

PSYCHO-SOCIAL PERSPECTIVE ON COGNITIVE DEVELOPMENT:
CONSTRUCTION OF ADULT-CHILD INTERSUBJECTIVITY IN LOGIC TASKS

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Obviously the concepts used in psychology at the beginning of this century were directly influenced by the then pervasive ideas of the theories of evolution. Looking back to this period it can be seen how such ideas gave a very important impulse to the study of human behaviour. However several decades later, it would be well worth reviewing these concepts and either enlarging them (as seemingly suggested by the organizers of the present symposium through the consideration of "socio-genesis") or substituting new metaphors and concepts to the existing ones in order to draw attention to aspects of psychological reality that the preceeding perspective might lead to neglect. This presentation takes as stand-point the cross-road of these two lines of thought. Indeed in our opinion, suggesting new concepts (e.g. "intersubjectivity") can be fruitful for the advance of science mostly if it can simultaneously account for both the already known phenomena and for newly described processes.

The gradual introduction into psychology of the idea that mind, personality, mental disorders, etc. are the results of a gradual development starting in early infancy and not just "static" gifts of Nature opened the way for innumerable studies on the micro-evolution of behaviour. On a different level of reality but nevertheless with somehow similar epistemological assumptions, these studies echo the on-going research trends in the study of the macro-biophysical world (with the concepts used from Darwin's theory to the "Big Bang") and of the macro-sociohistorical reality (suppositions on the rise of Homo Sapiens, the growth of civilization from "prehistorical to "post-modern", economic development or "under-development", etc.). In all these most

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varied cases, some common elements recur, the most important being: evolution considered as progress; change as being not only quantitative, but also qualitative; and hypothesis on how one stage prepares for the next (constructivism). In nearly all cases the observers (in a quite understandable ethnocentric blindness) regard reality from their own stand-point taking for granted that their state is the present peak of development: other species of course are less developed, but often also other civilizations, social structures or cognitive stages. In fact the observers do not notice that in interpreting reality they introduce value judgements and perspectives that are closely linked with their own present involvement in larger debates and action plans. And the observers' action plans, of course, often differ from their subjects' ones.

When Piaget refers to "genesis" to describe the course of child development he does not only point to an evolution but much more precisely to an eclosion, to a growth. He wants to account not only for changes but even more so for qualitative structural transformations. And, in doing so, with this term "genesis" borrowed from the famous myth of Creation and in particular of the creation of the first human beings, Piaget tries to identify the very profound mechanisms (i.e. equilibration processes within interactive and constructive dynamics) that in his eyes tell something about the nature of psychological life, and perhaps even about life and reality in general. In his famous book "Biology and Knowledge", Piaget can even be seen, on some pages, to be stirred by the wonder of the "vection of life" that he feels to be revealed in the fine dynamics of biological evolution and cognitive growth that he studies.

The genesis of what? The classical Piagetian response is: the genesis in the individual beings of ever more powerful and stable regulative processes, the most advanced and adaptative ones being cognitive. The growth of cognition is then accounted for in terms of successive structures characterized by their formal logical power. Once developed they can be applied indifferently to the physical or the social world.

From there on, various researchers have undertaken studies on the

varieties of capacities and understandings that these structural progresses elicit in the child. Often these results have been grouped into areas of interest: logico-mathematical competence; understanding of the physical world; social cognition. Parallely cognitive stages have been tentatively connected with behavioural development in areas such as: socialization, moral judgement, etc. The risk has then been to consider too readily that all these aptitudes reciprocally influence each other (a possible understanding of the meaning of the concept of "socio-genesis") and in doing so, to forget the stand point of all this research that sets, at the start, a model of development, value-loaded by the observer, that a priori considers development as progress, formal logics as adaptative, stages as logical, the search of equilibrium as the dynamical cause, equilibrium as understanding, and all these processes as primarily located in the individual beings - within a micro-history that forgets the structuring influences of group and cultural processes. Although all these assumptions are interesting starting points for research (and indeed they have proved their heuristic value), they are not necessary nor the only possible ones. For instance, Vygotsky's partially opposite perspective can be seen as attending more importance to cultural mediations and interpersonal processes and then describing development as an external reality progressively interiorized by the subjects during their socialization. However Vygotsky's view, no more than Piaget, questions certain value-loaded characteristics of what he considers to be the final stages of development and the role of socialization agents, notably in defining what the cognitive and social tasks are and what are their solutions.

This contribution will present another starting point: stepping back from a normative definition by the adult of what a given task is about and what solving it means, methodological approaches will be described that permit observation of the social and cognitive processes in which subjects are involved in classical tests. It will be seen that the activity displayed by the individual child is the product of an interaction between his understanding of the situation and his adult partner's. Furthermore the understanding that might emerge is due to socio-cognitive processes whereby the adult and the child come to more

or less negotiate an intersubjectivity.

II. THE TESTING SITUATION AS A CONTEXT FOR DEVELOPING THE LOGICAL ABILITIES OF THE CHILD

By what logical and social process does a child acquire new logical abilities ? Is the answer a child gives when he is questioned on a logic problem the expression of cognitive abilities which he has already developed, or does it depend on the particular social context in which it was produced ? Does this context have a catalytic effect which will or will not allow the child's abilities to come be revealed, or is the definition of the context itself the result of an interpretation of the subject ? These questions concern firstly the epistemological status of the cognitive abilities of the child such as they can be perceived by an observer: are they preconstructed individually, or on the contrary do they develop hic et nunc in the testing situation ? Secondly the epistemological status of the social context: does it consist of a group of external factors which influence the subject's cognitive activity, or is it a subjective internal construction ? Let us note that these questions implicitly assume that cognitive development results from a bi-polar interaction between subject and object.

By confronting two lines of research to which we ourselves contributed (research on the role of social interaction between children, and research on the role of the social context in cognitive development) we propose to show in this chapter how we were gradually led to reconsider this bi-polar perspective, and to view development as the result of a tri-polar interaction between the subject, the alter and the task. Firstly a rapid presentation of the main results of the two lines of research mentioned will be given, then studies whose aim was to understand through what psycho-social processes the child constructs his/her responses will be presented. Finally we will examine how the two socio-cognitive processes mentioned, namely the socio-cognitive conflict and the construction of intersubjectivity, lead to the acquisition of a new logical competence.

1. The role of social interaction between children in cognitive development

Research in this field shows that in certain conditions the child can take advantage of an interaction session with a peer to restructure his/her answer, and give an answer which is more complex from a logical point of view. An interaction session can be beneficial individually, even when none of the children in the group has the correct solution to the problem : the fact that children have different perspectives on the solution to a problem is sufficient to generate a conflict known as socio-cognitive conflict because it is provoked by the peers' differing points of view and leads to a social confrontation between children. This socio-cognitive conflict may account for the positive influence of social interaction on cognitive development (Doise, Mugny, Perret-Clermont, 1975; Perret-Clermont, 1980; Doise and Mugny, 1984; Emler and Valiant, 1982; Gilly and Roux, 1984 among others).

Research describing the social context which allows a child to derive benefit from a social interaction session, has also showed that before the interaction session (pretest) individual performances are often correlated with social origin and/or sex of the children, with children of high socio-economical status performing better than children of low socio-economical level. However these differences tend to decrease or disappear after an interaction session. These results show that the cognitive behaviour of the subjects is likely to be modified during the experimental micro-history; in this respect they concur with results concerning how the social context affects the display of cognitive competence in children (Donaldson, 1978; Perret-Clermont and Schubauer-Leoni, 1981; Grossen, 1988).

The latest research in this field concerns not only the effects of the interaction session between children on their individual performances, but also the problem solving strategies used by the children (Zhou, 1988; Blaye, 1988) and the specific modalities of interactions between children. It seems that interactions in which there is a co-construction of the correct solution lead to greater individual progress. It appears that more individual benefit is derived when, during the interaction, the children

cooperate equitably by trying to understand each other's point of view (Bearison, Magzamen and Filardo, 1986; Light, Foot, Colbourn and McClelland, 1987; Taal and Oppenheimer, 1989).

2. The role of the social context in cognitive activity

Research in this field shows that the child's abilities vary according to the social context in which s/he is questioned. Different contextual dimensions operate such as the child's interpretation of the experimenter's actions (Donaldson, 1978; Light, 1986); the social rules governing the testing situation (see on this subject research on social marking: Doise, Dionnet and Mugny, 1975; Roux and Gilly, 1984; De Paolis and Giroto, 1987; Nicolet and Iannacone, 1988; Zhou, 1988); the institutional or formal context in which the task is submitted to the child (see for example Säljö and Wyndhamn, 1987; Carraher, 1989); the respective roles of the actors (adult or peer) with whom the child interacts (Schubauer-Leoni, 1986; Schubauer-Leoni, Bell, Grossen and Perret-Clermont, 1989; Schubauer-Leoni et al. 1989).

The results of the numerous studies undertaken show that the child's answers are very sensitive to a change in the presentation of a given task and that even a minute change in a classical Piagetian test, for example, is enough to alter the types of judgement given by the child. It also results from these studies that different subjects are likely to approach differently a given social context. Our own research has repeatedly revealed that the effect of a given social context is not the same according to the sex and social origin of the children and that these differences themselves vary according to the experimental micro-history (Perret-Clermont and Schubauer-Leoni, 1981; Grossen, 1988; Nicolet, Grossen and Perret-Clermont, 1988).

These results suggest that these different dimensions (grouped under the rather vague term of "social context") should not be simply considered as external variables. They do not only influence the child's cognitive activity, but contribute to define what the activity is about. In order to assess the child's cognitive abilities the experimenter must indeed construct a

"staging" of the task and of the encounter. The child's cognitive activity is therefore always a response to this staging and to what s/he interprets about its meanings and aims. It therefore seems difficult to affirm, as some authors have, (for example Donaldson, 1978; Bovet, Parrat-Dayana and Deshusses-Addor, 1981) that the child's real cognitive abilities are elicited by certain situations and that other situations are artificial and not representative of the child's real abilities. What are these "real abilities"? Can they be assessed in any other manner than via a concrete testing situation? And the latter is of course always "artificial" since it is constructed by the experimenter. All dialogues are constructed.

If the experimental situation is considered as indissociable from the child's abilities, then new questions arise. What does the child think of the testing situation with which s/he is faced? How does s/he perceive the experimenter's expectations? What is, from his/her point of view, the aim of their encounter? What is the nature of the problem put to him/her by the experimenter? Is his/her definition of the situation and of the task the same as that of the experimenter (Wertsch, 1984)? Such questions call for a change in the object of study and in the unit of analysis considered. It is thus necessary :

- a) to extend the study of the subject-task interaction to subject-task-experimenter interaction, i.e. to make the testing situation itself an object of study, which necessitates including the role and behaviour of the experimenter in the observations;
- b) to re-place the cognitive activity in the communication context in which the subject acts it out. It is then necessary to examine the meanings which the experimenter and the child, from their respective points of view, give to the situation and to observe how they negotiate a supposedly common definition of the situation and of the task.

To attain such objectives it was necessary to resort to different observation methods permitting an understanding of the meanings which the child gives to the situation.

Three methods were mainly used: the analysis of experimenter-child interactions during a Piagetian test, post-experimental

interviews and role-playing (Bell, 1986; Grossen, 1988; Grossen and Bell, 1988). A more detailed account of the research undertaken using this latter method is given below.

III. THE CONSTRUCTION OF INTERSUBJECTIVITY BETWEEN THE EXPERIMENTER AND THE CHILD IN A PIAGETIAN TEST: PRESENTATION OF AN EMPIRICAL STUDY²

1. Introduction

This research aimed at studying the way in which the child interprets the testing situation and how s/he sees the experimenter's expectations. This objective was not an end in itself, but rather a means of understanding the cognitive and social processes through which a child comes to demonstrate his/her logical abilities.

The method used consisted in asking children having just undertaken the Piagetian³ conservation of liquids test to assume the role of experimenter with a naive classmate.

2. Description of research

A) Population and procedure

The population consisted of 114 children aged between 6-7. The children were randomly assigned to two groups a) the role-players group (RP), made up of 57 children (27 boys, 30 girls); b) the naive classmates group, who were later questioned by the RP, made up of 57 children, (26 boys, 31 girls). The experiment took place in two stages:

- Stage 1 : The experimenter submitted each child in the RP group to the conservation of liquids test. Of the 57 RP questioned, 18 children gave non-conserving judgements during the three test

² The experiment was done by Michèle Grossen (Grossen, 1988, pp. 227-364).

³ This test was chosen because it has given rise to numerous discussions in scientific literature and because the theoretical reasons which determined its construction are very explicit.

items⁴ ("non conserving operatory level"), 23 gave judgements which were alternately non-conserving and conserving ("intermediate operatory level") and 16 gave conserving judgements ("conserving operatory level").

- Stage 2 : Immediately after Stage 1, each RP played the role of the experimenter with one of the "naive" classmates.

B) Analysis of data

Analysis of the role-playing⁵ concerned the reproduction by the RP of certain concrete characteristics of the situation, such as the equalization request, the conservation question, the justification demand, the counter-suggestion, the type of glasses used and the different types of transformations made (through pouring). On the basis of this first analysis four patterns of behaviour were established through which it was possible to assess the way in which the children define the task and the problem.

The three patterns observed will first be presented, and the links between these patterns and the judgements given by the RP in Stage 1 will be discussed. Finally we shall give the results concerning the RP definition of the situation.

3. Presentation of results

A. Definition of the task

Four patterns were established on the basis of the RP behaviour during their role-playing.

1) The RP defined the task as a question concerning the comparison of the juice level in two equal or different glasses

Two types of behaviour were observed among the 7 RP grouped in this category :

⁴ The test consisted of three sequences each composed of a "equalization item" of the quantities in two glasses of equal size and a "transformation item" during which the liquid contained in one of the glasses is poured into a different glass. A countersuggestion is made between the second and the third sequence. The experimenter asks the child to justify his judgements.

⁵ It should be noted that out of 57 RP only 3 were unable to play their role of experimenter.

- At the beginning of the role-playing, the RP took two different glasses and poured some juice into them at unequal levels. These RP did not reproduce the equalization phase in two equal glasses, and proposed directly the result of the transformation after transferring the liquid.

- The RP took two different glasses and asked their classmates to pour juice into them at equal levels. The RP seemed to confuse the equalization phase and the pouring phase, selecting only the equalizing of the levels from the first phase and the different shape of the glasses from the second.

In both cases the conservation question⁶ contained a non-conserving assumption of the type "Who has the least juice?" and the RP themselves gave non-conserving judgements during the role playing.

The 7 RP in this category appeared to see the task as a problem of evaluating the level of the liquid, which was not always seen as being the result of a transformation.

2) The RP defined the task as a problem of non-conservation of levels after transformation

The 21 RP in this category proposed one or several sequences consisting of an equalization phase in two equal glasses and a phase where the juice was poured into a different glass. The conservation question presupposed unequal quantities (e.g. "Is there a little more juice in your glass?") and the RP gave non-conserving judgements during the role playing. For these RP, the equalization phase could have different meanings: some of them for example considered that it was a problem that had to be resolved in itself and asked their classmates several times to improve the equalization of the levels of the liquid. One RP (a girl) even refused to tell her classmate to pour the same quantity of juice into the two equal glasses as if in doing so

⁶ The experimenter asked the child: Have we both the same thing to drink or do you have more or less to drink? What do you think?". The expression "the same thing" is use for "the same amount" but in French this wording cannot be understood by 6-7 year old children.

she would have already been giving her the right answer! The fact that the child did not necessarily consider the equalization phase as a premise to the conservation problem set by the experimenter but as a problem in itself is corroborated by an analysis of experimenter-child interactions in the same testing situation (Grossen, 1988, pp. 173-206).

The 21 RP in this category thus seemed to think that the problem set by the experimenter was to grasp the fact that after the liquid had been poured into a different glass the level of the liquid changed, i.e. to understand that there was non-conservation of the levels of the juice. For them it was as if the expression "the same thing" did not concern the quantity, but the level of the liquid.

3) The RP defined the task as a problem of quantity conservation

The 18 RPs in this category, as was the case for those of the previous category, reproduced equalization sequences in two equal glasses, followed by a transfer to a glass which was different. In this case their conservation question presupposed equal quantity as in the following example: "Have we got the same thing?" and they did not word the question in any other way. Out of these 18 RP, only 3 asked a conservation question which contained the three terms given by the experimenter ("same thing", "more", "less"). For relational reasons which will be examined later, four RP began by asking a conservation question which presupposed a non-conserving judgement and then asked a conservation question centred on equality. Furthermore, most of the RP gave conserving judgements to their classmates during the role-playing.

The behaviours of these 18 RP led us to think that for them the problem was to understand that regardless of the container, the quantity of liquid remained equal, i.e. their definition of the task seemed to be the same as that of the experimenter. In this case it was as if the object of the interrogation was to admit at all costs that the quantities were equal, regardless of what actually happened during the interaction: consequently some RP seemed to expect a conserving judgement even from their

classmates despite the fact that a large quantity of liquid fell outside the glass while it was being transferred !

4) The RP adopted a neutral attitude so that it was not possible to determine how they defined the task.

The 8 RP in this category did not themselves give a judgement to their classmate during the role playing ; neither did they give any arguments to confirm or refute the judgement(s) of their classmates. All these RP asked a conservation question such as "Have we got the same thing?" i.e. a question which seemed to presuppose a conserving judgement, except one RP whose question suggested alternatives.

These RP's behaviours concurred so closely with the experimenter's neutrality that it was difficult to determine how they defined the task, even though their conservation question could lead us to suppose that they belonged to the third category.

B. Relationship between the subjects' answers during step 1 and the definition of the task

What relationships exist between the subjects' judgements during Stage 1 (their "operatorial level") and their definition of the task such as it can be observed in their behaviour during the role playing ? The results showed that :

- of the 7 RPs who defined the task as a level evaluation problem, 5 were non-conserving and 2 were intermediate at Stage 1;
- of the 21 RPs who defined the task as a problem of non-conservation of the levels after transformation, 9 were non-conserving and 12 are intermediate at Stage 1;
- of the 18 RPs who viewed the task as a quantity conservation problem, one was non-conserving, 5 were intermediate and 12 were conserving ;
- of the 8 "neutral" RPs only one was non-conserving, 4 were intermediate and 3 were conserving.

The RPs' definition of the task seemed therefore to be closely linked to the judgements given in Stage 1 : All the RPs (except

one) who were non-conserving in Stage 1 defined the task as a problem of evaluation or non-conservation of the levels, whereas all the conserving RPs defined the task in the same way as the experimenter. Among the 19 intermediate RPs, 12 defined the task like the non-conserving RPs.

C. The definition of the situation

Concerning the definition of the situation, the analysis of the RP behaviour gives rise to three series of comments :

1) Most of the RPs did not reproduce an important characteristic of the role of the experimenter : her **neutrality**. The experimenter tried as far as possible not to judge the subjects' answers and a fortiori not to give them the expected answer. However it was observed that out of the 54 RPs in question, 41 (76%) gave one or several conserving or non-conserving judgements to their classmate during the role playing, accompanied more often than not by reasons in favour. In other words, these children gave their classmates the answer they thought to be correct.

2) Nearly all the RPs ended up by obtaining judgements from their classmates which concurred with their own definition of the task. Thus, all the RPs (except one) who defined the task as a level evaluation problem, or as a non-conservation problem obtained non-conserving judgements, whereas all the RPs (except four) who defined the task as a conservation problem ended up by obtaining conserving judgements from their classmates. Analysis of the interactions between the children showed that the RPs used certain questioning strategies to steer their classmates towards the expected answer, and that the latter used other strategies to obtain more information on the expected answer (Grossen, 1988).

3) Very often the RP assessed their classmate's answer by remarks such as "that's right" or "that's wrong"; gave them recommendations or orders which emphasized the asymmetry of their relationship ; or in some cases observed only with conserving children, misled his/her classmate concerning his/her expectations as if to ensure that s/he would afterwards be in a position to have to steer his/her classmate to the expected answer!

These three series of comments suggest that the RPs defined the testing situation as a didactic situation whose aim was to transmit knowledge to their classmates. The RP gradually guided his/her classmate towards what s/he considered to be the right answer, taking on the role of teacher. It even seemed that the RPs who defined the problem in the same way as the experimenter accentuated this "little teacher" behaviour by giving, more often than the other RPs, judgements or supporting arguments. These RPs seemed to use the knowledge with which they have been provided as an instrument which not only ensures them of their legitimate status of experimenter but also reinforced their power with regard to their classmates.

IV. The production of a logical ability as a social co-construction

This study showed that, faced with a situation having the same objective characteristics, the child and the experimenter did not define the task and the situation in the same way. Concerning the definition of the situation, it was noted that if for the experimenter the aim of the liquid conservation test was of course to test the logical abilities of the child, for the child on the contrary it had a didactic aim. This confirms the results of other studies (Elbers, 1986; Bell, 1986; Schubauer-Leoni, 1986; Grossen, 1988), and can be explained not only by the fact that the didactic situation is more familiar to the child, but also by the fact that the institutional scholastic context in which the study was carried out constitutes a frame which induces the child into giving a certain definition of the situation that in turn modulates the cognitive abilities which the child will display (see research by Monteil (1988) on the effects of social comparison on the performances of pupils in the scholastic context; Säljö & Wyndhamn, 1987; Schubauer-Leoni et al., 1989).

Concerning the definition of the task, our results showed that some of the implicit characteristics of the task gave rise to interpretations which differed between the child and the experimenter. This was the case for example :

1) of the equalization request which, as was shown in the analyses of experimenter-child interactions, can be interpreted by the child not as a premise to the problem (of conservation)

but as a problem in itself, which consisted of obtaining the most perfect equalization possible.

2) of the conservation question which could be interpreted as a question concerning liquid level (see also Bell, 1986), its transformation during pouring, or as other observations showed, could even concern the question of drinking the juice (Grossen, 1988).

Everything seems to take place as if, faced with a new situation, the child has to decipher the assumptions on which the experimenter implicitly bases his interpretation of the situation, i.e. make an identical categorization of the various elements which for the experimenter constitute "the task". The fact that in our study there was a link between the judgements given by the children in Stage 1 and their definition of the task in Stage 2 seems to indicate that the construction by the child of a conserving judgement is dependant on the construction of a task definition which is the same as that of the experimenter. The answer produced by the child in the testing situation is the result of a cognitive and social activity in which the child tries to decipher the experimenter's expectations and to understand the assumptions on which the latter bases his definition of the situation and of the task.

The testing situation is therefore the social location in which two actors having a different status and role (experimenter and child) negotiate meanings concerning the object of their interaction and try to construct an intersubjectivity which will lead them to share a common definition of the situation and the task.

As any communication situation, the testing situation is governed by implicit and explicit rules which regulate the experimenter-child interactions. Among these rules, some are specific to the immediate interactive situation, others also apply to different social situations such as the didactic situation. These non-specific rules taken as a whole form what some authors call an experimental meta-contract (Rommetveit, 1979, 1985; Schubauer-Leoni, 1986; Elbers 1986; Hundeide, 1988) which will allow the interactants to make sense of a situation and set up the

experimental contract which will specifically govern this particular situation. Faced with a testing situation, the child's task, cognitive and social, will be to understand the nature of the meta-contract in question and to set up the experimental contract specific to this situation.

The type of cognitive activity which the child works out in a testing situation thus results from a tripolar subject-task-experimenter interaction. This which means firstly that the subject-task interaction is mediated by a third party (adult, experimenter, teacher, etc.) who constructs a situation and a task for another actor (the subject) with certain aims (teaching, evaluation, play, etc.). Behind the task there is thus always an adult who has constructed it (on the basis of certain cultural, social and scientific assumptions) and who gives it certain meanings ; secondly, the subject-experimenter interaction is mediated by the task on which they interact. However the construction of this task encompasses dimensions which go beyond the interindividual experimenter-child interactions because they carry meanings which have been culturally, socially and historically constructed. Consequently, the intersubjectivity which the experimenter and the subject construct during their interaction is not only an interindividual creation, but also a social and cultural one.

The object of the child-experimenter interaction is thus at the same time to a certain extent preconstructed, since it exists (as a cultural and social object) independantly of the encounter between the interactants, and intersubjectively created since it is partly constructed (or reconstructed) in the hic et nunc interaction situation, as a symbolic object carrying numerous meanings and mediating the interaction between the interactants.

In this perspective, the development of new cognitive abilities appears to be specifically linked to the social context in which the abilities were developed. The development of new cognitive abilities is the construction of the cognitive instruments which, in the particular social situation in which the problem is put to the subject (via an alter symbolically or actually present), appear to be necessary for solving the problem and also socially

and relationally relevant. Just as the understanding and interpretation of the social situation in which the child is questioned (testing situation) require the development of a cognitive activity, so the solving of a logic task requires social knowledge and skills which go far beyond the simple acquisition of logical instruments. Therefore not only do logical operations (or instruments) develop which make it possible to understand certain problems, but also a series of social skills develop which concern the interpretation of the social situation in which a logical activity is required.

The social context, as studied in the research reported in this paper, is therefore an intersubjective space which does not fall entirely in the sphere either of the experimenter or of the subject. It is in this space that the child will produce an answer which, even if it always depends on abilities and knowledge which he has acquired in other situations, is nevertheless an original creation insofar as it stems from this encounter.

It is thus very difficult to say whether the child's cognitive abilities are individual characteristics, they rather appear as being the fruit of a social co-construction whose result does not depend entirely on the subject or on the adult.

V. Socio-cognitive conflict and intersubjectivity : some perspectives

The itinerary leading from the study of the role of social interaction between children in cognitive development to the study of adult-child interaction in a testing situation has been briefly presented. The logical abilities which the child produces appear as being the result of an activity which is indissociably social and cognitive and in which the subject tries to interpret the situation by attempting to understand how the experimenter defines it and what he expects from him/her.

This perspective prompts questions on the results obtained in research on the role of social interaction between children in cognitive development (see Light and Perret-Clermont, 1989). As some studies in this field suggest, it could be thought that an interaction session between children is an opportunity for them

not only to oppose and coordinate the logical instruments which they dispose of, but also to confront their definition of the task and the situation and to construct a common definition.

Giving a central role to the intersubjectivity process (between children, or between adult and child) in the development of new logical abilities, these studies arrive, by different means, at conclusions which are similar to those of North American studies inspired by Vygotsky (see for example Wertsch, 1984; Rogoff, 1990). Considering the higher mental functions as individual interiorisations of symbolic instruments constructed socially, historically and culturally, research in this field is firstly centred on adult-child interaction in a learning situation, in order to study the processes through which two actors with a different level of expertise construct an intersubjectivity (Wertsch, Minick and Arns, 1984; Valsiner, 1984; Ellis and Rogoff, 1982; Rogoff 1990). The latest work (Rogoff, 1990) has gradually become orientated towards the study of interactions between children, putting the accent on cases where the children have different levels of expertise. This research has shown that interactions between children, by reason of the symmetrical characteristics of their relationship, give rise to greater cooperation in the progressive construction of a common definition of the situation and of the task (Forman and Kraker, 1985; Forman, 1987; Rogoff, 1990).

The confrontation of these two research currents leads us to ask how the notion of socio-cognitive conflict ties up with that of intersubjectivity. For it is observed on the one hand that a socio-cognitive conflict is only beneficial if each child takes his/her classmate's point of view into account, and on the other that intersubjectivity is not a constant state, but a series of states which are continually challenged by ruptures which provoke the interactants into re-creating a new state of intersubjectivity and which, far from necessarily breaking the dialogue, on the contrary stimulate it.

For a socio-cognitive conflict to be beneficial, it is therefore necessary on the one hand to create social conditions between the children which would incite them to understand each other's point

of view and to construct an intersubjectivity. However on the other hand, to make the acquisition of new abilities possible, phases of socio-cognitive conflict should interrupt this intersubjectivity. The socio-cognitive conflict and the negotiation of intersubjectivity appear to be two complementary processes which make possible the display of new abilities.

VI. Socio-genesis and cognitive development: the problems of macro- and micro-history and of the unit of analysis

Through the studies of processes like socio-cognitive conflict and intersubjectivity, we attempted in this chapter to draw attention to two different problems:

a) A problem referring to time considered first as the macro-historic duration, which encompasses the individual's history and the social and cultural history of the group he belongs to, secondly as the micro-historical duration which encompasses the very moment of a given situation in which a child is involved in a cognitive activity.

The studies presented in this chapter showed that children's cognitive activity depends on social and cognitive competence they have already developed, as well as on competence which they construct (or reconstruct) during the interaction itself: in other words, new cognitive abilities, which cannot be considered as merely already-made abilities, are created in the here and now.

b) A problem concerning the unit of analysis taken into consideration in the observation of children's cognitive activity. At first sight, terms such as "socio-genesis" or "cognitive development" could therefore be interpreted as the development of the child's internal competence (possibly influenced by some social factors). Nevertheless, the studies reported showed that the problem is more complex since the social context is far more than a set of external factors which influence development: it plays an integral part of cognitive activity. This means therefore that, in order to understand and interpret children's cognitive activity, it is not sufficient to observe the child as an isolated unit of analysis; on the

contrary it is necessary to consider the interaction between the individual child and the social actors he interacts with. We called this interaction "intersubjective space".

Thus, the link between social and cognitive processes should not be considered as an internal link between different kinds of competence, but as the result of immediate interactions between the individual and his social environment, as well as of the macro-history of these interactions.

BIBLIOGRAPHY

- Bearison, D.J., Magzamen, S. & Filardo, E.K. (1986). Socio-cognitive growth in young children. Merill-Palmer Quarterly, 32, 51-72.
- Bell, N. (1986). Analysis of post-experimental interviews with kindergarten children concerning the Piagetian test of the conservation of the liquids. University of Neuchâtel (Switzerland), Séminaire de Psychologie.
- Blaye, A. (1988). Mécanismes générateurs de progrès lors de la résolution à deux d'un produit de deux ensembles par des enfants de 5-6 ans. In: A.-N. Perret-Clermont & M. Nicolet (Eds.), Interagir et connaître, Cousset (Switzerland): Delval, pp.41-54.
- Bovet, M., Parrat-Dayana, S. & Deshusses-Addor, D. (1981). Peut-on parler de précocité et de régression dans la conservation? I. Précocité. Archives de Psychologie, 49, 191, 289-303.
- Carraher, T.N. (1989). Negotiating the results of mathematical computations. International Journal of Educational Research, 13, 6, 637-646.
- De Paolis, P. & Girotto, V. (1987). Social marking of cognitive operations. The effect of different social rules. European Journal of Psychology of Education, II, 3, 219-231.
- Doise, W. & Mugny, G. (1984). The social development of intellect. Oxford: Pergamon Press.
- Doise, W., Dionnet, S. & Mugny, G. (1975). Conflit socio-cognitif, marquage social et développement cognitif. Cahiers de Psychologie, 21, 231-245.
- Doise, W., Mugny, G. & Perret-Clermont, A.-N. (1975). Social interaction and the development of cognitive operations. European Journal of Social Psychology, 5, 367-383.
- Donaldson, M. (1978). Children's mind, Glasgow: Fontana.
- Elbers, E. (1986). Interaction and instruction in the conservation experiment. European Journal of the Psychology of Education, I, 1, 77-89.
- Ellis, S. & Rogoff, B. (1982). The strategies and efficacy of child versus teachers. Child Development, 1982, 53, 730-735.
- Emler, N. & Valiant, G. (1982). Social interaction and cognitive conflict in the development of spatial coordination. British Journal of Psychology, 73, 295-303.
- Forman, E.A. (1987). Learning through peer interaction: a Vygotskian perspective. The Genetic Epistemologist, 15, 6-15.

Forman, E.A. & Kraker, M.J. (1985). The social origin of logic: the contributions of Piaget and Vygotsky. In: M.W. Berkowitz (Ed.), Peer conflict and psychological growth. New directions of child development vol 29. San Francisco: Jossey Bass.

Gilly, M. & Roux, J.P. (1984). Efficacité comparée du travail individuel et du travail en interaction socio-cognitive dans l'appropriation et la mise en oeuvre d'une procédure de résolution chez des enfants de 11-12 ans. Cahiers de Psychologie Cognitive, 4, 171-188.

Grossen, M. (1988). L'intersubjectivité en situation de test. Cousset (Switzerland): Delval.

Grossen, M. & Bell, N. (1988). Définition de la situation de test et élaboration d'une notion logique. In A.N. Perret-Clermont & M. Nicolet (Eds.), Interagir et connaître. Cousset (Switzerland): Delval.

Hundeide, K. (1988). Metacontracts for situational definitions and for presentation of cognitive skills. The Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 10, 3, 85-91.

Light, P. (1986). Context, conservation and conversation. In: M. Richards & P. Light (Eds.), Children of social worlds: Development in social context. Cambridge (Mass.): Cambridge University Press, pp- 170-195.

Light, P., Foot, T., Colbourn, C. & McClelland, I. (1987). Collaborative interactions at the microcomputer keyboard. Educational Psychology, 7, 13-21.

Light, P. & Perret-Clermont, A.-N. (1989). Social context effects in learning and testing. In: A. Gellatly, D. Rogers & J.A. Sloboda (Eds.), Cognition and Social Worlds. Oxford : Oxford Science Publication, pp. 99-112.

Monteil, J.-M. (1988). Comparaison sociale. Stratégies individuelles et médiations socio-cognitives. Un effet de différenciations comportementales dans le champ scolaire. European Journal of Psychology of Education, III, 1, 3-18.

Nicolet, M. & Grossen, M. (1988). Testons-nous des compétences cognitives? Contribution psychosociologique à la situation de test à travers l'étude de conduites aux épreuves opératoires piagétienne. Revue Internationale de Psychologie Sociale, I, 1, 72-91.

Nicolet, M. & Iannaccone, A. (1988). Norme sociale d'équité et contexte relationnel dans l'étude du marquage social. In: A.-N. Perret-Clermont & M. Nicolet (Eds.), Interagir et connaître, Delval (Switzerland): Cousset, pp. 139-152.

Perret-Clermont, A.-N. (1980). Social interaction and cognitive development in children. London: Academic Press.

Perret-Clermont, A.-N. & Schubauer-Leoni, M.L., Conflict and cooperation as opportunities for learning. In: P. Robinson (Ed.), Communication in development. London: Academic Press, pp. 203-233.

Rogoff, B. (1990). Apprenticeship in thinking. Cognitive development in social context. New York: Oxford University Press.

Rommetveit, R. (1979). On common codes and dynamic residuals in human communication. In: R.M. Blakar & R. Rommetveit (Eds.), Studies of language, thought and verbal communication. London: Academic Press.

Rommetveit, R. (1985). Language acquisition as increasing linguistic structuring of experience and symbolic behaviour control. In: J.V. Wertsch (Ed.), Culture, communication and cognition: Vygotskian perspectives, Cambridge (Mass.): Cambridge University Press.

Roux, J.-P. & Gilly, M. (1984). Aide apportée par le marquage social dans une procédure de résolution chez des enfants de 12-13 ans: données et réflexions sur les mécanismes. Bulletin de Psychologie, XXXVII, 368, 145-155.

Säjjö, R., Wyndhamn, J. (1987). The formal setting as context for cognitive activities. An empirical study of arithmetic operations under conflicting premisses for communication. European Journal of Psychology of Education, II, 3, 247-260.

Schubauer-Leoni, M.L. (1986). Maître-élève-savoir: analyse psychosociale du jeu et des enjeux de la relation didactique. Doctoral dissertation. University of Geneva (Switzerland).

Schubauer-Leoni, M.L., Bell, N., Grossen, M. & Perret-Clermont, A.-N. (1989). Problems of assessment of learning: the social construction of questions and answers in the scholastic context. International Journal of Educational Research, special issue on "Social factors in learning and instruction", 13, 6, 671-684.

Taal, M. & Oppenheimer, L. (1989). Socio-cognitive conflict and peer interaction: development of compensation. European Journal of Social Psychology, 19, 77-83.

Valsiner, J. (1984). Construction of the zone of proximal development in adult-child joint action. In: B. Rogoff & J. V.

Wertsch (Eds.), Children's learning in the zone of proximal development, San Fransisco: Jossey Bass, pp. 65-76.

Wertsch, J.V., Minick, N. & Arns, F.J. (1984). The creation of context in joint problem solving. In: B. Rogoff & J. Lave (Eds.), Everyday cognition: its development in social context, Cambridge (Mass.): Harvard University Press.

Wertsch, J.V. (1984). The zone of proximal development: some

conceptual issues. In: B. Rogoff & J. V. Wertsch (Eds.), Children's learning in the zone of proximal development, New directions for child development 23, San Francisco: Jossey Bass.

Zhou, R.M. (1988). Normes égalitaires, conduites sociales de partage et acquisition de la conservation des quantités. In: A.-N. Perret-Clermont & M. Nicolet, Interagir et connaître, Cousset (Switzerland): Delval.