistance of the watch and still searches without looking. If I pull the object progressively (a little farther each time she has caught it) she searches farther and farther, handling and pulling everything that she encounters. If I pull it back abruptly, she is content to explore the place where the watch departed, touching her bib, her sheet, etc.

But this permanence is solely the function of prehension. If, before her eyes, I hide the watch behind my hand, behind the quilt, etc., she does not react and forgets everything immediately; in the absence of tactile factors visual images seem to melt into each other without substance. As soon as I replace the watch in Jacqueline's hands and pull it back she searches for it again, however.

OBS. 14. Here is a counterproof. At 0;9 (21) Jacqueline is seated and I place on her lap a rubber eraser which she has just held in

her hand. Just as she is about to grasp it again I put my hand between her eyes and the eraser; she immediately gives up, as though the object no longer existed.

The experiment is repeated ten times. Every time that Jacqueline is touching the object with her finger at the moment when I cut off her view of it she continues her search to the point of complete success (without looking at the eraser and often dropping it by displacing it involuntarily, etc.). On the other hand, if no tactile contact has been established before the child ceases to see the eraser, Jacqueline withdraws her hand.

Same attempts with a marble, a pencil, etc., and same reactions. My hand does not interest her at all; therefore it is not a shift in interest that causes forgetfulness; it is simply because the image of my hand abolishes that of the object beneath it, unless, let us repeat, her fingers have already grazed the object or perhaps also unless her hand is already in action under mine and ready to grasp.

At 0;9 (22) same observations.

OBS. 15. At 0;6 (0) Lucienne is alone in her bassinet and, watching what she is doing, grasps the material covering the sides. She pulls the folds toward herself but lets them go at each attempt. She then brings before her eyes her hand which is tightly closed, and opens it cautiously. She looks attentively at her fingers and recommences. This goes on more than ten times.

It is therefore sufficient for her to have touched an object, believing she grasps it, for her to conceive of it as being in her hand although she no longer feels it. Such a behavior pattern, like the preceding ones, shows the degree of tactile permanence the child attributes to objects he has grasped.

OBS. 16. So also Laurent, at 0;7 (5) loses a cigarette box which he has just grasped and swung to and fro. Unintentionally he drops it outside the visual field. He then immediately brings his hand before his eyes and looks at it for a long time with an expression of surprise, disappointment, something like an impression of its disappearance. But far from considering the loss as irremediable, he begins again to swing his hand, although it is empty; after this he looks at it once more! For anyone who has seen this act and the child's expression it is impossible not to interpret such behavior as an attempt to make the object come back. Such an observation, combined with the preceding one (Lucienne at 0;6) places in full light the true nature of the object peculiar to this stage: a mere extension of the action.

Subsequently Laurent, to whom I have returned the box, again loses it several times; when he has just held it he is satisfied to stretch out his arm in order to find it again, or else he stops searching altogether (see the next observation).

OBS. 17. As early as 0;4 (6) Laurent searches with his hand for a doll he has just let go. He does not look at what he is doing but extends his arm in the direction toward which it was oriented when the object fell.

At 0;4 (21) also, he lowers his forearm in order again to find under the sheet a stick he held in his hand and which he has just let go.

Same reaction at 0;5 (24) with all sorts of objects. I then try to determine how extensive his search is. I touch his hand with a doll which I immediately withdraw; he is satisfied to lower his forearm without really exploring the surrounding area (see Chap. II, obs. 69).

At 0;6 (0), 0;6 (9), 0;6 (10), 0;6 (15), etc., I observe the same facts. Laurent believes the object has disappeared if he does not find it merely by lowering his arm; the object for which he searches is therefore not yet endowed with true mobility but is conceived as merely extending the interrupted act of prehension. On the other hand, if the fallen object touches the child's cheek, his chin, or his hand, he knows very well how to find it again. It is therefore not motor incapacity which explains the lack of true searching but rather the primitive quality attributed to the object.

At 0;6 (15) I again observe that if the object suddenly falls from his hand Laurent does not search for it. On the contrary, when the hand is about to grasp the escaping object or when the hand displaces the object, shakes it, etc., then a search takes place. Only, in order to recover the object Laurent is always satisfied to raise his arm with no trajectory of true exploration.

At 0;7 (5) he grasps and swings the cigarette box of obs. 16; when he loses it right after having taken it he searches on the coverlet with his hand. However, when he drops it under any other circumstance, he does not try to find it again. I then again offer him the same box above his eye level; he makes it fall by touching it but does not search for it!

At 0;7 (12) he lets go, at his right, a rattle which he was holding in his hand; he searches for it for quite a while without hearing or touching it. He gives up and then begins again to search at the same place. Finally he fails. Next he loses it on his left and finds it twice more because the object is in the direct range of his arm movements.

Finally, from 0;8 (8) he truly searches for everything that falls from his hands.

We must first emphasize the difference between these reactions and the behavior patterns of the fourth stage, which consist in searching with the hands for the object disappearing from the visual field. In obs. 13-14 as in obs. 6-12 (accommodation to rapid movements) it is still only a question of a permanence merely extending earlier accommodation movements and not of a special search for the vanished object. The child, holding something in his hand, wishes to keep it when it escapes him; he then merely reproduces the gesture of grasping which he made shortly before. Such a reaction certainly presupposes that the subject expects his gesture to lead to the desired result. But this expectation is merely based on the belief that the object is at the disposal of the act. In this regard obs. 15 and 16 have decisive significance. That does not yet at all imply the substantial permanence of the thing independently of the gesture or the existence of objective trajectories.[2] Proof of this is that the least obstacle advening to change the situation as a whole discourages the child. The child is content merely to stretch out his arm; he does not truly search and invents no new procedure for rediscovering the vanished object. This is all the more striking because, as we shall see, it is along the very lines indicated by the present behavior patterns that such procedures will be formed.

Let us examine a third group of behavior patterns also capable of engendering a beginning of object permanence: the deferred circular reactions. As we have seen, the permanence peculiar to objects of this stage is not yet either substantial or truly spatial; it depends on the action itself and the object merely constitutes that which is at the disposal of that action. We have proved, moreover, that such a situation stems from the fact that the activity of the child at this level consists essentially in primary and secondary circular reactions and not yet in tertiary reactions. In other words, the child spends the better part of his time in reproducing all sorts of interesting results evoked by the sights around him and tries only a little to study new things for their own sake, to experiment. Thereafter the universe of that stage is

[2] See Chap. II, obs. 69.

composed of a countless series of potential actions, the object being nothing more than the material at the disposal of those actions. If this is true, it is to be expected that the secondary circular reactions constitute one of the most abundant sources of elementary permanence; that is what the analysis of deferred circular reactions will show.

It must be noted that sooner or later circular reaction brings with it a sort of revival that prolongs its influence over the child's behavior. We do not, of course, speak of the fact that circular reaction reappears every time the child finds himself facing the same objects (shaking himself when he sees the bassinet hood, pulling the chain when he sees the rattle to which it is attached, etc.) for there deferred behavior patterns are not involved, but rather merely habits revived by the presence of a familiar stimulus. We are thinking exclusively of those acts in the course of which circular reaction is interrupted by circumstances and resumes shortly after without any external stimulus. In such cases the fact that the child returns of his own accord to the position and gestures necessary for the resumption of the interrupted act endows the objects thus rediscovered and recognized with a permanence analogous to those of which we have just spoken. The permanence is even more marked because the rediscovered action, being more complex, gives rise to a proportionately greater solidification of the perceived images.

OBS. 18. At 0;8 (30) Lucienne is busy scratching a powder box placed next to her on her left, but abandons that game when she sees me appear at her right. She drops the box and plays with me for a moment, babbles, etc. Then she suddenly stops looking at me and turns at once in the correct position to grasp the box; obviously she does not doubt that this will be at her disposal in the very place where she used it before.

OBS. 19. At 0;9 (3) Jacqueline tries to grasp a coverlet behind her head, in order to swing it.[3] I distract her by offering her a celluloid

[3] This behavior of "swinging" already belongs to the fourth stage with respect to the general development of intelligence (see *O.I.*, obs. 139). But, with regard to object concept, the deferred reaction to which it gives rise in this observation does not yet transcend the level of the third stage. It is apparent that, without considerable artifice, it is impossible to synchronize the corresponding steps of the evolutions peculiar to the various categories

duck. She looks at it, then tries to grasp it, but suddenly stops to look behind her for the coverlet which she did not see.

At 0;9 (13) she tries to grasp with her left hand a bottle which I place beside her head. She succeeds only in grazing it by turning her face slightly. She gives up shortly and losing sight of the bottle pulls a coverlet in front of her. But suddenly she turns around to reapply herself to her attempts at prehension. It all happens as if she has retained the memory of the object and returns to it, after a pause, believing in its permanence.

OBS. 20. Laurent has had many such reactions since 0;6. If the child is interrupted as he pulls the string hanging from the hood, scratches the edge of the bassinet, etc., he will immediately turn in the right direction and rediscover these objects. Let us limit ourselves to describing an observation of him at 0;6 (12), which pertains at the same time to deferred circular reaction, accommodation of the eyes to the movement of falling and tactile-manual search for the object. Without being typical from the point of view of interrupted circular reaction, this observation sums up very well what we have hitherto seen regarding the constitution of the object at that stage.

I place a rattle on the edge of the bassinet hood, barely held in place by a string attached behind it. Laurent at once stirs around in order to swing the object as if it were a toy somehow hanging there; but the rattle falls in front of his face and so close that he grasps it immediately. He replaces the rattle up in the air; same reaction, five or six times in succession. It is therefore possible to consider these acts taken together as constituting a new circular schema: stirring about, making the object fall, and grasping it. What will happen when the cycle remains incomplete, that is to say when the object, instead of falling in a visible place, disappears from the visual field? Will the reaction thus interrupted be extended in deferred reaction and how?

1. When the object falls after having been detached by the movement of the child, his eyes search for it in front of him, at the usual place. If he does not see it he again stirs about, but looking in front of him and not up in the air. If he then hears the rattle, he stretches out his hand and grasps whatever may be there, without true exploration (thus he takes possession either of the rattle itself, if it happens to come under his hand, or of the sheet, the coverlet, etc.).

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of sensorimotor intelligence, and that temporal displacements are produced, the more comprehensible the farther removed they are from the elementary stages.