Chapter 10

Adult-child interaction, joint problem solving and the structure of cooperation*

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Introduction

A mother helps her 4-year-old daughter to do a task. They are building a tower with Duplo blocks according to a model that we had provided (cf., Elbers, Maier, Hoekstra and Hoogsteder, 1992). Although the child is fairly competent, the mother intervenes regularly in order to correct errors and to make suggestions. Halfway through the task, the mother goes to the kitchen for a moment. During this interval, about one and a half minutes, the child goes on building the tower. She succeeds in completing part of the tower all by herself, by comparing the tower with the model and selecting and placing the pieces correctly. As soon as the mother comes back, the child stops working and asks "What next?"

   This observation illustrates the issues we will be concerned with in this chapter. The dyad organized its cooperation according to two distinct patterns of interaction: a pattern in which the mother regulates the building of the tower, and a pattern in which the child controls the building on her own with the mother only present in the background. Moreover, in addition to building the tower, the parent and the child have to build their interaction. With her question "What next?", the child invites her mother to renegotiate the division of roles between them. The child does not only acquire competence in the construction of a tower according to a model, the task is also an "exercise in collectivity" for her (Bruner, 1986, p. 132): it involves negotiating and disagreeing, exchanging and sharing information, knowing when to follow the adult's instructions and when not to.

   Many studies on problem solving by adult-child dyads have concentrated on the process of teaching and learning. They rarely focused on interaction patterns, on the way in which adult and child negotiate and reach an agreement about how to cooperate. Researchers assumed that the conditions of cooperation could be taken for granted. The assumption was that adult and

child would engage in an instructive interaction, with the former in a teaching and the latter in a learning role. However, these conditions do not occur as a matter of course: they are constructed, they are the subject of negotiation and change. Each interaction is a construction, to which the participants bring their experiences, repertoires and the previous history of their relationship (cf., Minuchin, 1985). The outcome can certainly be didactic interaction, but a diversity of other interaction patterns is also available to the dyad.

In the first part of this chapter, we will discuss the modes of interaction (cf., Elbers *et al.*, 1992) that dyads use to mould their cooperation. What are the characteristics of these modes and how can they be recognized by an observer? In the second part, we will discuss a case-study of an interaction within a didactic mode of interaction. We will concentrate on the negotiations during the interaction and show how actively the child is involved in the construction and maintenance of the cooperation.

Some assumptions about adult-child interaction

A major problem in the field is that many studies have implicitly adopted a unidirectional approach. The focus is on how adults direct and control the interaction, while there is a conspicuous lack of interest in children's contribution. A transfer view on learning is at the basis of this account on adult-child interaction. The adult's regulation and management of the problem solving are thought to be transmitted to the child. In the course of time, the child learns to do the task independently, using the regulative strategies that the adult has taught in the past. The adult is the architect of the collaboration; the child only carries out the adult's instructions.

Instead of focusing the attention solely on the adult, we prefer to study the way in which the participants influence one another (cf., Stafford and Bayer, 1993) and the way in which they shape their cooperation. We regard children as actively involved in task situations in which they need assistance from an adult. They do not necessarily have a subordinate position, and they negotiate with the adult about how to proceed. The process of doing a task is not dominated by an adult, but jointly regulated by adult and child.

A related problem is that researchers of adult–child interaction tend to connect the child's learning in an interaction rigidly to the instructive behaviour of the adult. The origin of this view is, we think, their educational interest in how educators can most effectively stimulate a child's development. Research was designed in order to explore which kind of instruction is the most useful for children, what levels of abstraction adults may employ, and how effective communication can be brought about (for example, Wood, Bruner and Ross, 1976; Wood, Wood and Middleton, 1978).

However, there is more to children's learning than following the adult's lead. From the view on learning we adopt, a child's persistence in following his or her own way is not necessarily unconstructive. Rather, those kinds of

actions can often be considered as genuine attempts to contribute to a solution of a task, even if they are clearly wrong or in disagreement with the adult's suggestions. Therefore, we argue for studying adult–child interaction from the assumption that the child's learning does not necessarily depend on the adult's correct and proper way of intervening.

A third problem is connected to comparative research of adult-child interaction. This research has convincingly shown that there is no universal format for instruction (e.g., Greenfield and Lave, 1982; Wertsch, Minick and Arns, 1984). Rogoff(1990) distinguishes between two cultural patterns for learning through adult-child interaction. In Western middle-class communities, situations are adapted to children. In many non-Western cultures, however, children are adapted to situations; they are involved by adults in the life of the community, first as close observers and gradually as participants.

The danger here is that culture is taken as an independent variable for explaining the observed interactions that are taken as dependent variables. We would rather take a more constructivist stance: there is a variety of cultural options open to an adult-child dyad. Every culture provides adults and children with a repertoire of interaction formats or patterns. Although these patterns certainly borrow their meaning from the wider sociocultural context, there is no one-to-one relationship between culture and adult–child interaction.

To summarize, we wish to contribute to the field by emphasizing the construction of adult–child interaction. In particular, we want to study how adult and child shape their cooperation and how the child learns, not only about the task at hand, but also about problem solving as a joint enterprise. With Jerome Bruner, we believe that

> we shall be able to interpret meanings and meaning-making in a principled manner only in the degree to which we are able to specify the structure and coherence of the larger contexts in which specific meanings are created and transmitted.
>
> (Bruner, 1991, pp. 64-65)

In order to write this chapter, we have drawn from our observations in two adult–child interaction studies, involving various problem-solving tasks — construction tasks - and including children from 3 to 5 years old (Elbers *et al.*, 1992; Maier, Elbers and Hoekstra, 1992; Hoogsteder and Elbers, 1994; Hoogsteder, 1995). The adults were the children's parents (or other caregivers) and all interactions were videotaped at their homes. Parents were told that our interest was in investigating how children can solve a practical task with possible assistance by the parent. They were asked to assist the child in their own way and whenever they thought it necessary.

The variety of interactions we observed is partly dependent on the arrangements made with the parents. They participated on a voluntary basis, and appointments were made to come to their homes. It was up to them to

prepare their child. Once we arrived, the parent set the scene by indicating a working-space (table, couch or floor) and by getting the attention of the child in question. Other children present were occupied with something else, and the participation of the adult meant that usual household tasks were ignored and that adults dedicated their time to joint problem solving with the child. This whole scene probably also meant that adults (re)presented themselves as "good" parents, discarding, for example, fights or arguments.

Modes of adult-child interaction: status and types

A mode of interaction is a certain type of interaction, a genre, with a typical dynamic. It is the framework giving meaning to the overall activity of the participants, comparable to Leont'ev's activity (1981) as, for example, investigated by Wertsch *et al.* (1984). On the basis of an analysis of 25 parent–child dyads, we distinguished three modes of interaction. We will first give a brief provisional description, and discuss them more systematically later.

A playful mode of interaction. Adult and child played together. The aim of constructing a tower was not altogether ignored, but was rather secondary to the aim of maintaining a pleasurable relationship between the participants. In one case, for example, the quality of "togetherness", a kind of playful, almost sensuous, interaction between a father and daughter, governed the entire interaction. The daughter followed eagerly and in delight any hint given by her father, and was rewarded with kisses and other emotional back-channels.

An economic and efficient mode. Some dyads were mainly concerned with the correct and rapid execution of the task, avoiding conflicts or troubles between them or with the task as much as possible. If the child was not competent enough for an efficient completion of the task, the adult gave a minimum of instructions or commands to enable the task to be carried out, or she took over the entire responsibility for the task.

A didactic mode of interaction. Quite a few parents left a lot of space and time for explorations by the child, which could lead to errors and (self-)corrections. Those errors were seized as opportunity, for example, for explaining the rules of the task by the adult. Adults intervened when asked by the child or in order to clarify errors, or in order to evaluate the procedure followed.

Characteristics

What kind of criteria can be used for distinguishing and classifying the various types of interactions as belonging to one mode or another? How can modes be recognized by an observer? Although the modes of interaction are typified globally, they need to be justified and can be recognized by a combination of significant local elements. A mode of interaction can be specified by the following characteristics:

1   the role distribution between adult and child;
2   the instruments at their disposal, and in particular the forms of com-
     munication between adult and child;
3   the aim(s) pursued.

Role distribution concerns the symmetrical or asymmetrical constellation of responsibilities for the participants. Symmetry is an essential characteristic of play, so in a playful mode the participants have, in principle, equal opportunities. In efficient and economic interactions, the most competent participant (the adult) controls and dominates the other (the child) at all times in order to reach the goal either rapidly, or with a minimum of effort and fuss. The role distribution is asymmetrical. In didactic interactions, the expert will monitor the contributions of the child, and the child will have numerous opportunities to explore and to make mistakes. Therefore, with regard to responsibilities, a didactic mode has a layered structure. This means that the adult will not control each specific action of the child, but will keep an eye on the various actions of the child with regard to her understanding of the task and with regard to a satisfying solution. On the one hand, the participants have asymmetrical roles — the adult monitoring the actions of the child — but on the other hand, there is a specific form of symmetry, because adult and child attempt to reach a common understanding.

A role distribution also involves a particular *kind of identity* for the participants. In a playful mode, the participants adopt fictional identities belonging to the kind of play agreed on. In an efficient mode, the adult or expert will strictly control the procedure for reaching the goal in a minimum of time or effort, which reduces the child to a role of sole executor of those parts of the task that she can do correctly. The adult has an identity as manager and performer of all other aspects of the task. In a didactic mode of interaction, the identities of the participants are more subtle: the adult will monitor the activities of the child, and in this sense adopts an identity as manager, but the child has, at the same time, an identity of competent participant and one who can work on specific aspects of non-competence through participation.

The *instruments* at the disposal of the participants are mainly communicative instruments, such as demands, requests, orders, but also postures, gestures and other body-language conveying agreement or doubt. In play, we encounter role-playing and the associated forms of communication that are all of the register of adopted identities. In efficient interactions, communication is governed by a means–end rationality that is characteristic for this mode of interaction and often has the form of (indirect) commands, either with words or with gestures. In the didactic mode of interaction, one can encounter a great variety of communicative means, for example advice or encouragement, illustrations, explanations, suggestions, evaluative remarks, but also proposals by both parties to review what has been achieved up to now at a meta-level.

The *aims* pursued are of two kinds. Firstly, there are practical aims concerning the manner of proceeding with the task. For example, in the efficient and economic mode, the result-oriented production of the task is the aim, and therefore errors are prevented as much as possible. Secondly, there are aims concerning the participants. In play, an aim can be to seek pleasure and delight. In a didactic interaction, the aim is to transform the non-competent participant (the child) - as far as his or her knowledge on a specific point is concerned - into a competent one, and thus to transform the relationship between the participants. Errors are not prevented but seized as learning or teaching opportunities. A mode of interaction not observed in our studies, but present in many experimental studies in which an adult experimenter interacts with a child, is a test mode (e.g., Elbers and Kelderman, 1994; for an overview see Schubauer-Leoni and Grossen, 1993). Here the aim is that one participant evaluates the capability of the other in performing a task without any assistance.

In addition to the three characteristics of modes, observations about the order in and closure of a certain mode may help to recognize a mode.

First, participants systematically distinguish between what is *usual* and what is *exceptional* within an ongoing interaction. Parents and their children seem to be quite competent - when interacting in a specific mode - to discriminate between the ordinary and the unconventional. What is usual and belongs to the interaction is more or less self-evident, whereas the exceptional is easily identified as not acceptable within that particular mode. Let us illustrate with some examples.

In a playful interaction between a father and his daughter, the play was that the daughter followed any suggestion of her father without any autonomous initiative, for which she was rewarded every time. At some moments, she did something that was in some sense outside the agreed play - an autonomous selection of a block for the tower — but she spontaneously stopped with these initiatives, being apparently aware of the fact that these actions belonged to another game, in which she would have a different role.

An efficient or economic mode has a result-oriented agenda, and any disruption of this procedure, for example by making a mistake or by playing with the blocks without a task-relevant result, is immediately identified.

Didactic interactions are a rather particular case. Within this mode of interaction, a great variety of actions may occur, because of the combination of symmetrical and asymmetrical role distributions. However, all these actions will be coordinated at some phase of the interaction. This coordination establishes a shared understanding of the task and will finally lead to a correct execution of the task, although probably preceded by many errors. So a block that is selected correctly by the child but not put exactly on the right place may be left there for a while. This typically happens when the child is busy with part of the task and focusing her efforts on some aspect while neglecting others. In this sense, an error is perfectly normal and usual for a

didactic interaction. However, in the long run, this incorrect placement will be taken up at some moment, for example when the child recognizes a similar error with another block. The child herself may go back to the former block and correct the error, or the adult may guide the child in doing this. We may state that in a didactic interaction, errors are exceptional only in the long run, because all actions will be linked and coordinated with each other and with the aim of the task in order to increase participation of the child.

This brings us to a second feature, the particular *sequential* order of actions. In a didactic mode, various sequences of corrections, evaluations and explanations are possible, but most steps will be reconsidered in a later phase of the interaction. This means that all particular actions will be integrated in a meaningful whole at some moment. In an efficient mode, however, the management of the procedure for completing the task is taken over completely by the adult. The chosen procedure will then fully determine the order of the actions. Actions will not be reconsidered; for example, the correct placement of a block has its own value, and will not be related to the placement of an earlier block with the same principle. In play, once the "rules of the game" have been established, just about anything can happen as long as it fits into the play agreed on.

To a certain extent, we suppose that modes of interaction are structured totalities, and this view is supported by the function of conflicts. During some interactions, one of the participants (usually the child) stops acting and functioning according to the characteristics of the agreed mode. A conflict arises, a clash between one mode and another. This can be settled only if the participants renegotiate (explicitly or implicitly) and agree on how to proceed further. Sometimes they will adopt another mode of interaction, adjusting their actions accordingly; sometimes they will proceed in the old mode. In the example at the beginning of this chapter, the girl was eager to go back to a didactic mode in which her mother made suggestions for the task, after she had been building part of the tower independently.

We argue that modes of interaction are more or less closed structures, but open to change and applicable to a wide range of practical situations. Trespassing or disrupting a mode may result in a conflict — for example when a child is making mistakes on purpose, or when she asks her mother "what next?" while she has shown to be quite competent on her own — but by conflict one might pass from one mode to another. This pattern of changing modes was found in several dyads. Conflicts are therefore not exclusively disruptive, but also constructive; it is by conflict that switches from one mode to another can be realized.

As a preliminary conclusion, modes of interaction — classified globally and characterized locally — can be powerful frameworks for participants, although they may not be aware in which mode they interact and how this affects their (inter)actions. We will now have a closer look at how participants in a concrete interaction realize their cooperation.

The structure of cooperation in a didactic mode of interaction: a case-study

In order to illustrate the way in which a parent and a child cooperate, a case-study of one dyad interacting in a didactic mode will be presented. The choice of a case-study as a methodological procedure for presenting data and making argumentative claims may need clarification. Analogous to the claims made by studies on conversation and discourse analysis, case-studies on adult–child interaction serve to support certain types of claim (see Jackson, 1986; Jacobs, 1986). None of these claims is of a quantitative nature - about what frequently or usually happens — because such claims need evidence different from the evidence in a case-study. Case-studies serve other functions. First, a case-study may be evidence for something that had, until then, been unnoticed. A single case suffices to show the contrary, provided that readers regard the case as recognizable. Second, a case-study may serve as support for analysing the organization or structure of an interaction. Structures, simple or complex, cannot be explained with discrete, quantifiable data. Third, a case-study has an heuristic function. A well-done analysis has a demonstrative power that may generate new relevant questions and hypotheses concerning adult-child interaction.

The aim of the following case-study is to show how parent and child, interacting in a didactic mode, structure their cooperation with regard to a task. In line with this structure, their responsibility for acting, and hence the child's participation and learning, is distributed accordingly.

The dyad consists of a girl aged 3 years 7 months and her mother. The girl will be called Claire (C) and her mother Amy (A). Their case is drawn from a study with 15 caregivers and their 3-year-old children (Hoogsteder, 1995). The task was to build a tower of 13 wooden blocks (see Figure 10.1).

Episodes

In order to manage the problem of building a tower, the dyad has to divide the task into manageable steps. We called these steps *episodes,* a series of meaningful actions that form the interaction. An episode can be seen as a structural equivalent of a textual paragraph. The structure of both text and adult–child interaction can be marked by an author or by the interacting participants respectively by means of various instruments. For example, texts can be structured by punctuation marks, blank lines, choice of adverbs or topic shifts (Brown and Yule, 1983). Interactions can be structured by actions, pauses, regulations or goal-setting. We took goal-directed acting as a criterion for identifying episodes. An episode in an interaction is defined as a series of meaningful actions in which a *goal* is set by the dyad, implicitly or explicitly agreed on, performed and (sometimes) evaluated (See also Elbers *et al.*, 1992). Pauses, gestures and
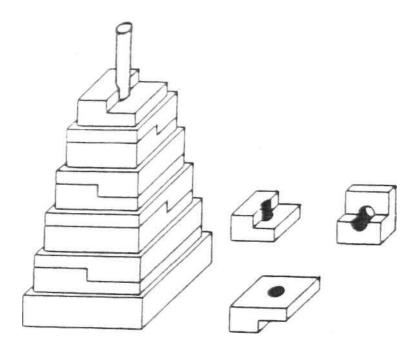
Figure 10.1 Construction task used with mothers

other acts or utterances can support the marcation of one episode from another.

How episodes structure an interaction

The transcription in Figure 10.2 presents the first 2 minutes and 45 seconds and starts after the introduction of the task by the researcher.

In each episode, the verbal formulation of the goal that is central for that specific part of the interaction is in *italics*. In the first episode (from line 1 to line 5), the dyad is concerned with the seriation aspect of the task; their searching for the biggest block. Claire selects the big yellow block (line 2), her mother explicitly states their goal of searching for the biggest one (lines 4-5). Claire again selects the yellow block as the biggest one (line 8), her mother disagrees with her choice and suggests looking for another big block (lines 10—12). Claire takes another block, checks her choice by comparing the blue block with the black base of the tower, and then places the blue one on the spindle (lines 12—13). Her mother evaluates with "right" (line 14). These series of actions form the first episode.

Then a new problem arises, it is not the selection of the blue block that is questioned, but its placement on the spindle. This problem is explained by Amy (lines 16—20) and verified by Claire. Amy then suggests a new goal; the blue block does "need another one" (line 22). She formulates the goal in terms

A: 1 Now, we'll have a try then (.) it is quite a
         very difficult high tower, isn't it?   C takes a big yellow block
                                                                 and
         What do you think? (.) *the biggest one is*   puts it on the stick
      5 *always down under,* uh? (.) You should first
         look for the biggest one

C: [whispering] This one   C points to the yellow one on the stick

A: 10 That one? (.) you could take another one
         that's very big (.) and have a look which   C takes off the yellow one from the stick,
         one is the biggest   takes big blue one, compares it to the
                                                                 black base, puts it on the stick upside
                                                                 down

         right
    I
         Hey (.) There is something strange, isn't
         there (.) do you see? (.) What do you see   A points to 'hole' under the blue block,
         here? (.) That wasn't quite like this when   C watches
         Mariëtte had the tower (.) Then it fitted
     20 nicely (.) How is that possible?

         Would it need another one?
                                                                 C nods, puts yellow one down and takes
                                                                 little blue one
     25 You should first (.) yes (.) wait a moment   A takes off big blue one, C lays down little
    II   blue one
         Do you know what you should do first? (.)
         We have this one (.) that's the biggest one,
         but there is *another one, that is as big*
     30   C points to yellow one, looks at other
                                                                 blocks on the table, takes big red one

         Is that one as big?
    III   That one is as big, isn't it? (.)
          So suppose you place that one on top of it
     35   C places red block upside down on blue
         No (.) No it doesn't fit yet (.) And when   block, on table
         you turn it
                                                                 C turns around red one, places it with
                                                                 thick side on thick side of blue block

     40 Look (.) No, it isn't yet *one* block (.) How
         will it become one block?

                                                                                              continued

		C brings red one to the stick
	No. (.) Look carefully (.) If you turn it like this	A constructs red and blue block together, red on top of blue one
45	Hey (.) do you see this? (.) you should have a look at this side (.) Now it has become	
IV	one big block, hasn't it? (.)	A turns the block and points to the side
	Now *it can* be put *on the tower*	
		C laughs and takes the big pair of blocks together as pair
50	Yes	
C: 51	It is going to break down	C brings pair to the stick and tries to put it on the stick
A:	Yes, it slips apart a little bit (.) Could you do them both together? (.) Just hold them	
55	real tight	
C:	It won't work	C stands up to have more strength and places the pair of blocks on the stick
A:	It works very well (.) really good	
V		C takes the big yellow one and wants to
C:	[whispering] Now this one	place it on the stick
A:	Hey no, again you should look for two that *belong together* (.) Which ones are equally	
65	big?	C takes the big green one
	Yes, I think so too	
C:	I don't know that tower	C tries to fit yellow and green one, constructs a pair and places them on the stick
A: 70	Just try (.) watch the piece carefully (.) turning, very good	
		C turns the blocks on the stick a little, places them neatly and looks at the tower
	Really good sweetheart (.) Beautiful, isn't it, with all those colours together (.) wonderful	
VI		

Figure *10.2* Transcribed excerpt of interaction between Amy and Claire

Notes: *A* = Adult (Amy); C = Child (Claire, 3.7 years); (.) = small pause;
blank line = longer pause; ___ = end marcation of episode.
The formulation of a new goal is marked by *italics.*

of belonging. Claire nods and searches for a corresponding block; she selects a small blue one, implicitly defining the question of belonging in terms of colour. This is the second episode, concerning the selection of a block related to the big blue one, in order to make it fit.

Her mother then formulates a new goal, because the block needed should not be selected in terms of colour, but in terms of size. She formulates the goal explicitly, "another one, that is as big" (line 29). This is the goal for the third episode. Claire searches for a block as big as the blue one, selects a red block (lines 30—31) and now holds the two biggest blocks, so this goal has been performed, which is acknowledged by Amy (line 33).

The fourth episode concerns yet another aspect of the task, the construction of a pair out of the two biggest blocks. This is formulated by Amy in lines 34 and in 40-41. Claire tries a few times, but eventually it is Amy who performs the goal, by placing the two blocks on top of each other, so they become "one big block" (lines 43-47).

The fifth episode involves placing the pair on the stick. Claire marks her recognition of the new goal by a smile and she supports her understanding of this and the previous goal (line 51); the two blocks form one pair, but by holding them in her small hands, the pair nearly breaks apart. She eventually places the pair of blocks on the stick.

Altogether, this part of the interaction is divided into five episodes, each one with a distinct goal. The dyad needs these five episodes before the two biggest blocks are put together on the stick as a pair. The fact that the goals of episodes IV and V - the construction and placement of a pair of blocks respectively - involve a *pair* of blocks and not two separated blocks, is illustrative of the rest of the building process. During the part of the inter-action in the sixth episode, the goal involves the selection and placement of one pair of blocks. This goal is formulated again by Amy (lines 63-64), but the separate goals of construction and placement are no longer explicitly formulated, because these are performed automatically together (lines 68—70). After that (not shown in the excerpt), the dyad finishes the whole tower within two more episodes: one episode for the third pair of blocks, and another episode for the smallest three pairs and the final block-on-top, which are placed successively without any new goals being explicitly set.

During the entire interaction, the number of blocks placed in one episode increases. The first pair of blocks is placed during episodes I–V, the second pair of blocks is placed in episode VI, the third pair of blocks is placed in episode VII, and the fourth to sixth pairs and the block-on-top are placed in episode VIII. This means that the terms in which Claire and Amy set goals change. The excerpt in Figure 10.2 indicates that in episode I the goal concerns the size of one block, while in episode VI the goal is to select, construct and place one pair of blocks. In episode VIII (not in Figure 10.2) the goal is to finish the tower, the rules governing its construction now having become self-evident. Claire's participation in episode VI is built on the dyad's way

of setting goals. She now understands and performs a goal that is formulated not in terms of separate blocks (as was the case in episodes I, II and III), but in terms of pairs of blocks. So, one way of learning during the course of this interaction is exemplified in the *kinds* of goal the dyad sets and performs in the successive episodes. Claire's understanding improves in terms of the goals she can handle. She has learned through participating in the earlier episodes (although her responsibility was low), as appears from her ability to deal with goal formulations in terms of pairs of blocks in the later episodes. This is an improvement compared to the start of the interaction, where the goals were formulated and performed in terms of the selection or placement of one block.

In the case of Claire and Amy, it is clearly shown how a kind of symmetry can be found in their interaction. This symmetry was not found in dyads interacting in an efficient mode, because the parents set the goals for an efficient construction of the tower, which meant that the child participated under the conditions of the parent.

It is important to realize that any adult and child have to construct their goals for acting on the spot. The goals emerge out of the dyad's interaction itself, specifically for the purpose of this problem-solving situation, and there is no predefined way of doing this. In the case of Amy and Claire, it might seem that Amy is responsible for the construction of goals. But although Claire's participation in the construction of goals is peripheral, especially in the first half of the interaction, it is the dyad who should be held responsible for the construction of goals. Amy and Claire have to negotiate the construction of a goal that can be agreed upon by both of them. For example, the goal in episode III, the selection of the two biggest blocks, can be seen as the outcome of such negotiations. This goal was first formulated as a selection of two blocks that belong together (in episode II), but Claire looked for a combination in the same colour. This made her mother formulate a new goal that explicitly mentions an important rule of the tower: the fact that the blocks should be selected by size and not by colour. Claire's participation, and hence her negotiations, are primarily in the sphere of operations with the blocks and not in the sphere of speech. Still, it is important that the goal is agreed on by both of them. The fact that it has become a *joint* goal is confirmed in episode VI, where the goal is set in lines 63—64, and Claire selects and constructs a new pair of blocks without much help from her mother. Amy does not intervene after the goal has been formulated, neither does she make suggestions. No further negotiations are necessary, because the goal has become intersubjective and silently agreed upon.

A layered structure

As has been argued before, a typical characteristic of a didactic mode of interaction is its layered structure of symmetrical and asymmetrical responsibilities.

We will illustrate a way in which this becomes manifest with an example from the same dyad.

After the completion of the task by the dyad, Claire spontaneously - without the researcher or her mother asking or encouraging her to do so - started to take the tower apart with the aim of building it again. Although she is now more familiar with the tower, the situation remains a tutoring interaction in a didactic mode. In the beginning of this second building process, it seems that the joint goal-directed procedure of selecting two blocks, making them into a pair and placing them on the stick, has become intersubjective and implicit. This goal is formulated either in a very abbreviated form or not at all.

While placing the third pair of blocks, however, something strange happened. The two blocks came apart and fell down on the stick one after the other. Amy says: "You can do it like this as well, did you see that?", so that Claire realizes that their procedure of placing pairs could be replaced by a procedure of placing blocks one after the other. This incident has consequences for the interaction in the next episode, in which the dyad started renegotiating the procedure of constructing and placing pairs. Claire selects the correct blocks, constructs them into a pair on the table, and then tries to place the blocks on the stick one after the other. She needs five attempts before the blocks are placed correctly (see Figure 10.3)

In the end, she decides to do it the old way because "it is not possible like this". In her fifth and last attempt, she constructs the pair on the table and places them on the stick as a pair. Apparently, it was very difficult for her to
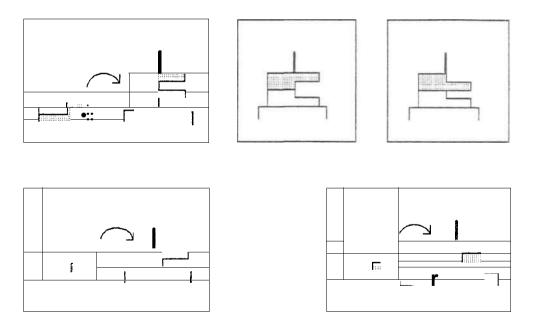

Figure 10.3 The child's incorrect and correct attempts within one episode

see that the position of the yellow block on *top of* the green one, as constructed on the table, is *not* the same as its position on the stick if placed as the *bottom* block of the pair. This is a problem she had not yet met, because in the old procedure, she placed both blocks on the stick as a pair instead of one by one. As a result of this problem, a break-down in the way the agreed goal is performed, the structure of the interaction becomes more complex. Four attempts result in incorrect placement of the blocks. It is not the goal itself that is brought up for discussion, but the (incorrect) result due to the way in which the goal is carried out. The *performance* of the goal becomes the focus of attention, resulting in a series of temporary subgoals. These subgoals within an episode lead to a layered structure of the interaction. The two layers in the structure of the interaction that can be discerned are (1) the agreed-on overall goal (placing a constructed pair of two blocks of the same size on the stick; this goal no longer needs negotiation) and (2) the temporary subgoals that are negotiated and performed, each with the intention of performing the overall goal, but four of them failing to do so.

Conclusions

The interaction between Claire and her mother is typical of a didactic mode. They take time to work on all the problems they come across (size, pair construction, placement on the stick), neither adult nor child wants to get a quick result, and mistakes are not immediately corrected but explored by the child, verbally mediated by the adult. In other words, a didactic mode is oriented towards the process of increasing the child's competence, not towards the product of the task (cf., Renshaw and Gardner, 1990). As will be clear, it is not just the adult having a didactic role, the child also participates in this didactic mode. She takes her time, listens to her mother, explores new ways of doing things. In other words, she knows to separate this kind of problem-solving from activities in another mode, such as play (which would have resulted in a fantasy construction with the blocks) or efficient productive activity. Amy and Claire combine symmetrical and asymmetrical role distribution, as shown while Claire explored her mistakes on her own, as long as she kept sharing the agreed overall goal.

The problem-solving interactions we analysed can be seen as *episodic* (cf., Valsiner, 1987), an emergent structure of goal-directed acting. The dyad as a problem-solving entity is responsible for these episodes. This means that although a child cannot perform the task alone, she is able to conceive and participate in the interaction as a problem-solving situation that needs goal-directed acting.

A structural analysis of adult–child problem-solving in terms of modes and episodes calls for an idea of control that is different from the idea displayed in most studies. An adult does not control a child on a moment-by-moment basis, as is implied by the notion of *contingency* (Wood *et al.*, 1976; Wood,

1989). On the contrary, a dyad constructs their interaction in accordance with a mode, and their cooperation is realized by a negotiated procedure that becomes manifest in episodes.

The variety of types of interaction we encountered can be systematized into modes of interaction. We can conclude that, even within the limited set-up of a problem-solving task, adults and children have diverse repertoires of interaction at their disposal. In some cases, adult and child initiated a certain mode of interaction, and this mode governed the whole session, as in the case of Claire and Amy. In other cases, there was quite some conflict, misunderstanding and (re)negotiation, because each participant tried to interact in a different mode to begin with.

The case-study showed that the child's learning does not depend solely on the adult's correct way of intervening. By taking initiatives on how to proceed and by participating in the interaction, Claire contributed substantially to her own learning.

How can instruction and learning be defined within the framework of the modes of interaction we could distinguish? Are there specific modes where learning and instruction take place, or is learning an opportunity in all modes of interaction? There is no single or simple answer to these questions.

To begin with, children have to learn to recognize the various modes of interaction and to function adequately within them. Therefore, the first answer is that learning and instruction always precede a given mode of interaction. Second, as each of the modes of interaction offers a rich field of experience, the second answer is that any mode of interaction offers ample opportunities for learning and instruction. Third, the didactic mode of interaction is a crystallization of a distinctive expert–novice relationship. This mode is a cultural invention, presupposing a social division of labour and considered as the ultimate educational activity in our culture. The third answer is that — at least in our Western history — a particular mode of interaction came into being as a very specific social organization of instruction and learning. However, learning and instruction as organized in a didactic mode can function only if embedded in other forms of learning and instruction; and, as shown by our case-study, learning should not be viewed only as the result of instruction.

We conclude that, on the one hand, learning and instruction are a specialized set of (inter)actions developed and constructed jointly by adult and child in a social history, but on the other hand, learning and instruction can never be reduced to these specialized (inter)actions. Learning and learning to learn are not the same.

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