connection between the imitative image, ludic symbolism and representative intelligence, *i.e.*, between cognitive representation and the representation of imitation and play. This very complex problem is still further complicated by the intervention of language, collective verbal signs coming to interfere with the symbols we have already analysed, in order to make possible the construction of concepts. It will therefore be necessary to separate the various factors, and we shall begin by doing this in the case of the first conceptual schemas and the first reasonings, and then in the case of the formation of representative categories.

# CHAPTER VIII

## TRANSITION FROM SENSORY-MOTOR SCHEMAS TO CONCEPTUAL SCHEMAS

For some authors the explanation of the transition from sensory-motor intelligence to conceptual intelligence is to be found in social life and in the logical representative forms provided by the system of collective representations and signs. Thus for Wallon there is a radical opposition between "intelligence of situations," which acts on reality without the use of thought, and representation, which is due to the influence of language, myths, rituals, and collective life in general. This attitude is entirely justifiable if we adopt the viewpoint and speak the language which are those of the sociologist, but the psychologist cannot leap straight from neurology to sociology. What has to be discovered is not only an explanation of representation in general, but an explanation covering the detail of the representative mechanisms, as, for example, the many forms of spatial intuitions (order, position, displacement, distance, etc., up to simple geometrical operations). To take only the example of space, it is certainly impossible to interpret psychologically the most evolved representative structures without recognising that there is a certain continuity with sensory-motor space. As for the social element which obviously intervenes sooner or later in all representation, the problem is to discover by what processes it does so. For the psychologist, "social life" can only be considered to have value as a cause on condition that the kinds of social relationships in question are exactly defined. "Socialised" or common space, for example, comprises the most varied relationships, from rational co-ordination of perspectives to the most irrational mythical space. Our task is therefore to follow step by step the transformation of the sensory-motor schema into concept, and to consider the socialisation and verbalisation of the schemas as only one of the dimensions of this general transformation. In this way, the stages noted in the social dimension will be clarified by the phases of the internal evolutionary process which leads from sensory-motor to conceptual intelligence, and the various relationships of this multi-dimensional table will be seen to be only interdependent aspects of one and the same reality.

### § 1. *First verbal schemas*

In order to see how slowly the process of transformation of sensory-motor schemas into true concepts takes place, it is sufficient to observe

the use made by the child of the first verbal signs and to analyse the types of assimilation to which they correspond.

Here are some examples of such schemas linked with semi-verbal signs, contemporaneous with stage VI of sensory-motor intelligence.

OBS. 101 (*a*). At 1 ; 1 (0) J. used the conventional onomatopœic sound "*tch tch*" to indicate a train passing her window, and repeated it each time a train passed, probably after the suggestion had first been made to her. But she afterwards said "*tch tch*" in two quite distinct types of situation. On the one hand, she used it indiscriminately for any vehicles she saw out of another window, cars, carriages and even a man walking, at 1 ; 1 (4). At about 1 ; 1 (6) and on the following days any noise from the street, as well as trains, produced *tch tch*. But on the other hand, when I played bo-peep, appearing and disappearing without speaking, J. at 1 ; 1 (4) also said "*tch tch*" probably by analogy with the sudden appearance and disappearance of the trains.

At about 1 ; 1 (20) she said "*bow-wow*" to indicate dogs. At 1 ; 1 (29) she pointed from her balcony at the landlord's dog in the garden and said "*bow-wow*." The same day, a few hours later, she made the same sound as she pointed to the geometrical pattern on a rug (a horizontal line crossed by three vertical lines). At 1 ; 2 (1), on seeing a horse from her balcony, she looked at it attentively and finally said "*bow-wow*." Same reaction an hour later at the sight of two horses. At 1 ; 2 (3) an open pram which a woman was pushing and in which the baby was clearly visible, produced "*bow-wow*" (this too was seen from her balcony). At 1 ; 2 (4) she said "*bow-wow*" at the sight of hens, and at 1 ; 2 (8) at the sight of dogs, horses, prams and cyclists, "*tch tch*" being apparently reserved for cars and trains. At 1 ; 2 (12) "*bow-wow*" referred to everything seen from her balcony: animals, cars, the owner of the house (whose dog had first been called "*bow-wow*") and people in general. At 1 ; 2 (15) the term was applied to the trucks railway porters were pulling, a long way from the house. At 1 ; 3 (7) it again referred to the pattern on the rug. Finally, after 1 ; 4, "*bow-wow*" seemed to be definitely reserved for dogs.

At 1 ; 2 (4) J. was in her mother's arms and said "*daddy*" to a man and then a moment later "*mummy*" to a strange woman. For some weeks "*daddy*" was applied indiscriminately to all sorts of men, while the use of "*mummy*" was more restricted, although it was applied two or three times to women who had not got children with them.

At about 1 ; 6 J. was becoming more and more skilful in using adults in order to obtain what she wanted, and always grizzled when they refused or pretended not to hear. One of her grandfathers was the person she found most accommodating, with the result that at 1 ; 6 (13) she began to use the term "*panana*" not only to call her grandfather but also to indicate that she wanted something, even when he was not present. She would indicate what she wanted by saying its name, give a definite grizzle and add "*panana*." At 1 ; 6 (9) she even said "*panene*" when she was finding it boring to be washed ; "*panene*" was merely an indication that she wanted something to amuse her.



Also at about 1 ; 6 the word "*papeu*" was used to mean "gone away" and was applied to people going out of the room, vehicles going away, matches that were blown out. At 1 ; 6 (11) she even used it of her own tongue which she had put out and then put in again.

OBS. 101 (*b*). L., at 1 ; 3 (4), said "*ha*" to a real cat and then to a toy elephant, but not to a hen or a horse. But at 1 ; 3 (19) "*ha*" was applied to the horse as well as to her toys. At 1 ; 6 (25) "*ha*" had become "*hehe*" and referred to all animals except the cat and the rabbit, to all kinds of people and even to her sister. The rabbit was "*hin*" and became identified with the cat, for which the same term was therefore used.

At 1 ; 3 (14) L. said "*no*" not only when she was refusing something but when she failed to find something she was feeling for. The transition between the two senses was the "no" applied to a forbidden object. Similarly the word "*avoua*" a corruption of *au revoir*, referred to people going away, herself going out of a room, touching a door or merely getting up from her seat.

OBS. 102. T., at 1 ; 0 (0), said "*tata*" for all successful actions, *e.g.*, getting hold of a toy with a string on it, or finding an adequate response to an attempt at imitation.

At 1 ; 2 (22) he cried "*Mummy!*" when his mother, who had been with him for more than an hour, began to swing to and fro. This was therefore an exclamatory appreciation of unsuspected powers on the part of his mother. At 1 ; 2 (23) he said "*daddy*" to J. who held out her arms to him like his father. The same day he used "*daddy*" in reference to a male visitor and to a peasant who was lighting his pipe (though he never referred to him thus in the usual way). For several weeks after 1 ; 3 (2) "*mummy*" was used, like "*panene*" in the case of J., to indicate that he wanted something. At 1 ; 4 (4), for example, he said "*mummy*" as he pointed to what he wanted, even when he was referring to his father or to some other person. Also at 1 ; 6 (23) he said "*mummy*" to his father as he pointed to a lamp that he wanted him to light and put out (although it was only his father who ever played this game with him). At 1 ; 4 (10), however, he said "*mummy*" when he gave his mother a piece of paper and also when he saw her clothes in a cupboard. Similarly, he said "*daddy*" at 1 ; 4 (23) when he saw his father shaving, also a few days later, when his father was swinging him, and then when he saw his father's rucksack. At 1 ; 4 (29), when one of my friends was there, and I asked him "Who is it?" he replied "*daddy*," pointing to him. At 1 ; 5 (19) "*daddy*" referred to any man who was from fifteen to twenty yards away, and at 1 ; 5 (25) to men in general.

At 1 ; 2 (24) he said " *bow-wow* " to a dog (as he had already done during the preceding days), but also to a hen, a cow-bell, cows themselves, guinea-pigs and a cat. At 1 ; 3 (5) he even said " *bow-wow* " to anything moving, from an ant to a tractor in a field. At 1 ; 3 (13), however, there was a differentiation: the cows, a deer's head and a stag's antlers became " *moo* " (although sometimes the antlers were still " *bow-wow* "), the cat became " *pussy* " and pigs wandering about were either " *moo* " or " *pussy*."

At 1 ; 4 (22) *ali* (the pillow) became an expression of achievement (like *tata* at 1 ; 0). At 1 ; 4 (23) he said " *nono* " while closing his eyes in an effort to make a lamp go out and come on again, but at 1 ; 5 (30) " *nono* " was used in reference to all his dolls (who slept when he was not playing).

At 1 ; 5 (19) " *no more* " meant going away, then throwing something on the ground, and was then used of something that was overturned (without disappearing). He thus said " *no more* " to his blocks. Later " *no more* " merely meant that something was at a distance from him (outside his field of prehension), and then it referred to the game of holding out an object for someone to throw it back to him. At 1 ; 6 (23) he even said " *no more* " when he wanted something someone was holding. Finally, at 1 ; 7 " *no more* " became synonymous with " begin again."

In spite of their trivial character, these examples are deserving of careful examination. At this stage, they are, with respect to purely sensory-motor schemas, in the same relation as the first symbolic schemas are to practice play, and the first forms of deferred imitation to immediate imitation. In other words, these first verbal schemas are intermediary between the schemas of sensory-motor intelligence and conceptual schemas, just as symbolic schemas are intermediary between practice play and ludic symbols abstracted from the child's own activity, and as deferred imitation is intermediary between sensory-motor imitation and representative imitation. Moreover, the words applied by the child to these schemas are themselves intermediary between symbolic or imitative signifiers and true signs.

Can these first verbal schemas be in fact compared to true concepts ? At the level of concrete logical operations (*i.e.*, as early as the age of seven or eight), concepts are either systems of classes, sets of objects grouped according to relations between wholes and parts, or systems of particular relations grouped according to their symetrical or asymetrical nature. But in all cases, the relations in question are determined by the qualities of the objects composing the groups, whether or no the child himself and his own activity are also involved. Now, whereas in the observations relating to later levels we shall see the beginning of the elaboration of such concepts, it is clear that the schemas described in obs. 101 and 102 do not correspond to this structure. On the contrary, they are characterised by the fact that



the principle for grouping of objects under one heading is only partially determined by direct assimilation of the objects one to another owing to their objective qualities, and involves also assimilation of the objects to the point of view of the subject (this often being the predominating element) : *e.g.*, the spatial situation in which the child finds himself, or the repercussion of the objects on his own actions. Thus for J. the semi-verbal sign " tch tch " was applied to anything that appeared and disappeared when she was looking out of a window (trains, cars, etc.) as well as to her father playing bo-peep with her. The sign " bow-wow " referred not only to dogs and similar animals, but to anything she saw from the balcony from which she had seen the original dog. " Panana " (a corruption of grandpa) referred to her grandfather but was also used to express a desire for something her grandfather would have given her had he been present. As for the words " mummy " and " daddy," which are often considered to be the first words used by children, their complexity is obvious. We are all familiar with the generalisation of " daddy " to apply to all men. In the case of J., " mummy " was also applied, though more rarely, to all kinds of women. But these terms are most frequently used to refer to particular actions which interest the child or are connected with him in some way. For T., " daddy " was anyone who lit a pipe or who stretched out his arms as his father did (in this particular instance it was his sister J.), and " mummy " became a term expressing a desire for something and a word of command to get his father to do something. Generalisation may also occur from the point of view of the child himself. Thus one day T. used " daddy " to refer to any men who were fifteen to twenty yards away and who were walking (as distinct from those who were motionless) and only later included all men like his father in this class. Moreover, " mummy " and " daddy " may be used to emphasise some action done in an unusual way by the parents. It is clear that these words, far from denoting merely singular classes and being proper names, as the statistics of Mrs. Buhler (*Kindheit u. Jugend*, pp. 149-150) suggest, really represent complex schemas of actions, either related to the subject or partly objective. Similarly, the zoological classifications of L. (" ha " and " hin ") and of T. (" bow-wow," " moo " and " pussy ") indicate, by their uncertainty, that they referred much more to systems of possible actions than to objects. Schemas such as " papeu " (*i.e.*, gone) in the case of J., " no more " in the case of T., and " avoua " and " no " in the case of L., as well as " tata," " ali " and " nono " are evidently only schemas of actions which are as much subjective as they are objectively classified.

Thus these first verbal schemas are merely sensory-motor schemas in process of becoming concepts ; they are neither purely sensory-motor schemas nor clear concepts. They are still essentially sensory-

motor, in that they are modes of action capable of generalisation and of application to an increasing number of objects, but they partake of the concept in that there is already a partial dissociation from the child's own activity. Moreover, since they are expressed by verbal phonemes through which they are related to the actions of others, they involve the element of communication characteristic of the concept.

Although these verbal schemas are an indication of development in the direction of the concept, it must be noted, even from this second point of view and irrespective of their character as schemas of action, that two peculiarities still considerably restrict their evolution in this direction and remind us once again of the sensory-motor schematism of stage VI, but this time on the new plane of concepts in process of formation. Firstly, the concept implies a fixed definition, corresponding to a stable convention which gives the verbal sign its meaning. The meanings of words do not constantly change, because the classes and the relations they denote involve a conceptual definition determined once for all by the social group. But the meaning of a term such as " bow-wow " in the case of J. changed in a few days from dogs to cars and even to men. The method by which one object is related to another is therefore different in the case of the true concept from that of the intermediary schema of this level. In the case of the concept, there is inclusion of an object in a class and of one class in another, whereas in a schema such as " bow-wow " and the others, there is merely a subjective feeling of kinship between the related objects, a kinship which is the forerunner of the " participations " which we shall show to be characteristic of the preconcepts of the next stage. Secondly, the first words used, " bow-wow," " daddy," precede " signs " properly so called, *i.e.*, the inter-related elements of an already organised language. They are still intermediary between the individual symbol or imitative image and the sign which is properly social. They still have, indeed, the imitative character of the symbol, either because they are onomatopoeic (imitation of the object indicated), or because they are an imitation of words used in adult language, but which are abstracted from it and imitated in isolation. But more especially as we have just seen, they still have the disconcerting mobility of the symbol, as distinct from the fixity of the sign

Hence we find all the intermediaries between these semi-concepts expressed by semi-signs and ludic symbols. For instance, when a child denotes a design on a rug by the term " bow-wow " (J. in obs. 101), is it a case of conceptual classification by means of a sign, or of construction of a ludic symbol merely accompanied by language ? Here are some examples of the transition between symbols in the strict sense and the semi-concepts of obs. 101 and 102.



OBS. 103. At 1 ; 6 (10) J thought she saw a fish (*cf.* her celluloid gold-fish) in the marks on the wooden ceiling, and she said " *frog* " when looking at a mark on the wall. At 1 ; 8 (20), seeing similar marks in the woodwork of a chalet, she pointed to a mule, a boy, a dog and a cat, and almost every time she added " *gone*," either because she was playing, or because she stopped seeing them, or even perhaps because she wanted to indicate that they were not real. Similarly, at 1 ; 9 (0) she saw a " *pussy* " in the pattern of a dress and then said " *gone*." At 1 ; 10 (1), on seeing the moon, she spontaneously said " *lady*," without laughing and without the comparison ever having been suggested to her either by words or pictures. Moreover, she added " *bell*," referring to the one that hung over the door of the chalet.

At 2 ; 0 (26), however, when she was watching her food being diluted with milk in a bowl, and said, " *look, dog, bird*," etc., she definitely laughed.

It is clearly almost impossible to determine whether these identifications are purely ludic symbols, as they tend to be at the age of 2 ; 0, simple comparative judgments based on imitative images, or judgments of conceptual assimilation. Probably they cannot be classified, precisely because they are intermediary between these three terms. Being at one and the same time symbolic, imitative and conceptual, they enable us to understand in retrospect the nature of the identifications of obs. 101 and 102, which also, though their proportions are different, represent intermediate stages between the symbol and the concept.

## § 2. " *Preconcepts* "

This being the position towards the end of the development of sensory-motor intelligence, how will the first verbal schemas, which as we have seen are half-way between sensory-motor schemas (adapted, imitative or symbolic in varying degrees) and conceptual schemas, evolve in the direction of the latter ? Obviously, since conceptual schemas are related to the system of organised verbal signs, progress in conceptual representation will go hand in hand with that of language. Once he is in possession of the semi-signs described in obs. 101 and 102, the child will quickly learn to speak, his progress following the lines with which Stern's investigations have made us familiar, word-sentences, sentences of two words, and complete sentences which soon come to be linked one with another. This brings us to the second phase of the development of representation, corresponding to stages I and II of Chapter V. But there still remains the problem of discovering in what way language makes possible the construction of concepts, for the relationship is naturally reciprocal and the capacity for constructing conceptual representations is one of the conditions necessary for the acquisition of language.

The first use of language is mainly in the form of orders and expressions of desire. As we have seen in the preceding examples, the act of giving a name to an object is not merely that and nothing more, but the statement of a possible action. At this level, the word does little more than translate the organisation of sensory-motor schemas to which it is not indispensable. The first question is to discover how the child proceeds, from this language which is coupled on to an immediate, present action, to the construction of true verbal representations, *i.e.*, to recognition-judgments and not merely to judgments of action. Recounting, which according to P. Janet is the beginning of memory, seems to be an essential intermediary here, since it is a means both of evocation and of reconstruction, and it is worthy of note that the child begins to recount precisely at the border-line between the preceding stage and the phase we are now analysing, and that his accounts are given to himself as well as to others.

OBS. 104. The first time we had verbal evidence of recall in the case of J. she was talking to herself. At 1 ; 7 (13) she was in bed in the evening when it was quite dark, and was sitting up talking to herself, unaware that I was listening. "*Look, look, uncle G., aunt A., uncle G.*" Then she stopped and lay down, saying to herself "*Nono.*" After that she sat up and began again: "*Look, mummy, daddy, grandma, uncle G.*, etc.", going on for fully ten minutes. At 1 ; 7 (14), while she was having her nap (and again thought she was alone), she went through the list of food she had just had, then moved the forefinger of her right hand an inch or so away from her thumb and said: "*Little Istine*," an allusion to a cousin who had just been born.

At 1 ; 7 (28) J. told her mother about a grasshopper she had just seen in the garden: "*Hopper, hopper jump boy*," meaning that the grasshopper jumped as a boy had made her jump. A boy cousin had in fact made her jump two days earlier. At 1 ; 11 (11), after she had been on a visit she said to me: "*Robert cry, duck swim in lake, gone away.*"

L., on the other hand, began giving an account of something to others and to herself on the same day. At 1 ; 11 (28), a few minutes after it had happened she said: "*Auntie Madaine in car, gone in car.*" Then, an hour later, when she was alone in the garden, she said to herself: "*Mummy gone, Jacqueline gone with mummy.*"

These behaviours are an illustration of the turning point at which language in process of construction ceases to be merely an accompaniment to an action in progress, and is used for the reconstitution of a past action, thus providing a beginning of representation. The word then begins to function as a sign, that is to say, it is no longer merely a part of the action, but evokes it. Then and then only is the verbal schema detached from the sensory-motor schema and



acquires, as the imitative schemas of the same level have already done, the function of re-presentation, *i.e.*, of new presentation. Moreover, whereas imitation can only reproduce the action as such, either externally by miming or internally by the image, in the verbal account there is in addition a particular kind of objectivation peculiar to it and connected with the communication or socialisation of thought itself. But the verbal account is still only the reconstitution of an action. A further step is taken in the transition from expression of actions to recognition in the strict sense, when the verbal account is continued into the present, brought up to date as it were. It then still accompanies the action in progress, as did the original language, but it describes the action instead of being an integral part of it. Description thus becomes present representation, since it is at the same time present perception and perception with respect to the past. The best indication of progress in conceptualisation is therefore the appearance of the question "what is it ?" which involves both the name of the object and the concept (the class to which it belongs).

OBS. 105. At about 1 ; 9 and 2 ; 0 J. felt the need to introduce things and people by name to anyone who came into the room: "*Daddy, mummy, nose* (of he doll), *mouth*, etc." She would often bring a doll to her parents and say "*little man*," or bring some object, calling it by its name, "*stone*" for instance, as if she wanted to share her knowledge. Then she would bring anyone who was there into what she was doing, pointing things out, and saying what she was doing while she was doing it. But she behaved in exactly the same way when she was alone, and oddly enough it was during one of her monologues that we observed her first "*What's that?*" At 1 ; 9 (24), for example, I heard her say to herself: "*What's that, Jacqueline, what's that? . . . There* (knocking down a block). *What's falling? A block* (then touching a necklace). *Not cold*," etc.

It is obvious that this kind of verbal account, with its denominations and descriptions, necessarily involves a split in the sensory-motor schema, since to the schema inherent in the action there is added a representative schema which translates it into a kind of concept But it must not be forgotten that both in the field of deferred and representative imitation and of symbolic play a similar split has already occurred without the resulting representations thereby becoming concepts. How then are we to be sure that the nouns used in obs. 105 really represent concepts and not still merely internal images, more individual than a class and with a greater load of individual symbolism than an objective notion ? The concept is general and communicable, the image is singular and egocentric. Now the language of the child at this level is still, in fact, half-way between communication with others and the egocentric monologue:

verbal accounts, descriptions and even questions are addressed by the child to himself as much as to others.[1] Socialisation at this stage therefore amounts to no more than lack of differentiation between the ego and others and is not yet an exchange based on clear differentiation. May it not therefore be that the conceptualisation corresponding to this egocentric language is also intermediary and undifferentiated, and that the first apparent concepts, or "preconcepts," partake both of the sensory-motor schemas which give rise to them and of the imitative images or ludic symbols to which they are akin in that they are only partially socialised representations?

Let us now consider from this point of view the use made between the ages of two and four of the verbal schemas which seem to be nearest to what the concepts of a later stage will be, *i.e.*, operational. We find one constant characteristic of the "preconcepts" of this age which seems to be decisive: the child at this stage achieves neither true generality nor true individuality, the notions he uses fluctuating incessantly between the two extremes—which also happened in the structure of sensory-motor schemas and of the imitative or ludic symbols to which they gave rise.

OBS. 106 (*a*). At 2 ; 2 (12) J. was in the garden walking on the landlord's flower-beds. Her mother stopped her from doing so and J. at once replied: "*Me spoil uncle Alfred's garden*," *i.e.*, she was identifying this situation with another, very similar, but which she had experienced in another town and in the garden of an uncle who had no connection with the landlord in question.

At 1 ; 11 (0), on coming in from a walk, J. said that she was going to see: "*Daddy, Odette and Jacqueline in the glass*" as if "Jacqueline in the glass" was someone other than herself (although she could recognise herself very well in a mirror). Again at 2 ; 7 (12), seeing L. in a new bathing suit, with a cap, J. asked: "*What's the baby's name?*" Her mother explained that it was a bathing costume, but J. pointed to L. herself and said: "*But what's the name of that?* (indicating L.'s face) and repeated the question several times. But as soon as L. had her dress on again, J. exclaimed very seriously: "*It's Lucienne again*," as if her sister had changed her identity in changing her clothes.

At 2 ; 11 (13) J. saw a photograph of herself asleep on my back and leaning against my shoulder (during a mountain walk). She asked anxiously: "*Oh, what's that?* (pointing to herself). *I'm afraid of it.*—But who is it? Can't you see?—*Yes, It's me. Jacqueline's doing this* (imitating the action). *So she's not afraid* (projection on to the photograph)." An hour later she saw the photograph again: "*I'm still a little bit afraid.*—But who is it?—*It's me. It's Jacqueline doing this* (imitating)." The next day, when she woke up, J. asked: "*Can Nonette* (L.) *shut her eyes?*—Of course.—*So when Nonette is big* '*Jacqueline doing this*' (pointing to the photo) *she'll be able to shut her eyes.*" In other words "J doing this" was a person that one became when going through a certain stage and that L. would become in her turn. Similarly, when I showed J. another photograph of herself she said: "*It's Jacqueline.*—Is it you or not?—*Yes, it's me, but what has the Jacqueline in the photo got on her head?*"

[1] Charlotte Buhler (*Kindheit und Jugend*, p. 163) objects to this view, but like many other authors who disagree with us on this point she uses the term "egocentrism" in quite a different sense from ours.



OBS. 106 (*b*). On the other hand, L. at 2 ; 4 (28) was looking at a photograph of J. when she was younger. "*Who is it?* It's J. when she was small.—*No, it isn't.*—Isn't it J. when she was small?—*Yes, when she was Lucienne.*"

As an illustration of the reality attributed to pictures, L., at 2 ; 8 (14), said spontaneously: "*It's very heavy* (a picture book) *because there's a little girl in it.*"

At 3 ; 2 (20) we passed a man: "*Is that man a daddy?*—What is a daddy?—*It's a man. He has lots of Luciennes and lots of Jacquelines.*—What are Luciennes?—*They're little girls and Jacquelines are big girls.*"

At 4 ; 2 (20) L. thought the mists forming over our heads in an Alpine valley were those of quite another place where she had been six months earlier. At 4 ; 3 (0) also, seeing a mountain stream in a village: "*It's the same one we bathe in* (in another village).—But where does it come from? Look! (we could see it coming down from the mountain) —*From the stream we bathe in.*—And the stream we bathe in?—*From that one.*"

OBS. 107. J. at 2 ; 6 (3): "*That's not a bee, it's a bumble bee. Is it an animal?* But also at about 2 ; 6 she used the term "*the slug*" for the slugs we went to see every morning along a certain road. At 2 ; 7 (2) she cried: "*There it is!*" on seeing one, and when we saw another ten yards further on she said: "*There's the slug again.*" I answered: "But isn't it another one?" J. then went back to see the first one. "Is it the same one?—*Yes*—another slug?—*Yes.*—Another or the same?—. . ." The question obviously had no meaning for J.

At 3 ; 3 (0) J. was playing with a red insect, which disappeared. A quarter of an hour later when we were out for a walk we tried to look at a lizard, which darted away. Ten minutes afterwards we found another red insect. "*It's the red animal again.*—Do you think so?—*Where's the lizard then?*"

At 3 ; 3 (27): "*Are little worms animals?*"

OBS. 108. J. at 3 ; 2 (23) could not understand that Lausanne was "all the houses together" because for her it was her grandmother's house "Le Crêt" that was "*the Lausanne house.*" For instance, talking about a lizard climbing up the wall she said: "*It's climbing up the Lausanne house.*" The next day I wanted to see if my explanation had been understood. "What is Lausanne?—*It's all these houses* (pointing to all the houses round). *All these houses are Le Crêt.*—What's Le Crêt?—*It's granny's house, it's Lausanne.*'

" All these houses " thus constituted a complex object depending on one of its elements which was seen as representing the whole.

Similarly, at 4 ; 2 (8), L. did not understand that some pennies removed from a group of pennies formed part of the whole.

These are very characteristic examples of pre-conceptual structures between the ages of two and four, and they link up with many of the observations we had made earlier of children from four to four and a half.[1]

On the one hand, the particular objects involved in the child's thought have less individuality, *i.e.*, they are less identical with themselves, than in the later stages. For instance (obs. 106), a particular garden was identified with another: J. refused to accept the identity of her sister L when she was wearing a bathing-suit and then said, " it's Lucienne again," when she was wearing her dress again; J. separated herself, according to the images she saw of herself, into " J. in the glass," " J. doing that," and " J. in the photo." In a word, the same individual can be composed of distinct persons, according to the clothes worn or the images presented in a mirror or a photograph. In the same way, L. (obs. 106 (*b*) ) thought that her elder sister J. had been a Lucienne, and that little girls were Luciennes before becoming Jacquelines. The essential character of these beings is thus not their identity through time, but the distinct successive stages through which they pass in changing character.[2]

But on the other hand, classes are less comprehensive than they will be later, a class being a kind of typical individual reproduced in several copies. Slugs (obs. 107) are all " the slug " reappearing in various forms, and the same is true of " the red animal," with the interesting addition that once it had been connected with the lizard it was expected to be accompanied by the lizard when it reappeared.

These two characteristics, absence of individual identity and of general class, are in reality one and the same. It is because a stable general class does not exist, that the individual elements, not being assembled within the framework of a real whole, partake directly of one another without permanent individuality, and it is the lack of individuality in the parts which prevents the whole from becoming an inclusive class. Thus, as it is still half-way between the individual and the general, the child's preconcept constitutes a kind of " participation " (in the sense of Lévy-Bruhl), this relationship being defined as follows: absence of inclusion of the elements in a whole, and direct identification of the partial elements one with another, without the

[1] See in *The Child's Representation of the World* the explanations of shadow and air; in *Judgment and Reasoning in the Child* and *La genèse du nombre chez l'enfant* the development of the notion of a part.

[2] We have here a further illustration of our earlier observations of the systematic lack of comprehension of the notion of time in young children (see *La genèse de la notion du temps chez l'enfant*).



intermediary of the whole. To take an example from earlier observations we made, a shadow thrown on a table was thought to come directly from the shadow of trees, without going through the general class of shadows which is defined by their law of formation.

Hence the importance of questions dealing with wholes and parts, *i.e.*, with the notion of inclusion, which gives rise to true concepts, questions, for instance, such as whether bumble bees and little worms are " animals " (obs. 107). For the child to be able to decide such a question, he would have to be able to unite the parts in a whole according to a reversible mode of composition, but the examples in obs. 108 are evidence of the difficulties he still experiences in establishing this kind of connection, even when he is dealing with a set of elements he can grasp spatially.

We shall now see how closely these preconceptual structures, without general classes or individual identities, are related, on the plane of cognitive representation or intelligent adaptation, to the symbolic structures of the ludic plane. What is, in fact, the difference between the act of taking one garden for another, or separating oneself into several characters, or reducing several slugs to one, and that of identifying in play one object with another and oneself with other people? Is it not merely that in one case there is belief and an effort at adaptation, and in the other there is only pretence and assimilation to the ego? Apart from this functional distinction, the preconcept and the ludic symbol both proceed by direct assimilation, without true identity or true generality, by prelogical " participation " and not by operations.

We find, moreover, between the ludic symbol, the imitative image and the preconcept, all kinds of gradations which are a continuation during this stage of the examples in obs. 103 and which fluctuate between " active analogy " and simple concrete comparison.

OBS. 109. At 3 ; 6 J. saw some little waves on a beach by the lake pushing little ridges of sand forwards and backwards, and exclaimed: " *It's like a little girl's hair being combed.*"

Again, at 4 ; 7 (26) she asked if syrup made with barberries was " *prickly syrup*," an example of " active " analogy. The same day, looking at the sunset: " *I'd like to go for a ride in the rays and go to bed in sheets made of clouds*," an example of a mere image. At 4 ; 7 (22) a thin piece of grass that had been slipped into a wider stalk gave rise to imitative images that were partly ludic and partly analogical. " *Look, it's spectacles in a spectacle case*," then " *It's an insect in its case* " (a reference to a caddis-fly she had seen in a stream), etc. A bent twig: " *It's like a machine for putting in petrol.*" A few days later, during a quarrel: " *Well, we'll leave one another then. Here's a wall that separates us* " (making a gesture with her hand to indicate an imaginary limit). Then: " *So I'm going back into the shell of that snail* " (though she did not know the expression " to

retire into one's shell "). The winding of a river: " *It's like a snake*," etc., etc.

This facility for thinking in images, together with the structural relationship we have just noted between the identifications of the ludic symbol and the preconcept, leads us to enquire whether there is not in the preconcept more of the imaged schema than of the true concept, which will be completely freed when it reaches the operational level. In the case of the ludic symbol, the given object is identified with various realities, thanks to the imitative images which serve as signifiers. In the case of the preconcept, the given object is also identified with others through a kind of direct participation. Now if a general class existed, this conceptual identification of objects one with another would merely consist in considering them as equivalents by reason of the fact that they were included in the same class, in which case the general class itself would serve as an operational schema of assimilation. The word or verbal sign would be the " signifier " of this schema and the imitative image would then be no more than an individual symbol supporting from within the collective sign. The image would thus remain quite distinct from the concept, since it would be reduced to the rank of mere signifier, in contrast to the signified content. But since, at this level, general classes functioning as operational schemas do not yet exist, and since there is direct assimilation of one object to another through these half-general, half-individual schemas which constitute preconcepts, the word or collective sign is still inadequate to the content of these egocentric assimilations. Therefore, although the image naturally already plays its part as signifier, it still keeps a function derived from its imitative origin (a function already noted in the case of the ludic symbol): it constitutes a partial substitute for the thing signified, through a kind of " adherence to the sign " typical of all primitive symbols. In fact, just because objects are directly assimilated one to another, the assimilating object becomes a kind of selected sample with respect to the object assimilated. Thus " the slug " is the prototype or representative of all slugs, while in a general concept all slugs are equivalent through their common abstract characteristics. Hence the particular image to which " the slug " corresponds keeps a much higher value, with respect to other slugs, than the equally particular image which serves as individual symbol to a child thinking in terms of the general class of slugs. Each of these two images consists of an individualised schema, *i.e.*, a schema accommodated to a particular object, but whereas in the case of the general class it is no more than a mere signifier, its relationship to the preconcept is much closer, since the preconcept itself is only a schema half-way between the individual and the general, depending on the existence of an individual prototype. In so far as the image is a signifier with respect to the preconcept, it represents the typical individual and



not just any object. In its two-fold quality as representative of the typical individual and as individualised schema, like the preconcept itself to some extent, the image is therefore more than a mere signifier of the preconcept. It is the representative of the object which serves as a substitute for all the others, and is thus itself a substitute of the second order.

In this sense, the preconcepts of this level can be considered to be still half-way between the symbol and the concept proper. Like the ludic symbol, the preconcept involves the image and is partially determined by it, whereas the concept, precisely because of its generality, breaks away from the image and uses it only as an illustration. To put it more exactly, since the operational concept achieves permanent equilibrium between assimilation of objects one to another and accommodation to each of them, accommodation is not continued as image, and the image itself, when it does come in, remains on a lower plane (as in the case of direct perception). Since in the case of the preconcept, on the contrary, there is assimilation to a selected object without generalised accommodation to all, accommodation to this specific object is necessarily continued as image when the child's thought is projected on to the others. The image intervenes as essential aid to assimilation, and therefore as privileged signifier, and to some extent as substitute.

During stage II, from the ages of four or five to six or eight, however, the various characteristics of the preconcept tend towards the operational concept, through the construction of a hierarchy of nestings, by means of which assimilation becomes mediate and generality is gradually achieved. Complete generality is only reached when operations become reversible, as we have shown elsewhere, but between the preconcept and the system of operationally connected concepts a gradual articulation of intuitive thought takes place. These articulated intuitions result in partial constructions, which are still linked with the perceptual configuration and with the image, but which are already logical within this restricted field. Here are some examples of cases of spontaneous inclusions, which contrast with the preconceptual structures, although they cannot be qualified, without further detailed examination, as articulated intuitions or as systems of operations.

OBS. 110. J. at 6 ; 7 (8) said. " *They're all called mushrooms, aren't they? Are fuzz-balls* (which we were looking for in fields) *mushrooms?* "

The same day, referring to a hamlet of four or five houses: " *Is that a village?*— No. It's still La Sage.— *Then it's part of La Sage?* " (*cf.* obs. 108).

At 6 ; 7 (9): " *The crows are afraid of us. They are flying away.* — Yes.—*But the blackbirds aren't afraid.* — No.— *They're the same family,*

*blackbirds and crows, so why are they afraid if they're the same family?*—But in our family you are never afraid now and L. is often afraid.—*—I'm not talking about J. and L. but about blackbirds and crows* (*cf.* resistance to simple analogical comparison in contrast to obs. 109).

We find in the above questions the use of the part-whole relation, either in connection with a collective object such as a village, or with abstract inclusions such as zoological classes. (N.B.—The characteristic use of the word "all" in "they're all called.") Hence implicit reasoning through inductive generalisation, in the example of the frightened crows, which brings us to the analysis of reasoning.

### § 3. *First reasonings: preconceptual reasoning (transductions) and symbolic reasoning*

It is interesting to discover that all the characteristics we have seen in the first concepts, from absence of generality to quasi-symbolic structure, are also to be found in the first reasonings. When it is a case of adapted investigation, we find simple, disinterested "transductions," while in the case of a social situation in which a desired action may involve distortion of reality, we find reasoning which is interested or tendentious (but not lacking in guile), or even symbolic reasoning, in which the combinations of images corresponding to the desires take strange forms.

We shall first give a set of examples, and then discuss them category by category:

OBS. 111 (*a*). The first examples of verbal reasoning [1] observed in the case of J. were of the following type.

At 2 ; 0 (7) J. had no inclination to go to sleep in the evening and called to her parents for a light and for someone to talk to. We went to her once to tell her to be quiet and warned her that we should not come again. She managed, however, to get us to go to her a second time, but understood that it was the last. After a long silence piercing screams were heard, as though something dreadful had happened. We rushed in and J. confessed that she had taken a toy from the shelf above her bed (which she was forbidden to touch at bed-time). She even looked really contrite, but everything was in its place and it was obvious that she had not touched anything. She had thus preferred to pretend she had done wrong and believe it, in order to get the light and the company she wanted, rather than to stay alone in the dark and have nothing on her conscience.

At 2 ; 0 (14) J. wanted for her doll a dress that was upstairs. She said "*dress*" and when her mother refused it, "*Daddy get dress.*"

[1] It is very difficult to agree as to the earliest examples of reasoning. Co-ordination of judgments passed with regard to the same situation, each of these judgments corresponding merely to a perceptive reading of it, cannot be called reasoning. Reasoning must involve judgments going beyond the field of immediate perception and connected with it by a bond of necessary subordination.



As I also refused, she wanted to go herself "*to mummy's room.*" After several repetitions of this she was told it was too cold there. There was a long silence, and then: "*Not too cold.*—Where?—*In the room.*—Why isn't it too cold?—*Get dress.*" Thus the judgment "not too cold," made to meet the need of the situation, was subordinated to the practical end in view. This is another example of what we called elsewhere sensory-motor reasoning (co-ordination of schemas for a definite end), but with the inclusion of representation which transformed reality and served as a means to attaining the end.

It should be pointed out that at this stage the child cannot yet rely on the promises of others, for the simple reason that it is still incapable of co-ordinating or even of conserving the representations involved. For example, at 2 ; 0 (13) J. was grizzling in her bath. I told her I would get her duck and she was pleased at the suggestion. But as I went out to get it she began to grizzle even more, as if she could not keep in mind the promise I had given her. In the case of the dress that was upstairs, however, the representations were kept in mind, because they had been arranged by the child herself to satisfy her need and without reference to reality.

OBS. 111 (*b*). At 2 ; 10 (8) J. had a temperature and wanted oranges. It was too early in the season for oranges to be in the shops and we tried to explain to her that they were not yet ripe. "They're still green. We can't eat them. They haven't yet got their lovely yellow colour." J. seemed to accept this, but a moment later, as she was drinking her camomile tea, she said: "*Camomile isn't green, it's yellow already. . . . Give me some oranges!*" The reasoning here is clear: if the camomile is already yellow, the oranges can also be yellow—a case of "active" analogy or symbolic participation.

OBS. 112 (*a*). We now have the first examples of recognitive reasoning as distinct from teleological or practical reasoning. At 2 ; 1 (13) J. wanted to go and see a little hunchbacked neighbour whom she used to meet on her walks. A few days earlier she had asked why he had a hump, and after I had explained she said: "*Poor boy, he's ill, he has a hump.*" The day before J. had also wanted to go and see him but he had influenza, which J. called being "ill in bed." We started out for our walk and on the way J. said: "*Is he still ill in bed?*—No. I saw him this morning, he isn't in bed now.—*He hasn't a big hump now!*"

At 2 ; 4 (16): When I was called and did not reply J. concluded: "*Daddy didn't hear.*" At 2 ; 4 (27) in the bathroom: "*Daddy's getting hot water, so he's going to shave.*"

At 2 ; 6 (24): "When you're big, we'll buy you a big bicycle.—*No, a little one.*—Why a little one?—*Like me. . . . I'm not big. You're big but I'm not big.*"

At 2 ; 6 (26) we went to look for "the slug" (see obs. 107): "Shall we see it to-day?—*Yes.*—Why?—*Because it isn't sunny.*" The next day: "Shall we see them?—*No, because it's sunny.*"

At 2 ; 9 (14): "*She hasn't got a name* (a little girl a year old).—Why?—*Because she can't talk.*" At 3 ; 2 (26): "*Granny says it's the sun that makes negroes black. Why aren't they brown then!*" (J. was sunbathing).

OBS. 112 (*b*). L. at 3 ; 1 (3): "*You're going to see mummy, so you're not coming to see me.*" At 3 ; 3 (12): "*You must have another little baby, then I'll have a little brother.*" At 3 ; 10 (24), looking at three chairs: "*I think that one* (the medium size) *is big enough for J., so Cl. can sit on that one* (the big one)." At 4 ; 2 (15) she learnt that an ornamented bodice formed part of the Bernese costume: "*Cl.'s Bernese girl hasn't got that, so she isn't Bernese.*" At 4 ; 3 (14): "*Why do people put on rubber suits when they go on motor-bikes?* —Because of the dust.—*So if we had a motor-bike you would have rubber clothes, but we have a car so you don't need rubber clothes.*" At 4 ; 3 (17), when she was on a mule: "Little girls who go on mules aren't afraid of motor-bikes. They aren't afraid of anything (to reassure her).—*No. When little girls are on mules like the men who ride motor-bikes, then they're not afraid of the motor-bike. But I didn't drive the mule. I was on daddy's knee, so I was afraid of the motor-bikes.*" At 4 ; 10 (21), an afternoon when she had not had her nap: "*I haven't had my nap so it isn't afternoon.*"

OBS. 113. Here we have J.'s reasoning between the ages of five and seven. At 5 ; 7 (12): "*Is Mr. S. a grandfather?*—Why?—*Because A. and L.* (his sons) *aren't big yet.*"

At 5 ; 8 (24): "*I've got two friends, Marécage and Julia. Marécage has two friends, Julia and Jacqueline. Julia has two friends, Marécage and Jacqueline. That makes three little friends.*" And at 5 ; 8 (6): "*You'll be the granny of godfather's children because you're their daddy's mummy.*" But at 6 ; 7 (13): "*Laurent has two sisters and a little brother* (himself)."

At 6 ; 5 (11): "*Why does Laurent do that?* (a kind of hiccup, which I imitated)—Just by chance.—*No, not by chance, because you did it first and he did it after* (a false premiss but sound reasoning)."

At 6 ; 7 (8): "*Do blue butterflies like the wet?* —Yes.—*And the brown ones? They like it to be dry. Then why are there some here with the blue ones?*"

At 6 ; 10 (0): "*The angel is like D., and D. is like T., so T. is like the angel too.*" Similarly L. at 5 ; 3 (26): "*E. is as big as you, I'm as big as you, so he's as big as both of us,*" but this was probably under the influence of J. (7 ; 8) who indulged in this kind of reasoning.

OBS. 114. We give here the only examples observed up to the age of seven of proofs or demonstrations:

J. at 2 ; 10 (4) showed me a postcard: "*It's a dog.*—I think it's a cat.—*No, it's a dog.*—Is it? Why? . . . Why do you say it's a dog? . . Why do you think it's a dog? *It's grey.*" *Cf.* this conversation at 2 ; 11 (7): "Is your doll's dress new?—*No, it's yellow.*—Is it an old one you've altered or a new one?—*It's new but it's yellow.*"



At 3 ; 11 (25): "*It's a horse, because it has a mane.*—Haven't mules got manes?—*Yes.*—Well then?—. . ."

At 4 ; 4 (2), looking at an iron bar: "*What's that stick, is it iron?*—Yes.—*Oh, yes, because it's cold, because it makes music* (hitting the ground with it)."

At 5 ; 7 (24): "Look what that ant is pulling. It's heavy.—*No, it isn't heavy.*—Oh, yes it is, for an ant.—*No, it's light. It's quite little and it's a bit of wood.*"

At 6 ; 3 (12) she thought her stuffed duck had lost one of its legs merely because she had put it on the ground. She tried the experiment for herself and saw that it did not lose its other leg: "*Then somebody must have trodden on it.*"

The first of these reasonings are very informative both as regards the connections between perconceptual and sensory-motor schemas, and the relations between preconceptual reasoning, or transduction, and symbolic or ludic co-ordinations. The reasonings of obs. 111 (*a*) are obviously closely related to the co-ordination of schemas of action that characterises sensory-motor reasoning. "If I do something silly, they will come and light the lamp and talk to me," and "if the room upstairs isn't cold, I shall be able to get the dress that daddy and mummy won't bring me," are the inferences. In one sense, they are a continuation, in a slightly more complicated form, of the practical co-ordinations of the baby of twelve to sixteen months, *e.g.*, rolling a watch-chain into a ball to make it go into a box, etc. In both cases, it is merely a question of achieving an aim and of finding adequate means for so doing. But on the other hand, there are two distinct differences between these reasonings which are both practical and verbal, and purely practical co-ordinations. In the first place, the child does not now confine himself to "reasoning by action" on what he sees and manipulates, but uses images and words to evoke the end in view and the means to be used. In the second place, and just because representation enables him to go beyond the perceptual field, he can distort the reality represented to suit his wishes, and subordinate it to the aim he wants to achieve. Although it is in its origin practical and teleological, like the simple sensory-motor co-ordinations, the child's first reasoning contains from the start the possibility of distortion, which also characterises symbolic or imaginative play. The interested auto-accusation of J. is in this respect an excellent example of both intelligent combination and what Stern has called "pseudo-lying" (Scheinlüge), *i.e.*, a made-up story which deceives the subject himself. P. Janet was accustomed to say that the discovery of lying marked one of the turning points in the intellectual development of humanity, and it is clear from what we have said that distortion of reality is a direct result of the first deductive constructions, and that it is as characteristic of the dawn of reasoning

as of ludic pretence and symbolic play, except for the degree of belief.

The relationship between these first reasonings and the symbolic thought at work in imagination is evident, not only in these semi-practical deductions, in which reality is distorted as in a game, but also in cases such as obs. 111 (*b*), where the child refutes an objection. It is assumed that the yellow colour of the camomile tea should entail the ripeness of the desired oranges, in the same way as there can be pretence that one object is another, except that here again it is not a question of pretence, but of belief.

Let us now consider the recognitive reasoning of obs. 112 (*a*) and (*b*). The reasoning of 111 (*a*) and (*b*) is influenced by desire, hence the continuity with practical sensory-motor reasoning and the relationship with symbolic or ludic thought. But what of reasonings of a recognitive or reflective character, which consist in relating recognition judgments one with another and drawing a conclusion not desired in advance? Careful distinction between the external or empirical truth of the conclusions and the internal or logical truth of the co-ordinations as such, shows that these recognitive reasonings, which will eventually become rational, operational connection, are at first only "mental experiences," a continuation, on the representational plane, of practical co-ordinations, and more particularly, that they remain for a long time intermediary between symbolic and logical thought, by reason of their preconceptual or transductive character.

It is well known that Stern described the first reasonings of the child as being inferences which proceed neither from the particular to the general nor from the general to the particular, but from the particular to the particular—in which case "transduction" would precede induction and deduction. As we have seen (§ 2), at the lowest levels of thinking, the child is equally incapable of attributing permanent individuality to particular elements and of constituting really inclusive classes. On the other hand, the classic definitions of induction and deduction are inadequate, since it is possible to have reasonings which follow a complete deductive pattern and yet only proceed from the particular to the particular (*e.g.*, the reasonings of the type A = B; B = C therefore A = C in obs. 113). Nevertheless, in the main, Stern's thesis holds good if we define transduction as an inference that is non-regulated (non-necessary) because it bears on schemas which are still half-way between the individual and the general. In other words, transduction is reasoning without reversible nestings of a hierarchy of classes and relations. Since it is a system of co-ordinations without nestings, through direct connection between semi-particular schemas, transduction will thus be a kind of mental experience continuing the co-ordinations of sensory-motor schemas on the representational plane. As the representations do not as yet constitute general concepts, but simply mentally evoked schemas of action, they will remain half-way between the imaged symbol and the concept proper.



This explains why in some cases transduction leads to correct conclusions, while in others the reasoning is false and incomplete. When the reasoning does not involve any reflective, intentional nesting, but merely practical schemas, *i.e.*, schemas generalised through previous actions and bearing on individual objects, transduction gives a right result, whereas when nestings of classes or compositions of relations are required, transduction fails, for want of a reversible operational mechanism.

Thus, in the following cases (obs. 112 (*a*) and two examples in 113), the reasons for the mistake are clear. The hunchback cured of his influenza no longer had a hump because the child identified the illnesses one with another, instead of distinguishing, in the general class of illnesses, the one that produced the hump and other possible ones. The bicycle that J. would have later on must be small, as if future heights were conditioned by her present height. The baby who could not speak had no name, through lack of dissociation between the point of view of the subject and that of the object. The father whose sons were little must be a grandfather, as if ages corresponded univocally to heights. T. had two sisters and a little brother who was himself, through lack of dissociation between the point of view of T. and that of J. herself. And in L.'s reasoning (112 (*b*)), an afternoon without a nap was not an afternoon, and a baby could only be a little brother. In each of these cases there is improper assimilation, either of the general class to one of its members, or of one point of view to another. And the reason why there is this assimilation of the particular to the particular, and not generalisation or reciprocity is obvious. The elements ignored in the reasoning (*e.g.*, the influenza in the case of the hunchback, the future height in the case of the bicycle, etc.), are assimilated to the elements "centred" by the child's thought (the illness which caused the hump, J.'s present height, etc.) merely because it is the latter which are the object of the child's interest, attention and activity, or because they characterise his present point of view, in a word, precisely because they are "centred." Thus the assimilation of the particular to the particular, characteristic of transduction, is distorting and irreversible in so far as it is centred, and will become logical and give rise to a hierarchy of nestings and reciprocities in so far as its decentration makes it reversible. When the element B is illegitimately reduced to the element A because A is centred, and the assimilation is therefore irreversible, we have transduction. When the elements A and B are assimilated one to the other in reversible fashion, and their reciprocal decentration leads to the formation of a class A + B which contains them both, we have

logical construction. The processes that constitute transduction are thus only a particular case of the general mechanism which characterise the whole development of the cognitive functions: the passage from centration of perception to decentration, and from egocentrism of thought to logical reciprocity.

In those cases where transduction leads to a correct conclusion, it is easy to see that this is due to the fact that the reasoning does not require new nestings (reflective and intentional), either because it is merely the application of a practical schema already generalised through earlier action, or because the simplicity or the nature of the compositions in question compels decentration. Thus when J. concluded that because there was no response " Daddy can't hear," or that a jug of hot water meant " he's going to shave," or when T. said " You're going to mummy, so you're not coming to me," etc., there is obviously no need for these judgments to imply general propositions which would be the implicit premisses of a formal deduction. They are merely practical schemas applied by mental experience. It thus often happens that the reasoning has all the appearance, verbally, of a logical deduction, with integration of particular cases in general classes or propositions, whereas in reality the generalisations in question are in no sense operational, being due merely to the empirical bringing together by the action itself of earlier experiences. For instance, the reasoning about the slugs which did not come out in the sun and did come out in the rain, belongs, in spite of its precision, to the same category as the ones we have already quoted, as is proved by what was said in § 2 about " the slug " as opposed to the conceptual class of slugs. In the same way, the seriation of the three chairs, which were made to correspond to the three little girls, of whom L. was one (obs. 112 (*b*) ), was clearly practical and intuitive, since all the elements were visible and there were only three pairs. On the other hand, the reasoning about the Bernese girl, the motor-cycle, and more especially the mule (obs. 112 (*b*) ), were perfectly logical, and depended on compositions that were new at the particular moment. But in the case of the first two of these, their very simplicity leaves little room for distorting centration, and in the case of the subtle reasoning about the mule, although L.'s fine distinction between the driver who was not afraid and the person driven who was, certainly does imply decentration between her point of view and mine, this decentration was unavoidable, since L. was replying to me and defending her point of view against my statement, in which the distinction had not been made.

The best confirmation of the part played in thought by centration and decentration, the one resulting in distorting assimilation and the other in coherent generalisation, and of their two-fold aspect, noetic (centration or decentration of interest and attention) and social (egocentrism and reciprocity), is to be found in the difficulty experienced by the child in finding a proof or demonstration of his remarks, *i.e.*, in justifying to others what seems obvious to him (obs. 114). Thus J. thought that an animal was a dog and not a cat because it was grey, as if that colour could not also apply to a cat ; or that a mane was an indication of a horse and not of a mule, or that " yellow " was the opposite of " new," or that a piece of wood was light for an ant because it was light for her, etc. And yet, when it was a case of proving to herself that a pole was made of iron, she managed to find much better reasons.



To sum up, it is clear that transduction, which is co-ordination without a hierarchy of nestings, remains half-way between practical reasoning, which is a continuation of sensory-motor co-ordinations, and truly logical reasoning. The schemas it uses are the product of assimilation that is direct and distorting because it is centred on the individual elements which interest the subject. It is this egocentric assimilation that is continued in the form of the ludic symbol, whereas the mental experience which constitutes the accommodation characteristic of transductive reasoning has as its signifiers the imitative images representing the elements centred by thought. Transduction is thus the result of an incomplete equilibrium between distorting assimilation and partial accommodation.

But between the ages of 4 ; 6 and 7 ; 0 (stage II) this equilibrium tends to be completed through relative decentration of assimilation and extension of accommodation. Thus we see in obs. 113 the appearance of co-ordinations some of which are still transductive, but which are tending towards reciprocity or towards seriation of relationships (*e.g.*, the reasoning about the three friends, the grandmother and the resemblances between three individuals), as well as towards construction of general classes and propositions. At the same time the need for verification becomes more definite, as can be seen in obs. 114 (at 6 ; 5). These various forms of progress influence and transform the ludic symbol and imitation, but between the ages of five and seven, it is still impossible to speak of operations properly so called, for lack of general " groupings " to stabilise and generalise these first connections, which are no more than the result of articulated intuitions and mark the transition from transduction to operational thought.

### § 4. *From sensory-motor intelligence to cognitive representation*

The facts we have just analysed show clearly that logical thought is not at once superimposed on sensory-motor intelligence with the appearance of language. We must therefore attempt to discover the links between the prelogical thought of early childhood and intelligence prior to language, as we did in the case of those between

symbolic play and sensory-motor practice play, and between representative imitation and sensory-motor imitation.

We have tried to show elsewhere that the schemas of sensory-motor intelligence constitute the functional equivalent of concepts and relations, and that sensory-motor assimilation is a kind of practical judgment, the co-ordination of schemas one with another being thus equivalent to sensory-motor reasoning. But obviously it is only a question of functional equivalence, which in no way entails structural identity. Between sensory-motor intelligence and conceptual intelligence, there are, in fact, four fundamental differences, which indicate how far the former falls short of being logical thought. 1. The connections established by sensory-motor intelligence link only successive perceptions and movements, without an overall representation dominating the states, distinct in time, of the actions thus organised, and placing them simultaneously in a complete table. For instance, the system of displacements involved in a behaviour such as the search for a lost object may be co-ordinated in a kind of experimental "group," but the only relationship is between successive movements and there is no representation of the system as a whole. Sensory-motor intelligence thus functions like a slow motion film, representing one static image after another instead of achieving a fusion of the images. 2. Consequently, sensory-motor intelligence aims at success and not at truth; it finds its satisfaction in the achievement of the practical aim pursued, and not in recognition (classification or seriation) or explanation. It is an intelligence which is only "lived" (an intelligence of situations, to use Wallon's expression) and not thought. 3. As its field is defined by the use of perceptual and motor tools, it acts only on real objects as such, on their perceptual indices and motor signals, and not on the signs, symbols and schemas related to them (concepts and representative schemas). 4. It is thus essentially individual, and lacks the social dimensions resulting from the use of signs.

If we accept the functional continuity between sensory-motor intelligence and conceptual thought, and also their structural dissimilarity, as defined by these four differences, four conditions, capable of being fulfilled simultaneously, would seem to suffice for the transition from one of these forms of intelligence to the other. 1. A general acceleration of movements, successive actions being merged into a mobile epitome of the action as a whole—the speeded-up film of the behaviour thus becoming interior representation, the draft or preliminary schema of the action. 2. An awareness of this abridged draft, a conscious unwinding of the film in both directions—the mere pursuit of a practical aim thus being replaced by recognition and explanation based on graded classification and seriation of relationships. 3. The addition of a system of signs to actions—construction of the general concepts necessary for this classification and seriation thus becoming possible. 4. The socialisation that goes with the use of these signs, individual thought thus being integrated in a common, objective reality.



These conditions can even be reduced to two: (A) a system of operations transposing exterior actions into mobile, reversible mental actions (conditions 1 and 2); (B) an inter-individual co-ordination of these operations ensuring both general reciprocity of points of view, and correspondence between the detail of the operations and their results (conditions 3 and 4). As to whether it is the construction of the operations, *i.e.*, their "grouping," which determines social co-ordination, or the converse, it is clear that the two processes are interdependent. A system of operations cannot be general unless these correspond term for term with those of others, but also socialisation of operations presupposes the possibility of their "grouping."

Having seen the functional continuity and structural dissimilarity of sensory-motor and conceptual intelligence, we can now examine by what means the child who speaks, imitates and plays will succeed in realising the *conditions* we have just defined. Will he do this all at once, as a result of "representation" being suddenly superimposed on "intelligence of situations"? Or will it be necessary for him, in spite of the functional continuity dominating all stages, to go through a new, slow structural evolution, corresponding on the new plane of representations to the one he has just completed at the sensory-motor level?

As a result of increased co-ordination of sensory-motor schemas—and hence of acceleration of movements and interiorisation of actions in the form of anticipatory drafts—the child is already capable, at stage VI, of representations, when there is equilibrium between assimilation and accommodation, of deferred imitation when there is primacy of assimilation. It is at this point that the acquisition of language becomes possible, and that words, or collective signs, enable the child to evoke schemas which have hitherto been merely practical. But is this evocation sufficient for the sudden, miraculous production of operations proper, the motor nucleus of reflective intelligence?

The preceding facts provide a decisive answer to this question. The first words are no more than a beginning of conceptualisation of sensory-motor schemas; they in no way complete it. Like the schema of action, the concept implies a complex interplay of assimilations and accommodations (conceptual assimilation being the judgment, and accommodation its application to experience). But in addition to accommodation to immediate, perceptual data, it obviously also implies a two-fold supplementary accommodation: (*a*) accommodation to all the data to which it refers outside the immediate perceptual field, or the field of immediate anticipations and recon-

stitutions which affect the action in progress; (*b*) accommodation to the thought of others and to their individual experiences. Moreover, in addition to assimilating perceptual and motor data (both of which are essential as a basis for operations), the concept must assimilate: (*a*) all other concepts in coherent systems (classifications and seriation); (*b*) the corresponding concepts of others. It is therefore merely a question of whether, as a result of language, sensory-motor assimilation and accommodation will automatically become operational assimilation and accommodation, thereby forming logical systems. These extensions of assimilation and accommodation, all of which are essential for the realisation of the four conditions for the development of conceptual intelligence, presuppose permanent equilibrium between the assimilating and accommodating processes. What, in fact, constitutes an operation such as uniting or separating, placing or displacing, arranging or disarranging, etc.? It is, on the one hand, imitation of possible transformations of reality [1] and therefore continuous, stable accommodation to experimental data. But on the other hand it is an action of the subject, an action which integrates the data to which it is applied, this assimilation having the peculiar feature of being reversible, *i.e.*, of linking objects one with another in such a way that movement in either direction is possible, instead of distorting them by reducing them to the activity of the subject. Now this reversibility is nothing else than the expression of the attainment of permanent equilibrium between generalised accommodation, and assimilation which has thereby become non-distorting. Reversibility is, in fact, the possibility of retrieving an earlier state of the data, which is not inconsistent with its present state (assimilation) and is as real or as realisable as that present state (accommodation). It is this mobile, reversible equilibrium that ensures the conservation of concepts and judgments, and that governs both the correspondence of operations between individuals (social exchange of thought) and the interior conceptual system of the individual himself. It thus becomes clear that there is some way to go between sensory-motor assimilation and accommodation and the operational processes that ensure both reversibility of individual thought and intellectual reciprocity between individuals. Indeed, assimilation and accommodation, which had arrived at a temporary equilibrium at stage VI of sensory-motor intelligence, are again dissociated on the plane of representation and language, owing to the intervention of new elements, extra-perceptual and social in character, which still remain to be assimilated and investigated. Before equilibrium can be restored on the representative plane, a road similar to the one just ended must thus once more be travelled.

[1] It was in this sense that F. Gonseth called logic a "physics of the arbitrary object."



This is, in fact, precisely what we can observe taking place throughout the second period (1 ; 6 to 7-8), but principally up to about 4 ; 0 or 4 ; 6 (stage I). Generally speaking, before the age of seven, we do not find any system of reversible, grouped operations, and only when there is "grouping" is there evidence of permanent equilibrium between assimilation and accommodation. Between the ages of four and seven (stage II), we find only a few intuitions capable of articulation (simple inclusions and intuitive co-ordinations of familiar relations) but without generalisation or reversibility. As for the period from 1 ; 6 to 4 ; 6 (stage I) which we have just studied in the preceding paragraphs, it is a striking fact that thought never achieves permanent equilibrium between assimilation and accommodation, but presents a sequence of partial, unstable equilibria, whose range explains the set of schemas varying from the ludic symbol and the imitative image to the preconcept, and also explains transduction.

The fundamental difference between sensory-motor equilibrium and representative equilibrium is that in the former, assimilation and accommodation are always in the present, whereas in the latter, earlier assimilations and accommodations interfere with those of the present. It is true that the sensory-motor schema itself is the past acting on the present, but the action is not localised in the past in the same way as, for instance, an evoked memory as distinct from a habit. What characterises representation, on the other hand, is that earlier accommodations persist in the present as "signifiers," and earlier assimilations as "signified." Thus the mental image, the continuation of earlier accommodations, intervenes as symboliser in both ludic and conceptual activity, thanks to which (and of course to the verbal, collective signs which accompany it in individual thought), present data can be assimilated to non-perceived, merely evoked objects, *i.e.*, objects that have taken on meanings provided by earlier assimilations. On the representative plane, accommodations are therefore two-fold: present (simple accommodations), and past (representative imitations and images), and the same is true of assimilations, which are present (incorporation of data in adequate schemas) and past (connections established between these schemas and others whose meanings are merely evoked, and not provoked by present perception).

In view of these differentiations, it is obvious that on the representative plane equilibrium cannot be immediately attained, and that the ground already covered on the sensory-motor plane must be covered again at the new level before complete co-ordination of the various differentiated processes takes place. Just as the assimilation of the sensory-motor stages begins by being centred on the child's own activity, and is gradually decentred during the course of this first period of development, so representative assimilation begins as a

process of centration, of which we saw examples in dealing with the preconcept and transduction, and which explains the initial irreversibility of thought. Confronted by various objects which he compares in order to arrange them in classes, discover their relationships, and combine the two in reasonings, the child who is on the threshold of the representative realm is incapable of putting at the same level present data and the earlier data to which he assimilates them. According to his interests and the object that drew his attention at the starting point of his actions, he centres this or some other element and assimilates the others to it. It is this irreversible assimilation which, as we have seen, explains the " participation " of preconcepts, which are neither truly individual nor truly general, and it also explains reasoning by transduction. Reversible assimilation, on the other hand, leads to the formation of real classes, *i.e.*, classes that are both general and based on the stable individuality of the elements, and to inductive and deductive reasonings. Moreover, precisely because one of the elements is centred as a prototype or representative sample of the set, the schema of this set, instead of achieving the abstract state that characterises a concept, continues to be linked to the representation of this typical individual, *i.e.*, to an image. Thus, corresponding to the irreversible and therefore incomplete assimilation of the preconceptual schema, there is accommodation which is also incomplete, being centred on one object of which it constitutes the image as " signifier " of the schema. Consequently, present assimilation continues to be distorting, and present accommodation inadequate, since they involve new objects and not the prototype; hence the instability of their equilibrium. The preconcept is thus related by a series of intermediary terms to the ludic symbol, in which present assimilation predominates over accommodation, and by another series of intermediate terms to representative imitation, in which accommodation predominates over assimilation. A similar relationship exists between transduction and symbolic reasoning or the coordinations of pretence on the one hand, and between transduction and mental experience or reproduction of an empirical development through the image, on the other. It is, moreover, unnecessary to emphasise that this irreversible centration of the first conceptual representations is mainly expressed socially as egocentrism of thought, since a concept centred on typical elements corresponding to the " lived " experience of the individual and symbolised by an image rather than by language, could neither be a general notion nor be capable of being fully communicated.

This then being the starting point of representative thought, it is clear that the initial processes can only find their equilibrium in the direction of decentration. A thought centred on one object to which it assimilates others cannot be in equilibrium, whereas by assigning an equal value to each in turn, the reciprocal assimilation born of decentration leads to stable equilibrium between present and past data. Accommodation to all the elements (present as well as past), which results from this same decentration, then ensures their individuality, and the reciprocal assimilation which unites them leads to the elaboration of general, abstract schemas, *i.e.*, of concepts, in the form of classes and relations. Decentration thus results in equilibrium between assimilation and accommodation, an equilibrium which of necessity tends towards a reversible structure.



It is not difficult to see, however, that between preconceptual thought on the one hand, and operational thought on the other, there is room for a certain number of intermediary terms, according to the degree of reversibility attained by the reasoning. It was these intermediaries that we described, between the ages of four and seven, as intuitive thought [1] which in its higher forms is reasoning that appears to be operational, but which is bound up with a given perceptive configuration. We saw, for instance [obs. 112 (*b*)], that L. was capable of assessing mentally the correspondence between three chairs of unequal size and three little girls of different heights. Between the ages of five and seven, the child is even capable of finding a one-one correspondence between sets of from six to ten elements, but in the case of these numbers, the correspondence requires the support of a figure or an imaged representation. Once the figure is destroyed (*e.g.*, two rows corresponding optically) the child ceases to believe that the two sets are equivalent, in spite of the fact that he has just recognised visually that they correspond term for term.

It is evident that in these articulated intuitions, the higher forms of intuitive thought, assimilation is still insufficiently decentred. As for accommodation, it is no longer linked to the image of an individual object, as in the preconceptual schemas, but it continues to be a source of images. As the general schema is not yet sufficiently abstract to acquire the reversible mobility of an operation, it does not give rise to accommodation that is the same for all possible situations, and therefore remains linked to a " configuration." But a configuration, which is by definition a structure involving a set of elements linked by a single total form, is still an image. It is therefore no longer the image of an object, but the image of a schema, an image which in intuitive thought is as essential to the existence of the schema as is the image of the typical individual object to the existence of the preconcept. Thus in intuitive seriations and inclusions, in the various cardinal and ordinal forms of intuitive correspondences, etc., either perception or the image of the configuration is indispensable to the thought. They are the last remains of the symbolic, imaged character

[1] *La genèse du nombre chez l'enfant* and *Le développement des quantités chez l'enfant*. Delachaux and Niestlé.

that we have found in all the initial forms of representative thought.[1]

It is, then, at the level of operational thought, and only at that level (period III), that assimilation becomes completely reversible, by reason of the fact that accommodation is completely generalised and is no longer translated into images. The image does of course persist, but merely as symbol of the operational schema, and no longer as an integral part of it. Thus a system of inclusions can be intuited by means of Euler's circles, or a series of numbers by means of a spatial figure, but there is free choice of representations, and the operation is independent of any particular figure of the chosen system, since it is essentially the expression of the transformation from one state to another, and no longer of the state as such. The figure is then no more than an illustration, which may or may not accompany the operational schema, which can only be adequately expressed by means of properly defined collective signs (language, or mathematical and logistic signs).

It is only at this point that the four conditions, described at the beginning of this section as being essential to the transition from sensory-motor intelligence to logical thought, are fulfilled. Operations are possible actions reduced to an anticipatory schema by which they are speeded up and become capable of a two-way movement; they are actions expressed by signs instead of being actually performed, and finally they are a guarantee of correspondence between individual points of view, which can acquire objectivity only through co-ordination.

[1] A special place must be reserved for geometrical intuition, to which we shall return in Chap. IX, § 6.

# CHAPTER IX

## FROM PRACTICAL TO REPRESENTATIVE CATEGORIES

HAVING examined the general evolution of thought from the sensory-motor schema to the concept, we shall now analyse this development with reference to the essential categories of causality, the object, space and time.

Once language has become instrumental, these categories evolve according to two distinct though more or less continuously related processes. On the one hand, they continue to develop in the field of practical manipulations, particularly in relation to the interaction of solids and liquids, and thus give rise to spatio-temporal constructions permeated at first with a variety of subjective elements (muscular force, personal perspective, etc.), but gradually becoming more and more objective. But on the other hand, the various causal and spatio-temporal connections extend beyond the field of action (distant space, effects of air and wind, etc.) and give rise, mainly under the influence of the " whys " and the questions as to origins, which become possible with language, to a multiplicity of spatial and temporal representations, and of apparently satisfying myths. These are questions that we studied in the past in *The Child's Representation of the World* and *Physical Causality in the Child*. It may be of interest to consider the problem in the light of spontaneous examples of the same kind observed in the case of our own children, and to relate it to the question of symbolic thought.

### § 1. *Myths of origin and artificialism*

It is noticeable that before the age at which the child can profitably be questioned (none of the children in the works quoted above was younger than four), numerous spontaneous myths make their appearance, myths that are half-way between ludic or imaginative symbolism and the investigation proper to intelligence.

OBS. 115. We have seen (obs. 101 and 102) the adult becoming an instrument for obtaining what the subject wants (" panana " in the case of J. and " mummy " in that of T.). In connection with this tendency we have evidence that natural phenomena are very early related by the child to adult activity.

At 1 ; 8 (12) J. was looking through the window at the mist forming on the mountain (200 yards away) and cried: " *Mist daddy smoke*," alluding to the smoke of my pipe. The next day, in the same situation, she merely said: " *Mist daddy*." At 1 ; 8 (14),