

## CHAPTER 6

# Early Childhood Attachment and Later Problem Solving: A Vygotskian Perspective\*

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### INTRODUCTION

A classical dilemma of developmental psychology concerns the relationship between societal and individual development. Until recently most psychologists tended to ignore society's role in child development, depicting the developmental process as a "lone venture" for the child (Bruner, 1984). There is growing concern with this attitude, however, resulting in critical analyses and studies. Riegel was among the first American psychologists to oppose this "lone venture approach." He criticized developmental psychologists for studying developmental processes without studying the historical conditions and changes under which they take place. In his opinion the child should be seen as developing in a developing society. Ignoring this fact means neglecting the crucial, formative role of society (van IJzendoorn & van der Veer, 1984). Recently, researchers such as Bronfenbrenner (1983), Hinde, Perret-Clermont, and Stevenson-Hinde (1985), and Harré, Clarke, and De Carlo (1985) have ventilated similar concerns.

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Bronfenbrenner (1983) tried to explain the complex issues at stake by comparing the developing child in a developing society to a person walking in a train. The person can walk backward (regress) and forward (progress) in the cars of the (developmental) train, but the train itself will inevitably pass through a changing environment. As with other metaphors, this one is not without its drawbacks, however, as has been pointed out by Engeström (1986). One of its weak points is that no one seems to be driving the train, implying that children do not actively construct their environment and are but passive passengers of life. This certainly is not true, as has been amply demonstrated in various child studies (Trevarthen, 1977; Brazelton, Koslowski, & Main, 1974).

In order to understand the complex dialectic between child development and societal development, most researchers have focused on the social relationships the child engages in. This seems to be the place par excellence where child and culture meet. There is, to be sure, a limitation in this approach, because the influence of society can be exerted also through cultural objects and means, such as toys and books, and through culturally structured environments (Valsiner, 1987). Following a purely "interpersonal" approach one would, therefore, underestimate the role of social and cultural factors in child development (van der Veer & van IJendoorn, 1985). Nevertheless, the emphasis on an interpersonal approach can be defended, because children are introduced to cultural objects and means mostly through personal relationships. In particular for infants and small children, then, it seems a plausible choice to study the societal "background" of development through studying social relationships.

Most children in Western societies grow up in a nuclear family, forming attachments with one or more blood relatives. As they grow older, the network of attachments expands to include other persons outside the family. It is generally supposed that these long-lasting attachments to a small number of significant persons are of great importance for the child's developmental trajectory. In nontechnical language this means that the love and friendship of a few important others are crucial for the child's development and will partly determine its course. For this reason Hinde et al. (1985) have pleaded the necessity for a science about long-term dyadic and triadic relationships. These authors concentrate on the interplay between the child's social interactions and relationships on the one hand, and his or her cognitive development on the other hand, emphasizing that it is in practice well-nigh impossible to separate the cognitive aspects of development from other aspects.

As we are going to talk about adult-child relationships in this chapter, and in particular, about mother-child relationships, we will ignore the

influence of relationships with siblings and peers. It is important to note that these relationships are quite significant for child development (Newcombe & Brady, 1982). They will not be studied here, however, to avoid excessive complication of already very intricate phenomena.

### *SOME METHODOLOGICAL REMARKS*

It is quite hard to conceptualize the way social relationships structure the child's development. Hartup (1985, p. 66) has tried to elucidate this question, suggesting that relationships serve three functions in the social and cognitive development of the child. First, they are the contexts in which basic competencies emerge. Second, relationships are resources that furnish the child with the security and skills needed. Third, relationships are forerunners of other relationships. Taking this point of view, one avoids making the mistake of exclusively concentrating on the cognitive effects of social relationships, seeing the adult partner of the dyad solely as the more capable one. The caregiver is, apart from being a cognitive agent, a potential source of emotional warmth and feelings of security as well. Hartup (1985) has also pointed out some aspects of the complex dialectic between ontogeny and relationships—among other things, the fact that two persons are developing within these relationships, not one. In adult-child relationships one of the developmental trajectories is rapid, and the other slow. But even though the adult's trajectory may be slower than that of the child's, it has implications for the relationship that exists between them. The situation is complicated even more by the fact that both mother and child can have more relationships. Referring back to Bronfenbrenner's metaphor, one might say that mother and child walk at different speeds through the developmental train and, moreover, continually stumble across other people who further or hinder their progress. Clearly, in this complex situation it is hard to answer causal questions. Hartup even gives up and states that to ask these questions with respect to the development of relationships and the development of cognition is to ask the "chicken and egg" question. The development of cognition is as much the result of developing relationships as it is the cause of their future course. Accepting Hartup's position would imply that we are in no position to question Samuel Butler's aphorism that "a hen is but an egg's way of making another egg."

An even more complicated picture is sketched by Hinde et al. (1985, XV). They state that, in social relationships, the nature of the interactions depends upon the natures of the participant individuals, while the characteristics that individuals display depend in part on the nature

of the interaction and relationship in which they are involved. Moreover, in the longer term the characteristics that they can display are influenced by the interactions and relationships they have experienced. Further, the nature of relationships depends on those of the constituent interactions, but the nature of those interactions depends on the participants' perceptions of the nature of the relationship. The nature of any relationship is affected by that of the social group in which it is embedded, etc.. Reasoning in this way they come to the situation delineated in Figure 1. Hinde and his colleagues conclude that the child psychologist evidently must come to terms with a whole series of dialectics between successive levels of social phenomena. At the same time he must realize that each level does not represent a fixed state but a process in continuous creation through the agency of dialectics.

Taking into account this intricate state of affairs, it is not to be expected that isolated empirical or theoretical studies will soon lead to an all-embracing theory about the role of social relationships in child development. It will rather take years of diligent work by many researchers to find the missing pieces of the puzzle, and, of course, now and then a brilliant researcher will stand up and tell us that we are solving the wrong puzzle. It will be quite difficult to clarify the role of social relationships in child development, but in our opinion it is not a hopeless task. There are ways to tackle some of the "chicken

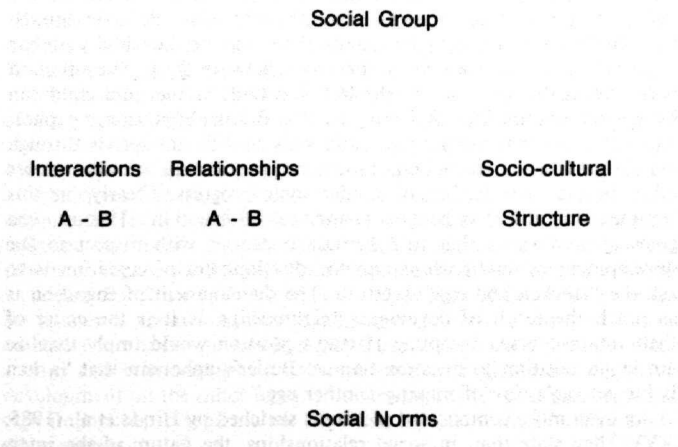


Figure 1. The dialectics between successive levels of social complexity (From Hinde, Perret-Clermont, & Stevenson-Hinde, 1985, p. xv).

and egg" problems, and under these circumstances solutions like Samuel Butler's can be proven implausible.

The traditional approach is to combine experimental or intervention studies with correlational studies. Bryant (1985) argues that both have their advantages and disadvantages. In his opinion intervention studies are capable of showing the fact that A (for example, a tutorial strategy followed by a mother) causes B (for example, enhanced cognitive performance of her child). But there is a basic problem about such studies, and this is the danger of artificiality. That is why Bryant argues that the experimental approach should be combined with (longitudinal) correlational studies, which constitute a better approach to find real-life effects. It is unclear, however, how this approach would solve our problems. The interpretation of correlational findings is, as we will see, fraught with difficulties. Moreover, Bryant's treatment of the intervention study seems to imply that the concept of direct linear causality ( $A \rightarrow B$ ) is applicable to processes of child development. This is doubtful, in view of the complexities sketched above. A tutorial strategy may facilitate or maintain the child's developing cognitive abilities, but it does not cause these abilities. The wish to find causal effects does not seem to be compatible with the dialectics of child development. More specifically, it seems to imply that the child's development is nothing more than the sum total of influences undergone by that child. This view would deny the active role of the child in structuring his or her own environment. An active role which has been defended by such diverse psychologists as Piaget and Vygotsky.

In the present study we will explore some of the connections between social relationships and child development from a less traditional perspective. The frameworks we will use are Vygotsky's cultural-historical theory and the attachment theory developed by Bowlby and Ainsworth. It is our feeling that the long-term influence of early childhood attachments for cognitive development has not yet been demonstrated convincingly. Finding such influence would considerably strengthen attachment theory. On the other hand, we feel that the cultural-historical approach lacks an appropriate perspective on the relevance of non-cognitive adult-child interactions. As we have argued in the introduction, the adult is not only a cognitive agent but also a potential source of love and protection. Both factors may influence the child's cognitive development.

### *ATTACHMENT*

The main points of attachment theory about the influence of early-childhood attachments on cognitive development can be summarized

as follows. The qualities of mother-child interaction can be assessed using the classification scheme developed by Ainsworth and Wittig (1969) for assessing the security of attachment between the mother and the child. In secure relationships mother and child seem to be sensitively tuned to one another in terms of proximity-maintenance and in terms of their emotions and communication. Secure attachments then, should be excellent contexts for mediating the regulation of the child's cognitive actions (Hartup, 1985, p. 79). Several findings seem to confirm this hypothesis (Matas, Arend, & Sroufe, 1978; Bretherton, Bates, Benigni, Camaioni, & Volterra, 1979). Securely attached mother-child dyads, for example, seem to include more enthusiastic and compliant children in problem-solving tasks who also exhibit fewer frustration-related behavior. Longitudinal research also demonstrated the fact that these children at 2.5 (Hazen & Durrett, 1982) and 5 years of age (Arend, Gove, & Sroufe, 1979) are more inclined to explore the surroundings than anxiously attached children. Finally, they are also more eager to learn and show more inquisitiveness (Waters, Wippman, & Sroufe, 1979). Hartup (1985) argues that the cognitive advantage of securely attached mother-child dyads is mainly to be found in the domain of regulative activities rather than other cognitive functions. Such advantages need not be reflected in global measures of intelligence such as IQ tests (but see van IJzendoorn & van Vliet-Visser, 1988), nor need they lead to higher chances of achieving success with a task. But they might result in a different patterning of specific abilities, in different emotional accompaniments of cognitive performance, and in different mother-child dialogues in problem solving tasks. Long-term effects of these cognitive differences were found in Arend (1984) and Rahe (1984).

A key concept in attachment theory seems to be that of "sensitivity" or "sensitive responsiveness" (Ainsworth, Bell, & Stayton, 1974). The caregiver has to respond sensitively in order for a secure relationship to be able to evolve. *Sensitivity* may be defined as a caregiver's tendency to provide contingent, appropriate, and consistent responses to an infant's signals or needs. Sensitive responses to an infant's signals will foster his or her feelings of security and competence: If every signal is adequately received and responded to, the infant develops a feeling of mastery over the environment and of trust in the persons who react to the signals. To react sensitively, the adult has to perceive the infant's signal or need, interpret it correctly, select an appropriate response, and implement it effectively (Lamb & Easterbrooks, 1981). Both understimulation (e.g., forcing the child prematurely to act independently, denying love) and overstimulation (e.g., overprotective behavior depriving the child of the possibility of independent explorations) should be avoided (Belsky, Rovine & Taylor, 1984). This does not necessarily

mean that an attachment relationship should be without frictions or even conflicts. Studies with nonhuman and human infants have shown that mothers will normally demand certain activities from their children when they feel it is appropriate to do so (Plooij & van der Rijt-Plooij, 1983). Perceiving that the infant is ready to perform the activity, they will demand from him or her to act, even if the infant is at first quite reluctant to engage in his or her "zone of proximal development" (see below).

We thus see that the caregiver-child attachment will function as a context for the child's cognitive development. The first interactional patterns between caregiver and child will have largely an emotional, affective nature. These interactions will develop into an affective relationship, the quality of which can be assessed by different means. Gradually the caregiver and child will start jointly performing increasingly difficult tasks, and the child will start independently exploring his or her environments. This means that the caregiver-child interactions will be cognitively more demanding. The affective interchanges will recede to the background while continuing to form an important context of the child's cognitive development.

### COGNITION

The picture sketched above fits nicely with the concept of social interaction developed within the cultural-historical tradition. Researchers working in this tradition claim that a large part of cognitive development evolves in social interaction with a more able partner. Child and caregiver continually participate in joint activities, and these activities are thought to be crucial for cognitive development. The adult partner in a relationship should be very well aware of the child's current abilities and should try to lure the child into joint activities slightly above his or her level of independent performance. This should help creating the so-called *zone of proximal development* defined by Vygotsky as "the divergence between the mental age, or level of actual development, which is determined with the help of independently solved tasks, and the level which is reached by the child solving tasks not independently but in collaboration" (Vygotsky, 1982, p. 247). Vygotsky was rather vague about the type of collaboration children need. He mentioned that the only good kind of instruction should march ahead of development and lead it (Vygotsky, 1982, p. 252), but this mainly referred to instruction in schools and he did not provide any detailed analyses of adult-child interactions. A basic idea behind the concept of the zone of proximal development is that the origin of all higher

cognitive processes is to be found in joint activities (van der Veer & Valsiner, 1986). At first they take place at the interpersonal level and only later, through internalization, they turn into intrapersonal capabilities (Vygotsky, 1983, p. 145). Many researchers, both in the West and in the East, have been inspired by these rather global but perceptive insights resulting in various different post-Vygotskian interpretations.

For our purpose the most relevant work has been done by Bruner (1983, 1984), Wood (1980; Wood, Wood, & Middleton, 1978; Wood, Bruner, & Ross, 1976) and Wertsch (1985a; b). Bruner has elaborated the concept of the zone of proximal development by introducing the notion of "scaffolding." He also pointed out the importance of "formats," that is, standard situations in which the interactions (e.g., play, problem solving) between caregiver and child invariably take place. Finally, Bruner demonstrated the importance of preverbal adult-child interactions for cognitive and language development. Thereby, he extended the period of supposed importance of adult-child interactions considerably to include infancy. Vygotsky tended to neglect these early joint activities (van der Veer & van IJzendoorn, 1985; van der Veer, 1986). Bruner's extension is also of importance for the connection with attachment theory. The reason is that the affective components of adult-child interactions are much more prominent in this period of life. By emphasizing the importance of this period for cognitive development and by analyzing emotionally-colored activities such as play and games, he turned our attention to the affective concomitants of interactions.

The work of Wood and his colleagues (Wood, Bruner, & Ross, 1976; Wood, Wood, & Middleton, 1978; Wood, 1980) is especially important because he has introduced a way of looking at the concept of sensitive responsiveness in the cognitive domain. Wood's idea was that mothers ideally should follow the so-called "contingency strategy" when trying to solve a problem together with their child. This strategy implies that the level of the mother's intervention in the child's problem-solving process should closely follow the child's successes and failures. If the child makes a mistake, the mother should provide instructions or suggestions just one level lower than she did before. An important characteristic of this strategy is that the mother adjusts her assistance in a very special way: she increases her demands as the child is doing well. This means that the mother is continually trying to get her child to perform at a higher level, thereby promoting independent problem solving. Effective instruction, thus conceived, consists in continually confronting the child with problems of controlled complexity, setting goals or making requests which lie beyond the child's current level of attainment but not so far beyond that he is unable to "unpack" or

comprehend the suggestion or instruction being made (Wood, Wood, & Middleton, 1978). Wood (1980) was able to show that children of mothers who followed this tutorial strategy were better able to solve the task without help afterwards. What is more, he demonstrated that teachers especially trained to follow the contingency strategy produced the same results. Children who had been solving problems with these teachers performed better than other children. This means that Wood and his colleagues were able to show that the mother's tutorial strategy contributed significantly to the independent problem-solving behavior of the children. The result is significant and should be kept in mind when analyzing the mother-child interactions in the present study. It implies that one should attempt to analyze mother-child interactions by retaining the sequential nature of these interactions. Only then can be seen which of the mother's interventions follow the child's actions. This reciprocal process will not be revealed by correlational findings but requires a sequential analysis.

Wertsch (1985a, 1985b) has done much to clarify the semiotic background of mother-child interactions reasoning from a Vygotskian point of view. He focused on the means mothers have at their disposal to create a perspective on problem situations shared by the child. When jointly solving a problem, mother and child frequently have different perspectives of the problem solving situation. It is the adult's responsibility to adapt flexibly to the child's perspective and to create a temporarily shared reality. In practice mothers follow, according to Wertsch, the strategy of accepting the perspective of their child if it is necessary for mutual understanding, but at the same time they repeatedly try to return to their own perspective of the situation. Not only do they quite probably think that their perspective is the more correct one, they also check whether the child is prepared to accept the adult view of the situation. When the mother realizes that her child is not capable of seeing the situation in another way than his or her own, she temporarily abandons her perspective. Mothers follow a quite flexible strategy in this respect. It is important to note that this strategy is essentially the same as the one advocated by Wood. When things go well, the mother starts demanding more; when things go wrong, she is satisfied for the time being and adjusts to the child's level. This, then, seems to exemplify sensitive responsiveness in the cognitive domain.

### ***SENSITIVE RESPONSIVENESS***

It is still unclear whether the concepts of affective sensitivity and cognitive sensitivity can be taken together under the heading of "general

sensitivity." This would mean that the basic processes of sensitive responsiveness are the same for both the affective and the cognitive domain. From the outline given above, certain similarities seem obvious. In both domains careful monitoring of the child's current abilities, signals, or state of mind is required. In both domains the caregiver should adjust to the child's point of view in order to reach common understanding. Finally, in both domains the caregiver will make demands on the child if he or she feels the child is ready for it. Despite these similarities one can imagine that some caregivers are more sensitive in one domain than in the other. In fact, evidence for the existence of two independent dimensions of sensitivity, one for affective behaviors and one for instructional behaviors, has been found by us in an earlier study (van IJzendoorn, van der Veer, & van Vliet-Visser, 1987; van der Veer & van IJzendoorn, 1987). In this study both the mother's affective (e.g., smiling, distance from child, encouragement) and cognitive (e.g., hints, feedback, instruction) behaviors during a joint problem solving task were rated. It turned out that these behaviors varied independently (formed two orthogonal factors in a factor analysis), thus suggesting that some mothers may provide a very good emotional climate while not being very adequate instructors, and vice versa. This would mean that, despite the structural similarities between the concepts pointing to an "umbrella" concept of sensitivity, in practice behavior may be specific for one or the other domain.

In the above it has been argued that the long-term influence of early childhood attachments has not yet been convincingly demonstrated. A more adequate conception of the importance of the intellectual interplay between caregiver and child may be needed. At the same time it was argued that researchers working in the Vygotskian line lack a perspective on the importance of affective caregiver-child interactions. The relevance of sensitive emotional behavior seems grossly underestimated in this school of thought (as is the case for any theory of cognitive development). These are reasons for trying to combine certain findings of attachment theory and cultural-historical theory. Concepts of sensitivity as outlined above could play an important role in this attempt. Keeping the idea of sensitive responsiveness in mind, we will try to explore in the present study some of the connections between affective and cognitive aspects of joint task performance. It goes without saying that we should not forget that the distinction between affective and cognitive behaviors is made by the researchers, and that in practice these behaviors will hardly ever be found in "pure" form. As Hinde et al. (1985, p. xvi) have put it, "we shall be forced to bear in mind that the concepts we use—relationships, cognition, emotion, stage, and

so on—are at the same time essential tools for understanding and blinkers that constrain our vision.”

### THE STUDY

In the present study some of the long-term repercussions of early childhood attachments will be explored. In particular, we are interested in the possible relevance of mother-child attachments for later joint actions of mother and child. To classify the early childhood attachment relationships, use was made of the well-known Strange Situation procedure. This resulted in the equally well-known categories of securely attached, and resistantly and avoidantly attached dyads. Three years later, the same mother-child pairs were asked to solve a cognitive task together, and both their verbal interchanges and their behaviors were analyzed. We wondered whether there would still be differences between the respective attachment groups in this situation of joint problem solving. In keeping with what was said in the paragraphs above, it was decided to study both the cognitive and the affective utterances and behaviors of mothers and children. The focus was thus not only on clearly cognitive aspects, like advice given by the mother, but also on encouraging remarks, etc. In this way any long-term differences for different attachment groups for both intellectual and emotional interchanges could be seen.

In agreement with the contingency strategy outlined by Wood and Wertsch (see above), special attention was given to the mothers' interventions following their children's behavior. Such a strategy seemed to be in keeping with the general Vygotskian framework which emphasizes the initial asymmetrical cooperation between adult and child. It is the adult who ideally adjusts his or her tutorial interventions to the child's efforts. Of course, inevitably, his or her actions will in their turn influence the child and promote some general atmosphere (van IJzendoorn et al. 1987; van der Veer & van IJzendoorn, 1987). In this chapter, however, the focus is on the question of whether adults generally follow a sensitive (contingency) strategy and whether such strategies are related to the attachment background. In addition we looked for emotional actions undertaken by the mother in reply to the child's efforts. Here also, the main interest was in the problem of the adults' sensitive responsiveness—in other words, the way adults react to children's actions in the emotional domain.

We will make use of different ways of analyzing the findings. In the first place, some traditional correlational results will be presented. It will be argued that these results are difficult to interpret and not sufficient

for our purpose. The reason is that correlational analyses are performed within groups and, therefore, speak only about the structure of these groups. They do not reveal anything about particular individuals within groups (Valsiner, 1986), nor do they tell us anything about the sequential structure of the data. In view of the goal stated above—to study mothers' interventions following children's actions—it was decided to add a sequential analysis. The sequential analysis fits the questions raised in this chapter particularly well, because the original temporal structure of the mother-child interactions is retained in the data. This analysis, therefore, allows interpretations about temporal contingencies and enables us to study maternal strategies in joint problem-solving situations.

### *Design*

At 24 months of age (range: 23 to 25 months), 77 children and their mothers were observed in the Strange Situation. Sixty-five of the mother-child pairs participated in a follow-up study 3 years later. The children completed an individual IQ test, and mother-child pairs completed a problem solving task. The whole process was videotaped. In the follow-up study, the mean age of the children was 64 months (range: 57 to 72 months).

Sixteen percent of the original subjects did not participate in the follow-up study. Respondents and nonrespondents were compared on the following variables: attachment classification, attachment behaviors, social economic status, and sex. No significant differences were found. Therefore, it was concluded that the nonrespondents did not constitute a specific selection from the original sample. Details about the original selection and the way it was selected can be found in Goossens (1986).

### *Procedure*

*The Strange Situation.* The Strange Situation is essentially focused upon the relationship between caregiver and child (Ainsworth, Blehar, Waters, & Wall, 1978). It consists of eight episodes, the last seven of which should ideally last 3 minutes each. The first one is variable and usually takes less than 30 seconds. After some final instructions in this first episode, caregiver and child are left in the playroom (Episode 2). In Episode 3, a stranger enters who, after 3 min, signals to the mother to leave (Episode 4). In Episode 5 the mother returns, to leave again in Episode 6. The stranger re-enters the room in the seventh episode, and in the last episode the mother returns once again. The whole procedure took place in a laboratory at the university. To assess the quality of the relationship, the interaction between mother and child

is scored on six 7-point rating scales, which take into account the frequency, intensity, and latency of specified behavioral components. The scales are for proximity and contact seeking, maintenance of contact, resistance, avoidance, search behavior, and distance interaction. The frequency of crying and explorations is observed. The patterns of scores on the first four scales in the reunion episodes (5 and 8) leads to the classification of mother-child pairs in anxiously avoidant attachment (A), secure attachment (B), or anxiously resistant attachment (C). These three main groups may be further subdivided into various subgroups (A1, A2, B1, B2, B3, B4, C1, C2). The securely attached group shows minimal resistant or avoidant behavior; children from secure dyads are somewhat upset when their mother has left, but her return has an immediate calming effect. The children from the A and C dyads deviate from this pattern. Some children avoid their returning mother (A), whereas other children behave ambivalently, seeking contact but resisting the mother as well (C). The subcategories B1 and B4 have been called "marginal" groups, because their position in the classification system is not altogether clear (Ainsworth et al., 1978). Children from the B1 dyads show some resemblance to children from A-dyads, because of their tendency to slightly avoid the mother. Children from the B4 group have been called anxiously dependent (van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1985; Sagi, Lamb, Lewkowicz, Shoham, Dvir, & Estes, 1985). These children are very upset in the Strange Situation: they cry a great deal and show little exploration or playing behavior. However, they greet their returning mother less ambivalently than do children from C dyads. Two observers independently scored 22 randomly selected videotaped Strange Situations. The interrater reliability, computed with Pearson's  $r$ , was good; for proximity in the two reunion episodes, .77 and .91, respectively; for maintaining contact, .95 and .97; for resistance, .88 and .92; for avoidance, .86 and .91. On the basis of these interactive scales, the children were classified as A, B, or C group children. The interrater agreement for this step was 95.5%; for the subcategories it was 91.5%. The scores on these scales and the classifications were derived from Goossens (1986). The interrater reliability for the scales in the other episodes and for "search" and "crying" ranged from .73 to .97. Agreement for exploratory manipulation was 78%. These scales and the behavioral patterns were scored by the second author. The stability and validity of the procedures for 24-month-old children is described elsewhere (Goossens, Van IJzendoorn, Tavecchio, & Kroonenberg, 1986; Goossens, 1986).

**The problem solving task.** Mother-child pairs were asked to come to the laboratory and to solve the so-called Butterdish problem. The mother was requested to assist her child (if necessary) as she and her child

were accustomed to. The whole problem-solving process was videotaped. The Butterdish is a series of round boxes of different sizes which fit together only when turned upside down (because of the protruding bottom of each box). The task for the child is to fit the boxes together in such a way as to form one compact box (having the size of the largest box). The maximum amount of problem solving time was fixed at 10 minutes. The actual amount of time needed was, however, much less. Mean time for reaching the solution was 139 seconds.

*Protocol analysis.* On the basis of the videotapes the dialogues between mother and child were transcribed. These protocols were then analyzed using various categories to score the verbal output of both mother and child. The utterances of the child were scored into the following categories: 1—Asking for feedback. All utterances of the child in which she or he asks for approval or disapproval of her or his actions by the mother. Examples could be utterances like "Is this wrong?", "This is okay, isn't it?", etc.; 2—Asking for advice. In this category were scored all requests for a general strategy, or questions about how to proceed in the next step of the process. The child might say, for instance, "What should I do now?" or "Where do I start?"; 3—Positive comments on the child's own actions; 4—Negative comments on the child's own actions; 5—Rest category of utterances not falling into the first four categories and of utterances which could not be deciphered. In addition the total frequency of the child's utterances was computed.

The mother's utterances fell into seven categories: 1—Positive evaluation; 2—Negative evaluation; 3—Neutral evaluation. All utterances in which the mother evaluated the actions of her child fall into these three categories; 4—Strategical advice. This category contains all the mother's suggestions concerning the most preferable way to proceed in this task to find the solution. The mother attempts to formulate a long-term strategy (either algorithm-like or heuristic-like) for her child. An example would be "Start with the smallest box and then try to fit the next smallest one, etc." (algorithm), or "Put aside all the boxes you already tried" (heuristic); 5—Direct advice. This category concerns all suggestions made by the mother about the best way to proceed in the phase immediately following the child's last action. The mother gives next-step or short-term hints and prompts to her child; 6—Egocentric talk. The mother comments on her own actions while trying to solve (a part of) the problem. In doing so she does not address her child; 7—Rest category of utterances not falling into the first six categories or utterances which could not be deciphered. In addition the mother's total number of utterances was computed.

Two raters independently scored all mother-child dialogues. The mean interrater-reliability was .92 (range: .65 to .99).

**Behavioral analysis.** The protocol analysis was based on the utterances of mothers and children. Of course, their interaction during joint problem solving does not solely consist of verbal utterances: both partners can display various nonverbal behaviors like pointing, looking, showing, etc. Therefore, using the videotapes, a system was developed to score the nonverbal interactions too. The categories used to score the verbal interactions were for the most part retained. This led to the following possible categories for the child's behavior: nonverbal request for help (the child is looking puzzled at the mother), asking for feedback, asking for advice, positive comment on own task performance, and negative comment on own task performance (for a description of these categories, see the paragraph above). The maternal behavior was scored into the following categories: no instruction (the mother is not paying attention to the child or is silently watching), global feedback (the mother gives feedback to the child without specifying any steps to be taken, e.g., yes, all right, try again, you can do it, etc.), strategical advice, giving and taking of the materials (the mother structures the task for the child by taking away irrelevant materials and supplying the right materials), demonstration (the mother shows the child how part of the task should be solved), and solving the task (the mother tries to solve the problem without the intention of showing her child how the task should be solved). All behaviors were scored using 3-sec intervals.

### ANALYSIS AND RESULTS

All utterances made by mothers and children were scored into the abovementioned categories. Because of the skewness of the resulting frequency distributions, it was decided to analyze the data using non-parametric statistical methodology.

#### *Analysis of Correlation Matrices*

The first thing one would like to know is whether the utterances of both partners in the dialogue are in some meaningful way interrelated. It seems evident that the mothers and children in problem solving tasks are communicating in the real sense of the word, and that their dialogue in no way resembles that of the proverbial cocktail party. A correlational analysis of the protocol data seems to confirm this idea (see the first part of Table 1).

The computation of Spearman rank-order correlations gives rise to the following considerations. The category "Asking for advice" is clearly related to various types of utterances made by the mothers. It seems that, if the children frequently ask for advice, the mothers will react by frequent evaluations of the children's actions and by indeed giving either strategical or direct advice. The correlations between the children's asking for advice and the mother's giving of advice are quite strong.

**Table 1. Correlations Between Maternal Behaviors and Children's Behavior for all Subjects (n=64), and for the Various Subgroups.**

Child	Mother Total group (n=64)				
	Positive evaluation	Neutral evaluation	Negative evaluation	Strategical advice	Direct advice
Asking feedback	.20	.07	.12	.24* <sup>1</sup>	.11
Asking advice	.24*	.23*	.26*	.45** <sup>2</sup>	.32**
Positive comments on own actions	.25*	.27*	.17	.24*	.09
Negative comments on own actions	-.03	.22*	.03	.10	-.07
B2/B3 (n=19)					
Asking feedback	.19	-.22	-.16	.08	.23
Asking advice	.07	.22	.14	.67*	.60
Positive comments on own actions	.14	.10	.04	.42*	-.07
Negative comments on own actions	-.02	.13	-.09	.14	-.16
A/C (n=13)					
Asking feedback	.21	-.06	.27	.32	-.05
Asking advice	.26	.52*	.09	.07	.31
Positive comments on own actions	.40	.12	.04	.25	.15
Negative comments on own actions	.15	.35	.17	-.20	-.16
B4 (n=14)					
Asking feedback	.30	.26	.42	.53*	.03
Asking advice	.53*	.24	.46*	.54*	-.20
Positive comments on own actions	.50*	.49*	.46	.42	.03
Negative comments on own actions	-.02	-.03	.06	.27	.08
B1 (n=18)					
Asking feedback	.11	.16	.32	.20	.09
Asking advice	.20	.15	.39	.43*	.44*
Positive comments on own actions	.20	.41*	.40*	-.11	.14
Negative comments on own comments	-.09	.28	.06	.28	-.12

1. \* indicates a level of significance of  $p \leq .05$

2. \*\* indicates a level of significance of  $p \leq .01$

This could mean that mothers react to their children's questions by providing much assistance. Of course, one should be cautious here. It might be that mothers giving much advice actually promote the asking of many questions. The correlations do not allow for any conclusions regarding the sequential chains in this situation. Whether the child's questions elicit the mother's tutorial behavior, or whether her instructions stimulate the child to ask for more advice, can only (partially) be solved by a sequential analysis (see below). On further inspection of the first part of Table 1, it becomes clear that the children's positive comments on their own actions are positively related to both neutral and positive evaluative comments made by their mothers. This would seem an obvious result if we suppose that both the children's positive comments and the mothers' positive evaluative remarks are probably related to a smooth task performance. Again, the plausibility of this assumption can only be demonstrated in a detailed sequential analysis of the child's actions and the mother-child dialogue. The children's negative comments on their own actions are positively related to neutral evaluative comments made by their mothers. This result can be interpreted in various ways. A plausible explanation would be that mothers do not wish to discourage their suboptimally performing children. They therefore restrict themselves to neutral comments.

From this correlational analysis it may be concluded that the mothers and children of our study generally interact in a meaningful and sensitive way when jointly solving an unknown problem. Referring back to the first part of our study, we can now ask the question of whether these interactional patterns are related to the attachment classifications established 3 years earlier. Is the emotional bond between mother and child, as established through the Strange Situation procedure, related to the nature of their cognitive interplay 3 years later? Let us remark first that such relations, when found, are quite hard to interpret. Indeed, they could reflect some stable aspects of the relationship between mother and child. But another possibility is that mother and/or child continue to show some characteristics which were built up in or influenced by their first attachment relation. In van IJzendoorn et al. (1987), we tried to solve some of these problems.

To analyze the cognitive interaction in our problem solving task for different attachment classes, we computed the Spearman rank-order correlations for four subgroups of mother-child pairs. Because the group of C dyads consisted of only four pairs, it was decided to combine the A and C groups. The normative B2 and B3 groups were also combined. This resulted in the following four attachment classes: A+C; B1; B2+B3; and B4. In Table 1 the correlation matrices for the different attachment classes can be found. The question arises of whether the correlational

patterns for the various subgroups are clearly different and, if so, whether these differences can be meaningfully interpreted. It would be particularly interesting if the differences were related to the assessments of the interaction made in the Strange Situation 3 years before.

Let us start with the normative group of B2 and B3 dyads (see the second part of Table 1). Significant relations were found between the children's asking for advice and the mothers' supplying of strategical and direct advice. Also, the children's positive comments on their own actions are positively related to the mothers' long-term instructions. Apparently, when the children are at a loss what to do and ask their mothers for advice, it is often given to them. The mothers, on the other hand, do not instruct their children if the latter are not explicitly asking for it (see the sequential analysis below). This would seem to be a reasonable picture for two partners well attuned to each other. In fact, in all groups, except the A/C group of avoidantly and resistantly attached dyads, a strong correlation between the mothers' long-term strategical advice and the children's positive comments on their own task behavior was found. The A/C group presented a remarkable picture, because only one significant correlation was found (see the third part of Table 1). The children's asking for advice was positively related to the mothers' neutral evaluations. One is tempted to conclude that mothers and children are not really well attuned to one another in this task. Their verbal utterances are not strongly related to each other, which suggests that Piaget's apt qualification "collective monologue" may be applied in our situation as well. One should be careful, however, because independent behavior need not always point to an inferior quality of interaction (see below).

We will refrain from discussing the correlational results for the B1 and B4 groups; their interactions resemble the B2/3 group much more than the A/C group. By now it has become clear that the correlation matrices do not permit strong conclusions with respect to the temporal order of the mother-child interactions. As the sequential nature of these interactions is one of our main interests, we now turn to another type of analysis which could be more fitting for our goal.

### *Sequential Analysis*

One way to get a more detailed picture of the interactional nature of mother-child dialogues is to analyze the actual sequence of the behaviors. Considering every behavior by one of the partners of a dyad as a turn in the ongoing dialogue, it becomes possible to compute the probability of occurrence of any turn as a function of the preceding turn(s). These probabilities are, of course, actually inductively found

**Table 2. Mothers' Instructional Reactions to Children's Behaviors (n=64; 3 Lags, 2659 Turns, 715 Behaviors)**

Lag	Children's behavior									Total lag 1			
	Request for feedback			Asking for advice			Positive comment				Negative comment		
Mother:	1	2	3	1	2	3	1	2	3	1	2	3	
No instruction	56	63	52	20	21	22	149	130	131	50	49	54	275
	(-)	(-)	(-2.0)	(-2.4)	(-2.1)	(-)	(2.5)	(-)	(-)	(-)	(-)	(-)	
Global feed-back	53	51	56	12	17	18	86	79	67	35	30	21	186
	(-)	(-)	(2.1)	(-2.3)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	
Global in-struction	29	24	21	24	18	13	22	29	24	15	13	14	90
	(-)	(-)	(-)	(3.8)	(2.3)	(-)	(-2.8)	(-)	(-)	(-)	(-)	(-)	
Concrete advice	40	40	41	20	17	18	48	50	50	20	25	24	128
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	
Does it herself	7	8	9	13	15	15	10	17	19	6	6	10	36
	(-)	(-)	(-)	(4.0)	(3.8)	(3.2)	(-)	(-)	(-)	(-)	(-)	(-)	
Total	185			89			315			126			715
%	25.9%			12.4%			44.1%			17.6%			

frequencies (e.g., "conditional frequencies" turned into percentages). Thus, if the child asks for advice in turn  $n$ , it is possible to compute the probability of occurrence of any behavior by either child or mother in turn  $n+1$ ,  $n+2$ ,  $n+3$ , etc. In Table 2 the frequencies of all maternal behaviors are presented as a function of the immediately preceding child behavior. Thus far we have concentrated on the purely verbal part of the mother-child interaction. However, both in the emotional and cognitive domain nonverbal behaviors may play an important role. That is why we now take into consideration several task-related behaviors (verbal as well as nonverbal), and analyze the sequential patterns of these behaviors. Because sequential analysis is based upon probabilities, we had to combine some observational categories to get reliable results. Therefore, we combined two categories of child behavior, e.g., nonverbal requests for feedback and asking for feedback. Both behaviors are global ways of getting information about the problem-solving process. We also combined three categories of maternal behavior which are focused upon concrete instructions and advice, giving concrete advices, taking and giving material, and demonstrating part of the solution to the child. In this way, we are able to present all data from 3-sec interval observations in 4 (child)  $\times$  5 (mother) categories. Single cases were connected through one, two, or three "missing data" codes, depending upon the number of lags analyzed, to prevent confounding of cases and lags (see Skinner, 1986, for a similar multiple cases approach of sequential analysis). In Table 2 the standardized residuals or  $z$ -values, computed on the basis of the conditional frequencies, are also shown for all subjects. Positive standardized residuals indicate that the frequency of the particular behavior was higher than expected (expectations being based on the assumption that all behaviors following a particular child behavior should have the same chance of occurring). Negative standardized residuals indicate that the particular behavior follows (*far*) less than expected.

Standardized residuals for three lags are given, because sometimes the child's behavior will influence maternal instruction only after several 3-sec intervals. First, the frequencies of the first lag will be considered. It is remarkable how often children have positive comments on their own performance: almost half of their behaviors consist of these positive comments, whereas only small part of their contribution to the dialogue consists of negative comments. For mothers the category "no instruction" is prevalent, whereas only small part of their assistance consist of solving the problem themselves. It is also remarkable that only during about a quarter of the turns do children show behaviors that are relevant to the problem solving process, e.g., 715 of 2659 turns. This could be the result of the restricted domain of our observational

system, but it is also conceivable that kindergarten children are unable to concentrate intensively on one task for a long period of time.

Second, standardized residuals for the three lags will be considered. Beginning with (verbal and nonverbal) requests for feedback, we notice that there is no maternal behavior connected with this behavior of the child in the first two lags. Only in the third lag do requests for feedback predict more global maternal feedback and less instructional aloofness of the mother than one would expect on the basis of the marginal frequencies. It is only after a delay that mothers relinquish their passive attitude and assist the child's problem solving with global feedback. We found a correspondence between asking for feedback and strategic advice in the correlational analysis, but here no immediate connection is to be seen. Mothers seem to need some time in order to decide whether their child is able to solve the problem alone before intervening on a rather global level. If, however, the child asks for concrete advice instead of global feedback, maternal reactions are faster and much more concrete. Already in the first lag, mothers show more involvement in the problem solving process, and it seems as if global feedback is considered inadequate for reacting to the child's request for advice. Global instructions prevail, as well as active participation in problem solving. These maternal reactions to the children's asking for advice are also visible in the second lag, and active maternal involvement is present in all three lags. If the child asks for advice, mothers' reactions are prompt and persistent. The results of the correlational analysis are therefore confirmed and specified. As we have seen above, asking for advice was correlated with maternal evaluations and strategic and direct advice. Asking for advice was correlated with most maternal behaviors, and we also see that asking for advice is sequentially connected most frequently with maternal reactions. Asking for advice, therefore, appears to be the most salient child behavior in a problem-solving process, eliciting prompt and persistent maternal instructions. Sometimes mothers will do (part of) the job themselves after the children's request for advice, thereby actually demonstrating difficult steps of the problem and allowing their children to observe how the task can be solved.

Positive or negative comments by the children on their own performance do not elicit much maternal reactions. Positive comments lead to less instruction by the mother, in particular to less global instruction. The child appears to correctly evaluate his or her task performance, and the mother refrains from intervening when the child shows he or she can handle the problem alone. Here, the results of the sequential and the correlational analysis diverge. We have seen that positive comments correlated with maternal evaluations and strategic

advice, but this outcome is not corroborated by the sequential analysis. Negative comments do not appear to be connected in any predictable way to maternal reactions. Mothers do not seem to take negative comments as an indication that their children need some help, and they appear to wait until requests for feedback or advice have been formulated more explicitly. These interactional patterns hold true for the aggregated "dyad" in our study. As in the correlational analysis, the question can be asked whether these patterns are related in some meaningful way to the attachment classifications established 3 years earlier. The sequential patterns for the four attachment groups are presented in Table 3. Of course, the results presented in this table are somewhat less reliable than those for the whole group because of the diminished number of turns in each group.

In Table 3, only the results for the first lag are presented. Frequencies for the second and third lag did not differ very strongly from those for the first lag. Below, we shall comment on significant standardized residuals for the second and third lag. First, the frequencies will be commented upon. Looking at the securely attached reference group, B2/3, we may conclude that the children from this group comment most frequently in a positive way on their performance. Negative comments are far less frequent. Children from B2/3 dyads seem to be most optimistic and self-confident about solving the problem. Together with the children from the other B groups, they also appear to ask less often for advice, but to request for feedback—verbally or nonverbally—more often than the anxiously attached A/C group. To see if these differences in the children's behavior result in different instructional behavior of the mothers, we have to look at the standardized residuals in Table 3. It is remarkable that three categories of children's behavior, i.e., requests for feedback, positive comments, and negative comments, do not appear to predictably elicit maternal instructional behavior. The diminished number of observations is, of course, of some importance here, but we already presented some correlational findings above which pointed in the same direction. As with the correlational analysis, only asking for advice is connected with maternal behavior in the first lag. However, these connections are restricted to the securely attached dyads: in the anxiously attached dyads, the A/C group, there is no sequential pattern whatsoever to be found in the data for the first lag. Mothers and children in the A/C group do not seem to interact meaningfully from the perspective of our observational system: asking for advice does not enhance the chance that mother will give some kind of advice or instruction in the first lag. In the securely attached dyads, however, asking for advice leads to more frequent global instruction and to the mothers doing some part of the task themselves. This last result, though,

**Table 3. Mothers' Instructional Reactions to Children's Behaviors in the Four Attachment Classes (Lag 1)**

Mother:	Children's behavior															
	Request for feedback				Asking for advice				Positive comment				Negative comment			
	A/C	B1	B2/3	B4	A/C	B1	B2/3	B4	A/C	B1	B2/3	B4	A/C	B1	B2/3	B4
No instruction	11	25	14	6	6	6	6	2	32	38	49	28	11	17	9	13
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Global feedback	8	16	14	15	6	4	1	1	18	26	23	17	7	11	7	10
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Global in- struction	6	11	5	7	4	7	7	7	3	7	11	13	3	5	2	5
	(-)	(-)	(-)	(-)	(-)	(2.0)	(2.2)	(2.1)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Concrete advice	4	18	10	6	6	5	5	3	13	9	15	10	5	11	1	3
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Does it herself	2	1	3	1	3	3	5	2	4	2	4	0	2	1	2	1
	(-)	(-)	(-)	(-)	(-)	(2.5)	(2.5)	(2.5)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Total	31	71	46	35	25	25	24	15	70	82	102	68	28	45	21	32
%	20%	32%	24%	23%	16%	11%	12%	10%	46%	37%	53%	45%	18%	20%	11%	21%

is based upon small frequencies and thus has to be considered less reliable. Mothers in the securely attached group appear to react meaningfully to their children when the latter have difficulties solving the problem independently: they give instructions or show how to solve the problem by demonstrating part of the solution. The impression of a collective monologue in the anxiously attached dyads, and a genuine dialogue in the securely attached dyads, is confirmed in the next two lags. Especially in the reference group B2/3 of very securely attached dyads, asking for advice after the first lag is followed by more instruction (standardized residual,  $sr=-2.3$ ) and by mothers doing more of the task themselves; this is, therefore, a continuation of maternal reactions in the first lag. In the third lag, there remains more instruction than expected ( $sr=-2.1$ ), but now the child is getting more concrete advice ( $sr=2.4$ ). This seems to be a sensitive strategy: after having given global instructions and trying to solve some part of the problem by themselves, the mothers of the B2/3 group turn to giving concrete advice in the third lag. Apparently, they wish the child to solve the rest of the task with the help of their advice. In the other—marginally secure—dyads (B1 and B4), this sequential pattern is less pertinent. In the B1 group, there is no connection between maternal and child behavior in the last two lags, whereas in the B4 group mothers are solving the problem themselves in the second ( $sr=2.1$ ) and third ( $sr=2.3$ ) lag, which seems to be a less sensitive strategy compared to giving concrete advices as the B2/3 mothers do. In the anxiously attached A/C group, mothers react to the children's asking for advice with global instruction in the second lag ( $sr=2.2$ ), but not in the third lag. They do not react promptly and they do not appear to persist in their reactions. We are, therefore, inclined to think that children from the A/C group are operating in a more difficult task environment than the "ideal" reference group B2/3. In the B2/3 group, and to a lesser extent also in the B1 and B4 groups, chances were rather high that the mother would indeed supply the requested instructions. Not so for the A/C group, where the chances that the mother will give adequate instructions do not seem to depend on any previous action undertaken by the child. In general, one can say that in these dyads the mothers' reactions are distributed among categories by chance and cannot be predicted on the basis of the child's actions in the previous lag. In this respect, the sequential analysis confirms the correlational structure of the data, in which almost no significant and interpretable correlations were found for the A/C group. Finding no clear sequential pattern in problem-solving interactions of the A/C group might mean that the mother is not closely monitoring the child's actions and, therefore, acts more or less independently. A more favorable but less plausible interpretation

would be that she is well aware of her child's actions but deliberately ignores questions for help, approval, etc., perhaps in an effort to promote independent problem solving.

We conclude this paragraph by looking at differences between boys and girls. In Table 4 the results of the sequential analysis for girls and boys, respectively, are presented.

For girls, not much sequential structure can be found. Negative or positive comments on their own actions do not elicit any reaction from their mother; the same holds true for requests for feedback. Only asking for advice stimulates maternal reactions: in general the mother gives more instruction, more global instructions, and tends to do the task herself more often than expected by chance. Generally speaking, one finds more interactional structure for mother-boy dyads than for mother-girl dyads. Whereas girls' positive comments elicit no consistent maternal reaction, boys experience consistent instruction: they get less global instructions, and more "no instructions," that is, less instructions generally, than would be expected by chance. These reactions seem adequate responses to the self-confident behavior of the boys and may stimulate their autonomous problem-solving capability. Boys also get more consistent and prompt reactions to their verbal and nonverbal requests for feedback. Mothers give more instructions generally and, in particular, more concrete advice. They appear to react about the same to the boys as in the case of girls' asking for advice. The differences between boys and girls are even more apparent for the second and third lags. For mother-girl dyads, no sequential structure was found.

Table 4. Mothers' Instructional Reactions to Behaviors of Girls and Boys Separately (Lag 1)

Mother:	Children's behavior							
	Request for feedback		Asking for advice		Positive comments		Negative comments	
	girls	boys	girls	boys	girls	boys	girls	boys
No instruction	34	22	9	11	64	85	27	23
	(-)	(-2.5)	(-2.0)	(-)	(-)	(2.2)	(-)	(-)
Global feedback	21	32	7	5	41	45	19	16
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Global instruction	13	16	12	12	14	14	6	9
	(-)	(-)	(2.5)	(2.5)	(-)	(-2.1)	(-)	(-)
Concrete advice	15	25	12	8	22	26	16	4
	(-)	(2.1)	(-)	(-)	(-)	(-)	(-)	(-)
Does it herself	5	2	6	7	5	5	5	1
	(-)	(-)	(2.0)	(4.0)	(-)	(-)	(-)	(-)
Total	88	97	46	43	146	175	73	53
%	25%	26%	13%	12%	41%	48%	21%	14%

For mother-boy dyads, the following pattern seems to arise: in the second lag, only asking for advice elicits a predictable response; the mother tends to do some part of the task herself ( $sr=4.3$ ). The same connection can be discerned in the third lag ( $sr=3.9$ ). However, in the third lag, requests for feedback also lead to systematic reactions: mothers give more instructions in general ( $sr=-2.1$ ), and react with global feedback more often, than was to be expected by chance ( $sr=2.1$ ). Finally, boys' positive comments on their own performance stimulate the mothers to give "no instruction" ( $sr=2.1$ ). In sum, in all three lags maternal reactions to boys appear to be more prompt and consistent, that is, more sensitive compared to their reactions to girls. These results are intriguing and difficult to account for at the same time. It appears that a statistical explanation can be ruled out—although the number of turns for boys is slightly higher than for girls (1332 vs. 1119), this difference in itself is unlikely to account for the sex differences found in the sequential analysis. There was also no confounding of attachment classification and sex in the sample. This implies that the finding is real and that we have to look for theoretical explanations.

### *DISCUSSION AND CONCLUSIONS*

The present study started as an attempt to explore some of the long-term repercussions of early childhood attachments. In particular, we were interested in the possible influence of attachment class on mothers' and children's later joint problem solving. Different methods to analyze the mother-child interactions were used. Generally speaking, the classical method of correlational analysis of mother-child interactions was found to be the least useful. The value of this method, the validity of which has been questioned by Valsiner (1986), seems rather limited, at least for the type of phenomena studied here. More informative were the sequential analyses of the mother-child interactions. In particular, the sequential analysis of both the verbal and nonverbal aspects of the interactions yielded some interesting results. Sequential analysis thus seems to be a potentially effective tool when studying this type of phenomena. A possibly more detailed understanding of the phenomena studied might have been reached by leaving the perspective of looking for between-group differences and diving into the individual mother-child interactions. This would also have brought us closer to the concept of sensitive responsiveness, as was outlined in the first paragraphs of this chapter. However, as we were interested in between-group differences, in particular the difference between securely and

anxiously attached dyads, we used the concept of sensitivity in a less restricted and more "loose" way.

Some interesting findings concerning early childhood attachments and later joint problem solving indeed were found. We will concentrate here on the differences found between dyads originally classified as either securely attached (B2/3) or anxiously attached (A/C). For securely attached dyads, the picture was as follows. When the children from the B2/3 group asked for advice, their mothers replied by giving such advice, i.e., global instruction, or by doing part of the task themselves. They, therefore, reacted meaningfully to their children's initiatives. As argued before, these replies made by the mother might be called sensitive in the "loose" sense of the word. The situation was different for the group of anxiously attached dyads. There, asking for advice was not characteristically met by prompt and consistent maternal reactions. Mothers were not likely to give the advice the children were asking for, at least not in the first lag. No pattern whatsoever could be found in our sequential analysis for the first lag. For the next two lags, meaningful patterns in the securely attached groups were detected, but only one link between maternal and child behavior in the anxiously attached group. One is tempted to conclude, therefore, that, 3 years after the original classification, there still are differences in interactional patterns between these groups. The dyads originally classified as insecurely attached still appear to interact in a climate which seems less supportive.

These findings are relevant for the two frameworks we have described in this chapter—cultural-historical theory and attachment theory. As has been said before, cultural-historical theory lacks an adequate perspective on early childhood affective interactions. It could benefit from attachment theory which has described in detail how the emotional bond between caregiver and child develops, starting from the earliest contact-eliciting child behaviors like smiling, crying, and proximity seeking. The reciprocal, interactional nature of this bonding process has become firmly established. It is our opinion that cultural-historical theory—starting from the same interactional perspective—can easily and should incorporate this attachment perspective. This would provide it with the much needed conceptualization of affective interactions. Elsewhere (van der Veer & van IJzendoorn, 1987), we have argued that both frameworks are compatible in this respect. The primitive contact seeking behaviors (e.g., smiling and crying) could be thought of as Vygotskian lower psychological processes which become interpreted in culturally bound ways (van IJzendoorn, 1986). Thus, findings and concepts from attachment theory can be a valuable contribution to cultural-historical theory. The latter's historically strong focus on

verbal interaction is attenuated, and the former's emphasis on affective preverbal interaction gets its due attention.

Attachment theory, on the other hand, may benefit from concepts and methodology developed within the cultural-historical framework. The claim of attachment theorists that the quality of emotional bonds is crucial for both the child's emotional and cognitive development can be corroborated only using the right means for assessment of emotional and cognitive development. The notion of the zone of proximal development and the idea of a contingency strategy seem to be valuable means in this respect. Moreover, as we have argued before, they seem to match closely the concept of sensitive responsiveness developed within the attachment approach.

The combination of cultural-historical theory and attachment theory thus seems to give us at least the outlines of a comprehensive theory of child development. Attachment theory is particularly appropriate for describing the evolution and development of the first emotional relationship(s) of the child. Virtually all caregiver-infant interactions are heavily affect-laden. Gradually the character of the interactions will change, however, and the affective aspect—though still strongly present—will become less prominent. The almost purely affective dialogue will gradually turn into a more cognitive dialogue. The emotional bond will not disappear, of course, and will form the context for all non-emotional interactions. Children from a securely attached dyad, for instance, will feel emotionally secure when coping with difficult cognitive problems. Quite probably this will affect their behavior in these tasks. In this chapter we have found evidence that patterns of interactions of dyads originally classified through the Strange Situation procedure still differ in a problem-solving task 3 years later. Apparently, although the bond between mother and child will be gradually transformed (and sometimes redefined by one or both of the partners), there still is some stability in their interactions. This stability showed up in our sequential analysis, suggesting a continuity between affective early childhood interactions and later joint problem solving.

However, we should be cautious. The differences between the various attachment groups are not overwhelmingly clear, and other, independent, classifications (e.g., sex) also result in some significant differences. This means to the present authors that one should look for other factors apart from quality of attachment on the dyadic level. As we argued elsewhere (van IJzendoorn, van der Veer, & van Vliet-Visser, 1987), when analyzing mother-child interactions one should realize that the child is part of a developing network of social relationships. A qualitatively good attachment network could provide the developing child with a degree and quality of support which makes it hazardous to

make any definite statements about the child's current or future cognitive and emotional development based upon dyadic data. Paraphrasing Hinde et al. (1985, p. xvi), we might say that the dyadic concept of attachment is at the same time a potentially useful tool for understanding and a blinker that constrains our vision.

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