

Psychosocial 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 behavior. However several decades later, it would be well worth reviewing these concepts and either enlarging on them (as seemingly suggested by the organizers of the present symposium through the consideration of "*sociogenesis*") or substituting new metaphors and concepts to the existing ones, in order to draw attention to aspects of psychological reality that the preceding perspective might cause to be neglected. This presentation takes as standpoint the crossroad 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 behavior. On a different level of reality but nevertheless with somehow similar epistemological assumptions, these studies echo the ongoing research trends in the study of the macro-biophysical world (with the concepts used from Darwin's theory to the big bang theory) and of the macro socio-historical reality (suppositions on the rise of *Homo Sapiens*, the growth of civilization from "prehistoric to "post-modern," economic development or "under-development," etc.). In this wide variety of cases, some common elements recur, the most important being: evolution considered as progress; change as being not only quantitative, but also qualitative; and hypothesis as to how one stage prepares for the next (constructivism). In nearly all cases the observers (in a quite understandable ethnocentric shortsightedness) regard reality from their own standpoint taking for granted that their state is the present peak of development: other species are, of course, 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 judgments 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' action plans.

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 (1971) 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 to 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; and social cognition. Parallel cognitive stages have been tentatively linked with behavioral development in areas such as: socialization, moral judgement, etc. The risk has then been to consider too readily that all these aptitudes influence each other reciprocally (a possible understanding of the meaning of the concept of "sociogenesis") and in doing so, to forget the standpoint of all this research that sets, at the start, a model of development, value laden by the observer, which a priori considers development as progress, formal logics as adaptative, stages as logical, the search for equilibrium as the dynamic cause, equilibrium as understanding, and all these processes as primarily located in 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 are they the only ones possible. For instance, Vygotsky's (1962) partially opposite perspective can be seen as giving 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's, questions certain value-laden 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 their solutions are.

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 understanding. 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.

The Test 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 become 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 which 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.

The Role of Social Interaction Between Children in Cognitive Development

Research in this field shows that under 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, 1984; Emler & Valiant, 1982; Doise, Mugny, & Perret-Clermont, 1975; Gilly & Roux, 1984; Perret-Clermont, 1980, 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 socioeconomic status performing better than children of low socioeconomic level. However these differences tend to diminish or disappear after an interaction session. These results show that the cognitive behavior 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; Grossen, 1988; Perret-Clermont & Schubauer-Leoni, 1981).

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 (Blaye, 1988; Zhou, 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, & Filardo, 1986; Light, Foot, Colbourn, & McClelland, 1987; Taal & Oppenheimer, 1989).

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: De Paolis & Girotto, 1987; Doise, Dionnet & Mugny, 1975; Nicolet & Iannaconne, 1988; Roux & Gilly, 1984; Zhou, 1988); the *institutional or formal context* in which the task is submitted to the child (see for example Säljö & 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, & Perret-Clermont, 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 judgment given by the child. It also emerges from these studies that different subjects are likely to approach a given social context in a different way. Our own research has revealed repeatedly 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 (Grossen, 1988; Nicolet & Grossen, 1988; Perret-Clermont & Schubauer-Leoni, 1981).

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. Therefore, it seems difficult to affirm, as some authors have, (for example, Bovet, Parrat-Dayana & Deshusses-Addor, 1981; Donaldson, 1978) 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 manner other 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, that is, *to make the testing situation itself an object of study*, which necessitates including the role and behavior of the experimenter in the observations; and (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 that would provide an understanding of the meanings which the child gives to the situation.

Three main methods were used: the analysis of experimenter-child interactions during a Piagetian test, post-experimental interviews and role playing (Bell, 1986; Grossen, 1988; Grossen & Bell, 1988). A more detailed account of the research undertaken using this latter method is given below.

The Construction of Intersubjectivity Between the Experimenter and the Child in a Piagetian Test: Presentation of an Empirical Study²

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 involved asking children, who had just undertaken the Piagetian³ conservation of liquids test, to assume the role of experimenter with a naive classmate.

Description of Research

Population and Procedure

The population consisted of 114 children aged between 6 and 7. The children were randomly assigned to two groups: (a) the role-players group (RP), made up of 57 children (27 boys, 30 girls); and (b) the naive classmates group, who were later questioned by the RPs, 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 RPsgroup to the conservation of liquids test. Of the 57 RPs questioned, 18 children gave non-conserving judgments during the three test items⁴ ("non conserving operatory level"), 23 gave judgements which were alternately non-conserving and conserving ("intermediate operatory level"), and 16 gave conserving judgments ("conserving operatory level").

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

Analysis of Data

Analysis of the role playing⁵ concerned the reproduction by the RPs 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 behavior 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 judgments given by the RPs in Stage 1 will be discussed. Finally we shall give the results concerning the RPs definition of the situation.

Presentation of Results

Definition of the Task

Four patterns were established on the basis of the RPs' behavior during their role playing.

1. *The RPs defined the task as a question concerning the comparison of the level of juice in two equal or different glasses.* Two types of behavior were observed among the seven RPs grouped in this category:

- At the beginning of the role playing, the RPs took two different glasses and poured some juice into them at unequal levels. These RPs did not reproduce the equalization phase in two equal glasses, and proposed directly the result of the transformation after transferring the liquid.
- The RPs took two different glasses and asked their classmates to pour juice into them at equal levels. The RPs 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 RPs themselves gave non-conserving judgments during the role playing.

The seven RPs 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 RPs defined the task as a problem of non-conservation of levels after transformation.* The 21 RPs 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 RPs gave non-conserving judgments during the role playing. For these RPs, 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, by doing so, 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 RPs in this category seemed, therefore, 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, that is, 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 RPs 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 RPs, 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, 4 RPs began by asking a conservation question which presupposed a non-conserving judgment and then asked a conservation question centred on equality. Furthermore, most of the RPs gave conserving judgments to their classmates during the role playing.

The behaviors of these 18 RPs led us to think that, for them, the problem was to understand that regardless of the container, the quantity of liquid remained equal, that is, 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 RPs seemed to expect a conserving judgment even from their classmates despite the fact that a large quantity of liquid fell outside the glass while it was being transferred!

4. *The RPs adopted a neutral attitude so that it was not possible to determine how they defined the task.* The 8 RPs in this category did not themselves give a judgment to their classmate during the role playing; neither did they give any arguments to confirm or refute the judgment(s) of their classmates. All these RPs asked a conservation question such as "Have we got the same thing?," that is, a question which seemed to presuppose a conserving judgment, except 1 RP whose question suggested alternatives.

These RPs' behaviors 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.

Relationship Between the Subjects' Answers During Stage 1 and the Definition of the Task

What relationships exist between the subjects' judgments during Stage 1 (their "operatory level") and their definition of the task such as it can be observed in their behavior 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 were 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 judgments 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 just like the non-conserving RPs had done.

The Definition of the Situation

Concerning the definition of the situation, the analysis of the RPs behavior 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 judgments to their classmates during the role playing, accompanied more often than not by reasons in favor. In other words, these children gave their classmates the answer they thought to be correct.

2. Nearly all the RPs ended up by obtaining judgments 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 judgments, whereas all the RPs (except four) who defined the task as a conservation problem ended up by obtaining conserving judgments 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 RPs assessed their classmates' answers 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 RPs 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" behavior by giving, more often than the other RPs, judgments or supporting arguments. These RPs seemed to use the knowledge with which they had been provided as an instrument which not only ensured them of their legitimate status of experimenter but also reinforced their power with regard to their classmates.

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 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 (Bell, 1986; Elbers, 1986; Grossen, 1988; Schubauer-Leoni, 1986), 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: (a) 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; and (b) 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, that is, 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 judgments 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 judgment is dependent on the construction of a task definition which is the same as that of the experimenter. The answer produced by the child in the test 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 test 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 test 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* (Elbers 1986; Hundeide, 1988; Rommetveit, 1979, 1985; Schubauer-Leoni, 1986), 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 test 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 test situation thus results from a *tripolar subject-task-experimenter interaction*. This 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) independent 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 (test 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 a series of social skills also 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.

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 test 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 & 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 Rogoff, 1990; Wertsch, 1984). Considering the higher mental functions as individual interiorizations of symbolic instruments constructed socially, historically, and culturally, research in this field is firstly centered 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 (Ellis & Rogoff, 1982; Rogoff, 1990; Valsiner, 1984; Wertsch, Minick, & Arns, 1984). The latest work (Rogoff, 1990) has gradually become oriented 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, 1987; Forman & Kraker, 1985; 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 interruptions 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.

Sociogenesis and Cognitive Development: The Problems of Macro- and Micro-history and of the Unit of Analysis

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

1. 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, and 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.

2. A problem concerning the unit of analysis taken into consideration in the observation of children's cognitive activity. At first sight, terms such as "sociogenesis" 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 in 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.

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Notes

1. We would like to thank the Swiss National Foundation for Scientific Research for its financial support (Grant n° 1.738.083).
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.
4. The test consisted of three sequences each composed of an "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 judgments.
5. It should be noted that out of 57 RPs only 3 were unable to play their role of experimenter.

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 used for "the same amount" but in French this wording cannot be understood by a 6- or 7-year-old child.