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MEMORY FUNCTIONING AND DEVELOPMENT THROUGH SOCIAL AND INDIVIDUAL PROCESSES

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MEMORY FUNCTIONING AND DEVELOPMENT THROUGH SOCIAL AND INDIVIDUAL PROCESSES

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Abstract

MEMORY FUNCTIONING AND DEVELOPMENT THROUGH SOCIAL AND INDIVIDUAL PROCESSES

by

Frederick Verdonik

Advisor: Professor Katherine Nelson

The present research is an exploratory study of memory processes that occur during social interactions between mothers and their children. Three major developmental issues were addressed in the present study: 1) the relation of joint reconstructions to participation in the overall activity; 2) the relation of joint reconstructions to participation in inquiries; and 3) the relation of joint reconstructions to participation in discrepancies between speakers about memory for places.

A total of 32 mother-child dyads participated in the study: 16 dyads each composed of 4-year old and 7-year old children and their mothers. Participants were from predominantly white middle-class backgrounds. The design of the study consisted of two phases. Phase I measures assessed individual memory competencies of mothers and their children under different degrees of contextual support for remembering. In the interview, subjects were requested to recall places in their community. Phase II consisted of observing memory processes between mothers and their children in the context of a map-making activity. Each mother-child dyad was instructed to build with blocks places

in their community. Instructions of the model building activity created implicit demands to remember information.

The results indicated significant differences in the proportional use of joint reconstructions by dyads. The proportion of joint reconstructions used in the activity was greater for dyads including younger children than for those including older children. Also, dyads that included older children used proportionally more individual reconstructions than dyads that included younger children. Moreover, the results indicated several differences in speakers' proportional use of inquiries during joint reconstructions. These differences were interpreted as further developments in children's participation in joint reconstructions. Finally, there were no significant differences in mean number of memory conflicts or checking episodes between dyads with different age compositions.

The present research provided a basis for further considerations of how memory processes are potentially organized in social exchanges. The social exchanges that constituted joint reconstructions between mothers and their children (from white middle-class backgrounds) may be specific to task-oriented activities. Nevertheless, the results suggest a socialization of children's memory processes and development of interpersonal functions functions of memory during early childhood.

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The intellectual stimulation and challenges provided by my committee members undoubtedly improved the quality of both my research and education. Since this is a document about joint memory, I wish to share with the committee my fondest experiences of my contact with them. I want to thank Dalton Miller-Jones for his keen insights into coding social interactions, and his countless therapy sessions which made life in graduate school more meaningful. I wish to thank Bill Hirst for the many dinner conversations during which he taught me how to be a "sane" experimentalist, and for the memories of a friend who was unselfish and patient in his exchanges. Finally, I wish to thank Katherine Nelson for her continuous encouragement of and input into the concepts of social memory, her giving a balanced perspective on individual memory processes, the degrees of freedom she granted me to explore, and for the understanding and patience that she gave to an often difficult student.

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Introduction

The purpose of this research is to describe memory processes that are observed in the interactions between mothers and their children during a joint activity. Collectively, these interactions are viewed as social memory processes. As social processes, episodes of sequential interactions between mothers and their children form co-operative mechanisms to reconstruct the past. From this perspective, memory-products emerge from social dynamics during these episodes.

The rationale of this research endeavor is best understood through first presenting an overview of the present study on social memory in relation to current problems addressed in memory development. This overview provides a general framework for considering the history and significance of the research problem. Following this overview, a research literature which is particular to the developmental hypotheses in the present study will be reviewed.

Significance of social processes for current research paradigms of memory development

Past experiences are used on a daily basis to carry out activities (Neisser, 1982). Developmental psychologists need to explain what, how and why memory-related processes (i.e., those processes that contribute to reconstructions of past experience in an activity) develop during early childhood (e.g., Ornstein, Naus, Liberty, 1975, Paris &

Lindauer, 1978; Perlmutter & Meyers, 1979; Nelson, Fivush, Hudson, & Lucariello, 1980) stabilize and/or change over the life-span (e.g., Perlmutter, 1983, in press; Baltes, Dittman-Kohli, & Dixon, 1984) are different and/or similar within and across individuals (e.g., Meumann, 1907; Schneider, 1984), and are different and/or similar within and across cultures (e.g., Cole, Gay, Glick, and Sharp, 1971; Cole & Gay, 1972; Wagner, 1974, 1982; Cole & Scribner, 1977). Towards these ends, researchers have acknowledged, in principle, that memory functions and their development are determined by an interplay of biological, psychological, and social variables (e.g., Bartlett, 1964; Vygotsky, 1979; Luria, 1976; Perlmutter, 1984, in press).

However, with too few exceptions (e.g., Ratner, 1980, 1984; Rogoff & Gardner, 1984), there is little research in developmental psychology on social dynamics between participants that operate to reconstruct past experiences in the service of an activity. Developmental and non-developmental models of memory have generally ignored these social dimensions of remembering. Given the sparseness of studies on this topic, further research on social memory processes is justified. The present study contributes to current research on social memory processes through: 1) identifying different social processes between mothers and their children that constitute reconstructions of past experience, and 2) describing how their social memory

processes are related to individual memory skills and age composition of participants in an activity.

A descriptive study of social memory processes is also justified by the potential contributions of this general line of research to explanations of development of children's memory. Specifically, it has been suggested by some researchers that biological and psychological variables do not fully account for how and why memory processes, such as semantic recall and autobiographical memories, emerge during childhood (e.g., White, 1984). Social exchanges between parents and their children are potential mechanisms for further explaining development of memory-related processes.

Over the last decade, researchers have offered evidence that adults' guidance, support, and structuring of children's participation in activities can facilitate development of various cognitive processes such as language and thinking skills (Sigel, 1970; Ninio & Bruner, 1978; Wertsch, McNamee, McLane, & Budwig, 1980; Saxe, Gearhart, & Guberman, 1984). Similarly, these social dynamics between adults and children may also contribute to the development of memory-related processes during childhood (Ratner, 1980, 1984; Verdonik, 1981, 1986, in press; Rogoff & Gardner, 1984). Children may differentiate, integrate, and eventually internalize memory-related strategies (e.g., rehearsal and semantic transformations) that are initially co-enacted as joint processes with the aid of competent

adults and peers in an activity. Thus, participation in conjoint reconstructive processes in the service of an activity may constitute social mechanisms for establishing, maintaining, and refining individual memory processes during early childhood. The present descriptive study of social memory processes is intended to specify co-constructive processes that potentially contribute to memory development during early childhood.

A review of the research literature on social memory functioning: A process view.

Current studies on memory functioning have employed social perspectives that can be described as social influence models. These studies differ significantly from the social perspective of the present study in several ways. Although these studies are not reviewed, an overview of their research programs is presented to clarify some differences in their empirical approach and theoretical assumptions from those of the present research.

Studies of social influences on memory reflect two different approaches to the same research tradition. First, many studies have examined the relation of higher-order social variables (e.g., education, race, and socio-economic status) to individual memory functioning (e.g., Cole, Gay, Glick, & Sharp, 1971; Jensen & Figueroa, 1975). However, these studies have not attended to descriptions of social exchanges that are embedded in higher-order social variables (e.g., school versus non-school settings, or cohort

effects). While demographic studies of memory provide valuable insights into the prevalence of memory functions as related to social categories, they do not directly inform the present work about the qualities of social exchanges that are related to social categories. How and why specific higher-order social variables are related to particular memory processes remain unanswered questions.

Similar to the present study, a second approach to study social influences on memory employs social interactions as a research paradigm (e.g., Bartlett, 1964; Ratner, 1980, 1984). However, the theoretical assumptions of these studies differ from the assumptions of the present research. First, in these studies memory-specific processes are viewed as being affected by social interactions, but memory processes are ultimately attributed to individuals in the interaction. In contrast, the present study is based upon memory research generated from sociological traditions (e.g., Halbwachs, 1980) and general systems approaches (e.g., Olson, 1979). From this perspective, social exchanges between participants in an activity are interpersonal processes that actualize reconstructions of past experiences. They do not simply influence memory processes. Social exchanges constitute memory processes.

The present conceptualization of social memory processes has followed a separate line of inquiry from social influence models with respect to: its history in the research literature, the research questions it tends to

address, and its view of the relation of social to individual memory processes (e.g., Halbwachs, 1980; H. Perlmutter, 1952; Olson, 1979). At this time, the two approaches are difficult to reconcile. Consequently, studies of social influences on memory-specific processes will be referenced only when they are relevant to clarify the social processes.

Theoretical frameworks guiding the present research, (the sociological approach of Durkheim [1982] and Halbwachs [1980] and general systems approaches of Von Bertalanffy [1968] and Olson [1979]) are outlined below. Empirical research which provides a rationale for descriptive hypotheses in the present study is presented after the theoretical discussions of social memory processes.

Memory as a communicative process between participants in an activity. Memory is defined as a function which operates as an integral part of both individual and interpersonal activities (Zinchenko, 1981; Istomina, 1975; Vygotsky, 1979). Stated in its most general form, a memory function is evident when information from past experience is reconstructed in the present. This functional approach implies that there are numerous operations to actualize memory functions under different conditions, including social exchanges that constitute conjoint cognitive processes.

Within a general systems approach, memory processes that operate during social exchanges are viewed as

dimensions of communicative processes between group members (Olson, 1979; Wolf, 1979; Verdonik, 1986, in press). Indeed, communicative processes are regarded as subsystems of actions that are embedded in a larger system of human transactions called activities (cf., Kuhn, 1971). In extending a general systems perspective to memory operations in communicative contexts, memory processes are defined as social because their specific structures and operations in joint activities occur through communicative channels between participants (cf., Olson, 1979). Insofar as joint activities are systems regulated by social exchanges between participants, social memory processes operate as functional components of communicative subsystems in the service of an activity.

An implication of this social perspective is that communicative and individual processes that actualize memory are not specific to memory functions. For instance conjoint remembering is constituted by various social-cognitive processes between participants. Mothers and their children may jointly infer, elaborate, interpret, and check information when reconstructing experiences from the past (Verdonik, 1984, in press; Rogoff & Gardner, 1984). Social-cognitive processes are combined or orchestrated to actualize memory functions, which make them memory-related processes at a particular time, yet these processes are not specific to memory functions in all activities.

Social-cognitive processes used by group members to achieve memory functions are often adaptive to the immediate needs of participants in an activity to share meaning about the past. As an adaptive system of social exchanges, social orchestrations of cognitive processes are characterized by their flexibility. Also, the same memory function can be realized by different combinations of social-cognitive processes. Thus, the term "memory" in the present research refers to either individual or social uses of cognitive processes to reconstruct information.

Social-cognitive operations used to actualize memory functions differ for social interaction, when compared to their occurrence under individual conditions. Social exchanges constrain and afford reconstructions in ways that are different from individual remembering. While individual processes contribute to social constraints and affordances, they do not fully determine how memory functions are realized during social interactions. Rather, communicative functions of remembering create unique constraints on and affordances for remembering during social interactions. For instance, group reconstructions entail two or more people who have different interpretations of information already remembered or to be remembered. While group members share some interpretations, when they do not share the same meaning of some event a need is created for them to negotiate a shared meaning (Rommetveit, 1980).

In contrast to communicative settings, when individuals reconstruct information outside of social exchanges, it is not necessary to construct shared meanings with themselves. An individual as a self-system does not have to share meaning with her/him self, or take the perspective of him/herself since she/he is the self. Thus, the specific communicative constraints on remembering as an individual effort after meaning are different from those constraints on group reconstructions as joint efforts after shared meaning. Thus, unique qualities of memory as a social process are grounded in its communicative role.

In sum, there are unique memory functions that reflect the imprint of their uses in communicative, versus non-communicative settings. One major function of social memory processes in communication is: group members reconstruct the past as an effort after shared meaning (cf., Halbwachs, 1980; Spence, 1982). In particular, social memory processes help group members to establish, maintain, and change shared meanings of actions between group members during social interactions. This communicative function is achieved through participation of group members in processes of generating shared frameworks of memory, which relate group members to prior experiences (Verdonik, 1984).

Consider the following dialogue as an illustration of how participants of a discussion jointly act to structure, guide, and support each other's reconstructions [Note 1]. A

mother and child were engaged in a discussion about a future trip to their country house.

M: Do you remember last summer when we went swimming in the lake?...And you saw the ducks?
C: No.
M: We picked wild blueberries and made blueberry pie? [Pause]
We saw a deer? And we tried to feed the deer.
C: Yeah, and it ran away.

The mother first announced to her 6-year old child that they would be going to the country again, but the child did not understand where they were going. In an attempt to bridge their understanding, the mother helped the child to reconstruct some events from a previous visit to the country. As exemplified above, an important feature of social memory processes is the functional relationship between participants during these reconstructive episodes, and the changes in this relationship over time. As participants in a discussion, they were mutually dependent upon one another to generate and interpret information about the past. For instance, the participation of the child in reconstructing past experiences at a summer home was guided and supported by his mother's inquiries. Through these inquiries the mother invited her child to interpret and confirm their past experiences. Also, timely pauses by the mother provided opportunities for the child's participation in the reconstructive process.

Moreover, the mother's efforts to reconstruct information with her child and to establish a shared framework of meaning about the past were enabled and

constrained by the quality of her child's participation. For instance, the child's verbal and non-verbal feedback to his mother's inquiries regulate how his mother further elaborated and organized information. In sum, memory-products that were constructed during social exchanges reflect co-operative efforts. Memory-products emerged from the interlocking behaviors of both participants in a reconstructive episode.

The present emphasis on communicative functions of memory in mother-child interactions may generate concern about an over-socialized view of memory processes (cf., Wrong, 1961). To avoid confusion about the relation of social memory processes to individual memory processes, some additional comments are necessary to clarify what is not being claimed in the present perspective. First, the present social perspective neither precludes nor denies the actualization of memory functions by individuals, nor the importance of individual processes for development of memory functions.

Second, social and individual memory processes are not mutually exclusive in occurrence during a single activity. During some segments of an activity, participants can choose to collaborate, while in other episodes participants may reconstruct information with little interdependency with respect to reconstructive processes. This does not mean that contingency of actions does not exist on other levels (e.g., coordination of physical actions or planning). It simply

suggests that memory functions are not always realized through social processes in joint activities.

Third, relations of individual to social processes are viewed in terms of constraints and affordances for development of operations that realize memory functions. For instance, individual memory competencies simultaneously limit and enable a range of social exchanges that can occur between participants to form joint reconstructions. In turn, social memory processes do not fully determine the development of individual memory competencies. Social reconstructions create conditions for participating in new forms of reconstructions that have not yet developed or stabilized on an individual plane. Through participation in joint reconstructions, individual memory competencies may emerge and expand. Hence, children's development of individual memory processes are also constrained and enabled by quality of participation in social reconstructions.

Finally, the focus on mothers and their children is neither meant to suggest that social memory processes only affect individual memory development during early childhood, nor that social memory processes only occur between mothers and their children. As previously noted, research on mother-child memory processes reflects an interest in describing initial developments of social memory processes. The use of mother-child dyads to describe these developments is a means to an end. It is not a theoretical statement which limits

the potential operation of these processes to mothers and their children.

There are several developmental aspects of the framework presented thus far that are relevant to issues of memory development during early childhood. A research literature which supports descriptive hypotheses about development of social memory functions during childhood is presented in the next section.

Social memory processes between mothers and their children. The present study focuses on social exchanges between mothers and their children that constitute joint reconstructions. Engagements in these social exchanges are called joint reconstructive episodes or social memory processes. Previous studies of social memory processes have exclusively employed adult samples. There is no research from sociological or general systems approaches on group memory processes between adults and children. Consequently, the present research draws upon an adult literature on social memory.

Research on adult social memory processes provides a useful framework in which to consider developmental questions. In particular, a study by H. Perlmutter (1952) suggests that social memory processes differentially affect individual memory-products. In his study of college students, subjects were read a story, and then they were asked to recall the story under group (i.e., with the help of other people) and/or individual (i.e., without the help

of other people) conditions over repeated trials (cf., Bartlett, 1964). Results indicated that social pressures to conform tended to limit extreme distortions by group members when recalling the target story in a group setting. The final group memory-product (i.e., an agreed upon version of the story) was not derivable from assessments of individual story recall that occurred prior to participation in group reconstructions.

In a similar study on adult group recall of a story, Yukes (1954) confirmed and elaborated upon Perlmutter's findings. Pressures to conform to the social consensus were significantly related to the general structure of participation in joint reconstructions (e.g., democratic versus authoritarian leadership in groups). Also, there was less variability on individuals' recall of the story after participating in group reconstructions, as compared to recall for the same subjects, when individually tested prior to their participation in group reconstructions.

It is important to note that studies by H. Perlmutter (1952) and Yukes (1954) employed rating scales to measure group processes. The rating scales assessed group members' global perceptions of interactions that occurred during group reconstructions, such as pressures to conform, competitive feelings, and group cohesiveness. These rating assessments occurred immediately after each group recall session. However, there were no records (i.e., audiotapes or videotapes) of group processes during the actual

reconstructions of the story. Hence, descriptions of cognitive operations between group members were not included in these studies. All descriptions of group operations pertained to general social dynamics as opposed to those social exchanges that constituted joint reconstructions.

While there was no information on specific group reconstructive processes, results from both studies strongly suggested that social processes created limitations on participation in joint reconstructions. These social constraints affected the immediate memory-products of the group, and memory-products of group members outside of an immediate group setting. The operation of these constraints was evident in the differences and similarities in memory-products (e.g., organization of recall, omissions of information, transformations of information) within the same groups over repeated measures of recall, and across recall conditions over repeated measures of recall.

Together these studies indicate that group constraints are important dimensions of adult social memory processes. But an uninformed generalization of these results and conclusions to dyads composed of children and adults is inappropriate. Empirical research is necessary to document occurrences of social memory processes between mothers and their children, and operations of social constraints within their joint reconstructions. Indeed, from a developmental perspective, if constraint processes operate between mothers and their children during joint reconstructions,

descriptions of these processes may provide clues to the potential effects of social memory processes on the development of children's individual-memory processes. Towards these ends, the present study attempts to identify and describe constraints that characterize social memory processes between mothers and their children.

Forms of participation in social memory processes between mothers and their children. A salient form of participation in memory processes between mothers and their children may take the form of inquiries. From the present perspective of social memory processes, communicative functions of inquiries can operate both to create particular demands for participants to organize information to be reconstructed (i.e., an information aspect), and to create a shared posture or attitude to reconstruct information (i.e., an interpersonal aspect). These two aspects of inquiries enable and constrain social reconstructions because: 1) the content and form of inquiries implicitly set limits on how information is interpreted; and 2) if the implicit interpretations are accepted by participants, then the strategies that can be successfully co-enacted to actualize memory functions in an activity are determined in part by the form of an inquiry.

Research has shown that inquiries are primary methods used by participants of interactions to guide, direct, and structure information (Leonard, Bernstein, Palmore, & Hendin, 1960; Churchill, 1978). Inquiries often occur during

mother-child interactions as means to "scaffold" cognitive processes in an activity (Wertsch, 1979; Ratner, 1980,1984; Sigel & Cocking, 1977; Zahaykevich, Sigel, & Rock, in preparation). For instance, Ratner (1980) reports that in their homes, 25% of the total speech to children of ages 2 to 3 years by mothers involved questions.

Some data suggests that the proportion of inquiries posed by mothers during interactions is related to children's development of memory processes. Ratner's study (1980, 1984) examined how mothers' memory demands act as stimuli to shape young children's memory functioning. According to Ratner, increasing demands by mothers on children's memory performances challenged children to reconstruct the past. Results indicated that mothers' questions about events from the distant past were significantly correlated with memory performances of their children at age two or three years (i.e., the time of the first data collection) and one year later. Ratner (1984) interpreted these results as supporting her hypothesis that mothers' memory demands facilitated some aspects of children's performance and development of remembering

While the content of inquiries create memory demands, formal aspects of inquiries may regulate participation in joint efforts to meet these memory demands. Formal qualities of inquiries may restrict and enable different types of participation in social memory processes. Indeed, a critical feature of inquiries is that they imply different social

degrees of freedom for making "appropriate" responses (Sigel & Saunders, 1979). For example, open-ended inquiries impose the least number of restrictions on responses, but they simultaneously create higher cognitive demands for respondents to transform and represent experiences (Wertsch, 1979). In contrast, closed-ended inquiries impose the most restrictions on responses, but they simultaneously create fewer cognitive demands for respondents to transform and represent experiences.

Research on the development of children's representational competencies informs the present discussion on the relation of parental inquiries to cognitive development. Findings from several studies indicate that use of open-ended inquiries by parents in social interactions with their children is related to development of representational competencies (e.g., Sigel, 1970, 1982; McGillicuddy-DeLisi, Sigel, & Johnson, 1979). In contrast, use of closed-ended inquiries is not related to performance on tasks that assess representational competencies (McGillicuddy-DeLisi, Sigel, & Johnson, 1979).

With respect to memory capacities, data also suggest that open-ended inquiries are related to development of some memory skills. For instance, Zahaykevich, Sigel, & Rock (in preparation) examined the relation of parental inquiries to children's performances on cognitive tasks, two of which assessed memory skills. These investigators reported that parental inquiries (i.e., mothers and fathers) were

significantly correlated with children's performances on a memory reconstruction task (r=.41, $p < .05$), and interpreted these results as evidence that use of open-ended inquiries influenced memory performances. The implication is that use of open-ended inquiries by adults during social interactions with children facilitated children's development of individual memory. To summarize the studies on inquiries in social interactions, the findings indicate that inquiries by parents, in everyday (Ratner, 1980) and task-related settings (Zahaykevich, Sigel, & Rock, in preparation), can and do relate to children's development of individual memory.

With respect to memory, inquiries can be viewed as transactual processes between mothers and their children that form joint reconstructive episodes. In the context of joint reconstructions, episode is defined as a sequence of exchanges which may vary in temporal duration, whose components are organized by a goal to remember, and whose structure has a beginning and end that mark its occurrence from other social exchanges. Use of inquiries between group members, as a means to regulate exchanges in joint reconstructive episodes is addressed in the present study.

Discrepancies between mothers and their children about memory for places. Memory discrepancies reflect qualities of engagement in joint reconstructions by mothers and their children. From the present perspective, memory discrepancies are related to motivational systems between mothers and

their children in an activity. It is suggested that they play an important role in regulating and changing participation of mothers and children in joint reconstructions. Indeed, some research suggests that discrepancies during social interactions are related to children's development of cognitive functions in general (Piaget, 1980; Perret-Clermont, 1980). Similarly, children's participation in memory discrepancies with adults may constitute a powerful mechanism for the development of individual and social memory processes. Occurrences of memory discrepancies as related to joint reconstructions between mothers and their children are described in the present study.

Two general categories of social memory discrepancies are checking and conflict. Checking between participants to confirm the accuracy of information being reconstructed or already reconstructed is one form of discrepancy. As part of a communicative system in an activity, checking is defined as inquiries and statements by participants that suggest a need to justify the accuracy, meaning, and/or use of information in an activity.

Checking as a social process does not take the form of isolated stimuli. Rather, it is claimed that checking is strategically organized in sequences and have structures in relation to other reconstructive episodes in a single activity. Moreover, an important quality of checking is that it is not the primary goal of a joint reconstruction. It is

a set of exchanges that emerge from interactions between participants in an activity. Amongst its many uses, checking serves a local purpose of maintaining shared meaning of information about the past (H. Perlmutter, 1952).

A second form of memory discrepancy is conflict. In a conflict episode, there is an explicit disagreement about memory-related information (i.e., verbatim content and/or meaning of information about the past), in which participants initially assume opposite and non-complementary positions. A joint effort to resolve a memory conflict is often marked as a transitional goal, in which a target conflict becomes a reconstructive episode onto itself. As such, a conflict has a history in an activity (i.e., emerges from previous exchanges between participants), but its significance for an activity makes salient a need to resolve a memory conflict to share a framework of meaning. Thus, conflicts may serve a more general purpose of moving participants of an activity forward in the same direction, since many times completion of an activity reaches an impasse until a conflict is resolved (i.e., some level of shared meaning between participants occurs).

In addition to its history within an activity, joint reconstructions that are used to resolve a conflict may have implications for future reconstructions in an activity (i.e., both individual and social). They may change the course of subsequent joint reconstructions that are not directly related to a conflict situation. For example,

occurrence of a conflict may change the distribution of different types of joint reconstructions. Also, the trajectory of an activity may be affected by conflict episodes and their resolutions through joint reconstructions.

Purpose and Predictions

As an exploratory study of social memory processes, the major purpose of the research was to describe social interactions that were directly related to joint reconstructions between mothers and their children. Three sets of general hypotheses guided the descriptions of social memory processes. The rationales for these hypotheses were derived from the previous review of the research literature.

Joint reconstructions of the past are social phenomena between mothers and their children. To demonstrate the social reality of joint reconstructive episodes, the participation of mothers and their children in joint reconstructions was examined from several perspectives. It is hypothesized that those interactions categorized as social memory processes would adequately describe and account for a significant proportion of memory functions in social interactions, as compared to individual reconstruction of the past. Cross-sectional shifts in the proportional use of social to individual processes were expected, because it is assumed based on the research literature that younger children are less able to independently recall information and therefore require more help than older children.

A second general hypothesis was formulated as follows. (If and) When joint reconstructions occurred between mothers and their children, a major format for participants to reconstruct the past was through inquiries. Because the

structure of inquiries can provide more or less guidance in remembering, and children of different ages require more or less guidance when remembering, the structure of these inquiries is expected to differ according to the age composition of the dyad. It is also predicted that the structure (e.g., open-ended and closed-ended questions) of inquiries, as particular means for directing and guiding the reconstruction of the past, would change with age composition of the dyad, and the memory skills that participants bring to an activity.

The third general hypothesis is an elaboration of the second general hypothesis, rather than a distinct and mutually exclusive theme. The third descriptive hypothesis is: (If and) When social memory processes occur between mothers and their children, specific dynamics that these processes play in joint reconstructions can be understood from the perspective of discrepancies in memories that participants pose for one another in an activity. It is proposed that two types of discrepancies (i.e., conflict situations and checking) that occur during social memory processes differed according to the age composition of the dyad. This prediction is based on the assumption that younger and older children have different individual memory skills that interact with their mothers' memory skills and, thereby,affect the occurrence of checking and conflict episodes.

As already implied, the three general hypotheses presented above were considered descriptive themes for analyzing data. Elaborations of these themes in the form of testable predictions are listed below. Descriptions of the structure and function of social memory processes between mothers and their children in an activity are outlined in greater detail in specific age-related predictions for each of the general hypotheses stated above.

For the sake of clarifying the meaning of terms used in specific predictions, a brief summary of the research context, subjects, and method is provided. In the present study, social memory processes were examined in the context of a model-making activity. In this activity mothers and their children (paired into dyads) must remember information about their local environment as a means to complete the model-making activity.

Dyads consisted of 4-year olds and their mothers, and 7-year olds and their mothers. Two age groups of children were employed in the present study to address questions related to cross-sectional differences in the use of social and individual processes.

Assessments of individuals' memory competencies were included in the present study to specify some contributions of individual memory skills to the occurrence of social memory processes in the model-making activity. These assessments took place prior to mothers' and children's participation in the model-making activity.

General hypotheses and specific predictions

Relation of joint reconstructions to participation in the overall activity, age composition of dyads, specific speakers, and functions of memory in the activity.

Prediction 1: Quantity of participation in the overall activity will be correlated positively with quantity of participation in joint reconstructive episodes.

Prediction 2: Quantity of participation in the overall activity will be positively correlated with quantity of participation by specific speakers of dyads (i.e., mothers and children) in joint reconstructive episodes.

Prediction 3: Dyads that include 4-year olds will have a greater proportion of joint reconstructions in the activity than dyads that include 7-year olds.

Prediction 4: 7-year olds will initiate proportionally more reconstructive episodes than 4-year olds. Mothers of 4-year old will initiate proportionally more reconstructive episodes than mothers of 7-year olds.

Prediction 5: For dyads that include 7-year olds, individuals' memory competencies outside the model-making activity will have a negative correlation with proportional occurrence of joint reconstructive episodes in the model-making activity. For dyads that include 4-year olds, individuals' memory competencies will have no significant correlation or will be correlated positively with joint reconstructive episodes.

Prediction 6: For dyads that include 7-year olds, individuals' memory competencies outside the model-making activity will have a positive correlation with proportional occurrence of individual reconstructions in the model-making activity. For dyads that include 4-year olds, individuals' memory competencies will have no significant correlation or correlated negatively with individual reconstructions.

Relation of mother-child inquiries to joint reconstructions

Prediction 1: 7-year olds will receive proportionally fewer open-ended inquiries and more closed reconstructions in inquiries during simple joint reconstructions, as compared to 4-year olds. With respect to production of inquiries, 7-year olds will produce proportionally fewer open-ended inquiries and more closed-ended inquiries during simple joint reconstructions, as compared to 4-year olds.

Prediction 2: Participants with higher individual competencies will receive proportionally more open-ended

inquiries and fewer closed-ended inquiries during simple joint reconstructions, as compared to participants with lower competencies.

Discrepancies between mothers and their children about places remembered

Prediction 1: Mean number of memory conflict episodes will be significantly greater for dyads that include 4-year olds, as compared to dyads that include 7-year olds.

Predictions 2: Mean number of memory conflicts initiated by 7-year olds for macro- and micro-building functions will be significantly greater than mean number of memory conflicts initiated by 4-year olds.

Prediction 3: Mean number of memory checking episodes will be significantly greater in dyads that include 4-year olds, as compared to dyads that include 7-year olds.

Predictions 4: Mean number of memory checking episodes initiated by 7-year olds will be significantly greater than mean number of memory checking episodes initiated by 4-year olds.

Method

Subjects

A total of 32 mother-child dyads participated in the study: 16 dyads composed of 4-year old children (10 males and 6 females) and their mothers; and 16 dyads composed of 7-year old children (10 males and 6 females) and their mothers. The mean age of the children in the 4-year old group was 4 years, 5 months (age range 4 years, 0 months -4 years, 11 months), and the mean age of the children in the 7-year old group was 7 years, 6 months (age range 7 years, 0 months - 7 years, 11 months).

The two age groups of children were chosen for an exploratory study for several reasons. Individual competencies of 4-year olds in the domain of memory functions are not yet developed (see Brown, 1975; Kail & Siegel, 1977; and Kobasigawa, 1977 for an overview of research on developmental changes in memory competencies). Also, the social relationship of (middle-class) 4-year olds to their mothers can be characterized as dependent with respect to their freedom to explore a local environment. In contrast, individual competencies of 7-year olds with respect to memory functions are developed to a greater extent. Moreover, social relationships of (middle-class) 7-year olds to their mothers can be characterized as relatively independent with respect to their freedom to explore a local environment, as compared to preschool

children (e.g., 7-year olds can often go to local stores and school by themselves).

Participants were from predominantly white middle-class backgrounds. All participants had resided in the same geographic area for a minimum of three years. Subjects were contacted through local schools, other participants in the study, and community organizations.

Materials and Procedures

The design of the study consisted of two phases (Note 2). All phases of the research occurred in the home of each participants, and were administered by a male experimenter who was unfamiliar to all subjects at the beginning of the project.

Measures included in Phase I assessed individual memory competencies under different degrees of contextual support for participants' remembering places in their local community. One week later, subjects participated in a second session (phase II) which consisted of observing memory processes between mothers and their children in the context of a "map-making" task.

The content domain assessed in the interview (Phase I) and the "map-making" activity (Phase II) was the same; both assessments required participants to recall places in their local environment. A general description of the locale being recalled by participants will be given to highlight some of the selective memory demands in the tasks.

Phase I assessment of individual memory competencies. The Local environment interview assessed different facets of individuals' competencies for remembering information related to their home town, and served to compare levels of individual memory competencies between age groups (the standard question format is presented in Appendix A). The interview was administered to all mothers and children individually and in a single session (Note 3). All interviews were audiotaped.

In this first session, both participants were told that the project was part of the experimenter's homework, which was to find out what children and their mothers know about places around the location where they live. After outlining the aims of the project, participants were given a choice about who would be the first person interviewed. The person who elected to go first stayed in the room with the researcher, and the person who elected to go second was asked to leave the room while the first person completed the activity.

The responses to the interview questions provided an estimate of: a) the number of local places each subject (i.e., mothers and children) can recall without help from another person to guide and support remembrances of places; and, b) if necessary, the number of places recalled under conditions of minimal and standardized help from another person to guide and support remembrances of places.

No prompt condition. The first interview question requested each subject to remember places in a specified geographic area. The instructions given by the interviewer emphasized: 1) a subject could tell the interviewer about any local place; and 2) all places named by a subject must be 'real' places that the interviewer could visit.

Subject were not corrected by the interviewer if they named places outside of their neighborhood, or if they named fantasy places. This condition of the interview was finished when a participant recalled ten places (the ceiling number of responses), or if a participant could not remember another place.

Prompt condition. If any subject could not recall ten places, then a second part of the interview procedure was used. Specifically, the prompt condition was used only when a subject could not name another place after repeated use of the standardized cue ("Anything else?") by the interviewer, and/or when a subject stated that s/he could not name another place. The interviewer initiated the prompt condition by giving a standardized cue: "Well, what places do you go to with your mother?" (in the case of a mother, the term 'child' was substituted for 'mother' in the prompt).

At the conclusion of the Local Environment Interview, both subjects were reminded the second session, in which they would make with building blocks a model of their local community, and that the session would be videotaped. A

rationale for the videotaping was provided. It was explained that a video record was needed so that the researcher could look at the detail of the places they made.

Phase II observations of memory processes during a social interaction task. The aim of the social interaction task was to provide a context to observe spontaneous joint reconstructions of places in a local environment by mothers and their children. The materials to provided to complete the task included a 6' X 6' white, plastic sheet positioned on the floor to serve as the surface to make the model. Each dyad was provided with approximately 250 wooden blocks of different shapes, colors, and sizes to construct their model (shapes, sizes and colors of blocks are shown in Appendix B-2). (The blocks were commercially produced by Sandberg Manufacturing Company.) In addition to the blocks, a commercially produced material for modeling greenery in landscapes was provided.

The blocks and greenery were stored in 4 plastic buckets that were easily transportable by mothers and children. These buckets were initially placed in a standardized location on the side of the plastic modeling surface. However, the participants were told that they could move the buckets to any location on the plastic once the activity started.

After setting up the materials, mothers and their children were paired together and instructions were addressed to both of them (tasks instructions are shown in

Appendix B-1). The experimenter outlined the objectives of the activity, and the instructions were addressed to both mother and child. To summarize the instructions: participants were requested to make a minimum of eight places that they know in their neighborhood with blocks and other materials provided by the experimenter. The instructions indicated all of the following freedoms and limitations on making their model neighborhood. They could make any place in their neighborhood, and how they constructed the places was determined by them. However, it was emphasized that the places included in their model must be real places in their neighborhood; places that the experimenter could go to and see if he wanted to do so. In addition, participants were requested to make at least eight places. They were told that they could divide the labor in any way they wanted, and that they could help each other. Finally, participants were informed that the experimenter would be videotaping places as they made them.

After delivering the instructions to the mother and child, the experimenter assumed a position on the perimeter of the plastic sheet. The interactions between the mother and child were filmed from various locations around the perimeter of the modeling surface. The procedures for filming the interactions were as follows. Whenever possible, both mother and child were included in the picture. If both participants could not be included in the picture at the same time, then an effort was made to alternate the focus on

the child and mother. With respect to the places being modeled, close-up shots were taken when one or both participants (together) finished constructing a place. Also, close-up shots were taken when subjects were building places to ensure sufficient level of details for future coding.

When interactions related to memory were occurring, attempts were made to focus on references to details of places, references to other places, non-verbal coding of responses (e.g., movement of head to indicate yes or no), illustrations (e.g., movement of fingers to simulate walking to a place), and relative position of participants to each other. Lastly, at the end of each session, an overview of a model (e.g., the relation of places to one another), and close-up pictures of each place (details about the symbols for each place) were recorded.

The model-building activity was specifically designed to examine joint reconstructive processes between mothers and their children. Participants were told that the main focus of the study was to examine mothers and children's knowledge and understanding of their local environment. They were not informed until the end of the project that the another aim of the research was to study social reconstructive processes. Presented in this way, contents of discussions between mothers and their children were emphasized rather than the reconstructive processes per se.

There were two main sources of memory demands built into the activity. One source was the structure and goals of

the activity. Memory demands in the activity were "standardized." A second source of memory demands was generated by or emerged from interactions between participants. In these instances, participants would impose demands that were not included in the instructions.

a. Memory demands created in the activity.

In conjunction with the physical materials to build the model, instructions of the building activity generated demands to remember information. Specifically, the instructions created restrictions on information that was appropriate to the activity. To complete the activity as specified in the instructions, participants must remember places in a specific geographic area. Once a place was remembered, participants must select some aspect(s) of a place to be represented in their model. Also, mothers and children must encode selected features of places in some form with the materials available to them. Representing places necessarily involved demands to mediate meaning through symbolic processes. For example, a swing set and sand box made from blocks may represent a local playground.

In addition to the demands to remember information about their local community as it truly exists, the construction of the model per se created its own set of memory demands. As participants represented more places in their community, there were more places for participants to identify and locate in their model during the remaining time in the activity. Together the instructions generated general

constraints on the relation of information about the past to the activity.

b. Optional memory demands generated by participants.

While certain demands were necessary to the activity as defined in the instruction set, other memory demands were generated by mothers and their children based on their interpretation, participation, and definition of the activity. For instance, the instructions of the activity did not specify any requirements about the exactness of the model. Participants could impose their own criterion of exactness. They could choose to preserve the relation of places to one another in their model (high memory demands). For example, a drug store could be constructed next to a florist, because this spatial arrangement reflects the locations of places in the community as it truly exists. In contrast, participants could also choose to remember places with no regard for their relation to one another. Indeed, these choices were not mutually exclusive over the course of the activity. Participants could elect to maintain the exact spatial relations with some places while not electing to do so for others places.

There was no time limit on the activity. On the average, the model-building session lasted forty minutes and all sessions were videotaped. Given the minimal requirements of making eight places, the modeling task was officially ended when participants decided that they had completed the task to their satisfaction. However, it was sometimes

necessary for the researcher to request the participants to build more places because they had not completed the minimal number of places. At the end of a session, participants were congratulated on the completion of their model neighborhood.

Coding.

For Phase I data, fifty percent of the interview data was transcribed and checked for accuracy of transcriptions by two coders. Seventy percent of the Phase II data were transcribed and checked for accuracy of transcriptions by two coders. The remaining thirty percent of Phase II transcripts were transcribed and checked for accuracy by the same coder.

In the sections that follow, a summary of coding schemes for major constructs in Phases I and II of the study are presented.

Phase I: Local Environment Interview.

Quantitative performance variables. Recall of a place was operationalized as a response by a subject which referenced a geographic location, or a set of functional or structural attributes of a geographic location (e.g., Pete's drug store, houses on our street, or the place that has a big roof on it). Quantity of places was the sum of places recalled by each participant.

A place recalled by a subject was scored as accurate if the place was within the geographic boundaries of the subject's home town. A map of the geographic area was used

by the investigator to define the geographic boundaries of the community modeled.

Representational qualities of places recalled. A place recalled by a subject was coded as a specific name if a subject produced a label for a location which was intended to be a unique identifier of the place. (e.g., Bodega store or Chang's vegetable store). A place recalled by a subject was coded as a generic name if the subject produced a single category label which was a superordinate class (e.g., The categories of stores, schools or houses were sometimes given.). A place recalled by a subject was coded as no name if a subject failed to produce a specific or generic name of a place, but s/he produced functional information about a place, and/or structural qualities associated with a place; or if a subject produced a general name of a specific place (not a class of places), and s/he produced functional information about the place and/or structural qualities associated with the place (e.g., "Its a great big house with a brown outside and we go to the doctor there.").

The coding of representational qualities of places recalled was conceptualized as a continuum of specificity of subjects' recall of place names. At one end of the continuum were specific name places and at the other end of the continuum were no name places.

Phase II: Model-Building Activity.

General grouping factors. Two grouping factors were used in the analyses of phase II data: status of speakers in

the activity, and age composition of dyads. Both factors were used in developmental comparisons. The term speaker referred to the status of each dyad member as either mother or child. Age composition of dyads referred to the dyad as a unit: dyads were either composed of 4-year olds and their mothers, or 7-year olds and their mothers. Henceforth these age compositions will be referred to as 4-year old dyads and 7-year old dyads respectively.

Reconstructive episodes. A reconstructive episode was defined as an effort to actualize a memory function in the service of an ongoing activity. There were two main types of reconstructions in the present activity: joint reconstructive episodes (i.e., JRE), and individual reconstructions.

Joint reconstruction referred to co-constructions of previously experienced information (content and/or meaning) by both participants in the activity (See Appendices C-1 for an example of joint reconstructions). During a joint reconstruction, relative participation of dyad members in co-constructing a memory-product (e.g., name of a place or its location) was interdependent and mutually regulated. Each participant structured the other participant's involvement to some degree.

Joint reconstructive episodes shared certain defining characteristics that distinguished them from individual reconstructions: attempts by participants to generate new information or build upon previous information through

verbal and/or non-verbal exchanges of information; relative contingency between the communicative devices used by participants to orient participation in reconstructions (e.g., inquiries and responses); and a minimum of one turn between participants in which participation was relevant to an intended reconstruction (an example of the boundaries of a joint reconstruction episode is given in Appendix C-2).

A salient form of joint reconstruction, which was focused on throughout the analysis, was called a simple joint reconstruction (See Appendix C-3 for examples of a simple joint reconstruction, and other forms of joint reconstructive episodes). A simple joint reconstruction (i.e., SJR) was a sequence of exchanges between participants in which a single goal to reconstruct information was established by participants at the beginning of the episode, and completion of the episode produced a targeted memory-product. In contrast to other forms of joint reconstructions, in a SJR, subgoals were not established or changes in the topic and goal of a joint reconstruction did not occur.

A second source of memory products in the activity was an individual reconstruction (See Appendix C-4 for an example). An individual reconstruction was defined as an effort by a single participant to reconstruct information without the help and contributions of the other participant. The behaviors that defined individual reconstructions in the activity were: a single participant produced information

about the past; the reconstruction took the form of a declarative utterance; information produced by a single participant did not elaborate upon or qualify a (immediately) prior memory response by the other participant; and help by one participant to another (in the forms of adding content or structuring information) was not given or solicited. Indeed, there may be social contingencies between participants' actions on levels other than efforts to reconstruct information, but the important criterion was that social contingencies did not give specific support to a participant's efforts to reconstruct information.

Initiator of a joint reconstruction referred to the speaker who first engaged the other participant to reconstruct information. Initiator of an individual reconstruction referred to the speaker who engaged in reconstructing information about the past without the aid or contributions of the other participant. However, in the case of an individual reconstruction, the term "initiator" is a misnomer in that there was, by definition, only one contributor to the reconstruction. Rather, its use in the analyses of individual reconstructions was the same as its use in joint reconstructions. In both cases, the term initiator indicated intentional or (self or other) directed behavior by a participant.

Functions of reconstructive episodes. Joint and individual reconstructions served various functions in the

activity. Two main types of functions that are directly related to building the model town were macro- and micro-building functions (See Appendices D-1 and D-2 for examples of macro- and micro-building functions). A macro-building function was defined as joint or individual reconstructions of information that identified a place to be modeled or already modeled (name of a place), and/or the relative location of a place to be modeled or already modeled (e.g., a florist was modeled next to a Korean fruit market because they were arranged that way in their neighborhood). This function was called macro because it referred to remembrances that were related to a place as a complete and whole unit. A micro-building function was defined as joint and individual reconstructions of information that identified functional/ structural attributes of a place to be modeled or already modeled (e.g., the counter in a store, or the big set of stairs and statues outside of a library), and/or the relative location functional/structural attributes of a place to be modeled or already modeled (e.g., garbage cans were placed next to a fence, or a door to a classroom was arranged across from a teachers desk because they reflect their actual locations). This function was called micro because it referred to remembrances related to a part(s) of a place.

Measure of participation. Participation in joint reconstructions and in the overall activity was measured by the number of verbal utterances. An utterance was defined as

independent and dependent clauses expressed in a verbal form by a participant. For example, the transcribed sentence "While you're making the park, I'll start Pinos." would be counted as two utterances; and the sentence "Where is our house?" was counted as one utterance.

Types of inquiry. Inquiry was defined as an information-seeking question. Only those inquiries that were part of simple joint reconstructions were coded. Two types of inquiries were coded: open-ended and closed-ended inquiries (Sigel & Saunders, 1979). Open-ended inquiries were identified from a cluster of indicators: responses to these questions were not predictable from the content of interrogatives, demand of the inquiry was non-specific, particulars that were required for a response were ambiguous, amount of information needed to complete a response to an inquiry was unstated, and the correctness of a response in relation to the inquiry was ambiguous. For example, the utterance "Where do we go shopping?" was coded as an open-ended inquiry. Closed-ended inquiries were also operationalized from a cluster of characteristics: responses to these questions were predictable from the content of interrogatives, demand of the inquiry was specific, particulars that were required for a response were clear, amount of information needed to complete a response to the inquiry was stated, and the correctness of a response in relation to the inquiry was unambiguous. For example, the

utterance "Is our house over here?" was coded as a closed-ended inquiry.

Forms of open- and closed-ended inquiries. Open- and closed-ended inquiries in simple joint reconstructions were also coded in terms of their structural forms: simple, conditional, and embedded. A simple open- or closed-ended inquiry was defined as a request for information which was stated with no explicit qualifications of the request. An example of a simple open-ended inquiry was: " What places do we go to?" An example of a simple closed-ended inquiry was: "Is this the chair outside Hagen Daz?"

Conditional open- or closed- ended inquiry was defined as a request for information with a single condition which qualified and limited the types of response to an inquiry. An example of a conditional open-ended inquiry was: "If we walk down the street this way, what places do we see?" An example of a conditional closed-ended inquiry was: "When we go food shopping, is the toy store before or after Pinos?"

Embedded open- or closed- ended inquiry was defined as a request for information which embedded the request in several qualifications that constituted conditions and/or restrictions on responses to the inquiry. An example of an embedded closed-ended inquiry was: "This is where we go food shopping, and this is 7th avenue, so what places do we see along 7th avenue down this way?" An example of an embedded closed-ended inquiry was: "Here's our house, and here's the

school. Is Guthrie's house before or after we get to the school?"

The three forms of open- and closed-ended inquiry varied in degree of structural complexity, and degree of constraints on responses to inquiries. (Sigel & Saunders, 1979). The lowest constraint on a response to an inquiry and least complex form of inquiry was a simple open- or closed-ended inquiry. Medium constraint on a response to an inquiry and medium complexity of form was a conditional open- or closed-ended inquiry. The highest constraint on a response to an inquiry and the most complex form of inquiry was an embedded open- or closed-ended inquiry.

Types of memory discrepancies. Two types of memory discrepancies were coded: memory conflict episodes and memory checking episodes (See Appendices E-1 and E-2 for examples of each type of discrepancy episode). A memory conflict episode was defined as a joint reconstruction of the past, in which one participant assumed an opposite and non-complementary position about the accuracy and/or appropriateness of a memory-product constituted by the other participant. Importantly, a participant who initiated a conflict explicitly asserted that information given by the other participant was incorrect or inappropriate, and the information was qualified, excluded or deleted.

Memory checking episodes also occurred in joint reconstructions. Checking expressed a qualification of another participant's contribution to a reconstruction,

because the contribution may be perceived as inaccurate and/or inappropriate to the activity. In contrast to a conflict episode, checking was a method of (re)considering the accuracy or appropriateness of remembrances. It was a complementary relation between participants. The participant who checked on the accuracy or appropriateness of memory-products did not assert that information was inaccurate or inappropriate.

The initiator of memory conflict episodes referred to the speaker who first contested the accuracy and/or appropriateness of another participant's contribution to a reconstruction. Initiator of memory checking episode referred to the speaker who first expressed a memory check of another participants' contribution to a reconstruction.
Reliability checks on coding.

Cross-sections of transcripts were coded for each variable and checked for reliability prior to coding the full data set for these variables. Reliability of coding was calculated by the agreement of two coders for coding categories derived from data in the present study. Specifically, inter-rater agreement for a sample of 20% of the interview protocols for Phase I data was 93%. For Phase II data, inter-coder reliability of all reconstructive episodes and memory discrepancy episodes for a sample of 20% of the protocols was 88% and 91%, respectively.

For the remaining Phase II data, coding schemes developed by other researchers were employed. Cross-sections

of protocols were coded for target variables using coding schemes that have been already developed. For these data, on separate occasions (at least two days after the first coding session), the same samples of data were coded once again by the same coder (blindly) to establish reliability in applying these coding schemes. Consistency of coding these variables ranged from 88% to 96%. After following this procedure for each set of variables (e.g., data on open- and closed-ended inquiries), all data were coded once again by the same coder to insure equal familiarity with a coding scheme when applied to the full data set.

Results

The results are presented in three sections. The organization of these sections reflects the three general hypotheses and their corresponding predictions. First, social memory processes between mothers and their children are described. This section includes background data on degree of participation in the overall activity of making a model neighborhood in relation to participation in reconstructive episodes in the service of the model-making activity. Second, data on inquiries that are part of joint reconstructions between mothers and their children are reported. Third, data on memory discrepancies between mothers and their children are presented. These data are descriptive of memory conflicts and checking episodes that occurred during joint reconstructions.

Results are presented for each of the three hypotheses in two parts. First, scoring procedures for all data that are analyzed in all predictions for a particular hypothesis are outlined. In this section references are made to terms defined in the coding scheme. Second, findings are presented separately for predictions that are associated with each hypothesis.

HYPOTHESIS I: Participation in the Overall Activity

Scoring data for analyses.

Degree of participation in the overall activity was defined as the total number of utterances produced in the

activity summed across mother and child within each dyad. Participation was also broken down by speakers --mother and child-- and by the age composition of the dyads.

Degree of participation in simple joint reconstructions (SJRs) was defined as the total number of utterances produced in each SJRs, from the onset of an episode to its conclusion. Participation in SJRs was computed for each dyad, and participation in SJRs was also breakdown by speakers and by age composition of dyads.

As described in the coding scheme, there were two major types of reconstructions in the activity: joint reconstructive episodes and individual reconstructive episodes. Proportion of joint reconstructions was calculated for each dyad by dividing total number of joint reconstructive episodes by total number of memory reconstructions (i.e., summation of joint and individual reconstructive episodes). Similarly, proportion of individual reconstructions was based on total number of memory reconstructions.

Proportion of SJRs was calculated for each dyad by dividing total occurrences of SJRs by total number of memory reconstructions. Proportion of SJRs initiated by the different speakers was calculated by dividing total number of SJRs initiated by a speaker by the total number of SJRs for the dyad.

Two types of statistical analyses were performed on these data: analyses of variance and correlational analyses.

For non-proportional summations of data in which time of task completion affects the outcomes (e.g., quantity of participation in the overall activity), time of task completion was entered as a covariate in analyses of variance (ANOVA). Group means were adjusted for time of task completion. Also, in all correlations that included these data, time for task completion was partialled out.

Correlational analyses of individual competency variables for adults have two irregularities when compared to these variables for children, because all mothers recalled the maximum number of places (i.e., ten) in the interview session, and none of the mothers participated in the prompt condition of the interview. Consequently, correlations could not be computed for quantity of places recalled in the prompt condition and for any interview variable in the prompt condition.

Findings.

The various predictions in this section were concerned with the relation of reconstructive episodes (joint and individual) to participation in the overall activity. Assuming that there is consistency between degree of participation in memory functions that contribute to the overall activity, it was expected that degree of participation in the overall activity would be correlated positively with quantity of participation in SJRs. The results supported the prediction. Participation in the overall activity was significantly correlated with

participation in SJRs for the sample as a whole (r=.427,p<.008).

However, additional analyses indicated that participation in the overall activity and SJRs was mediated by the speakers involved, and by the age composition of the dyads. Specifically, mothers' participation in SJRs was positively correlated with total amount of participation in the overall activity (r=.378,p<.018). In contrast, there was no significant correlation of children's participation in SJRs with their participation in the overall activity (r=.158,ns).

Moreover, as shown in Table 1, for 4-year old dyads, the correlation of total participation in SJRs with participation in the overall activity approaches significance. However, there was no significant correlation of participation in SJRs with participation in the overall activity for mothers and children separately (see Table 1).

Correlational patterns of participation variables for 7-year old dyads revealed possible relationships (See Table 1). Increasing quantity of participation in the overall activity was significantly correlated with increasing quantity of participation in SJRs. In addition, correlations of both mothers' and children's participation in the overall activity with participation in SJRs approached significance.

Analysis of covariance (Anova Model) was used to test for differences in mean number of utterances during SJRs by age composition of dyads, with time for task completion as a

Table 1

Breakdown of partial correlations between participation in overall activity and participation in simple joint reconstructions (SJR), by age composition of dyads with time of task completion partialled out

Participation in overall activity	Four-year olds' and mothers' participation in SJR
Total	.37*
Mother	.30
Child	.09

Participation in overall activity	Seven-year olds' and mothers' participation in SJR
Total	.50**
Mother	.39*
Child	.39*

*p<.03
**p<.09

covariate. Adjusting for the covariate, the mean number of utterances produced by 4-year old dyads was 246.72, and and for 7-year old dyads was 209.97, the difference was not significant ($F(1,29)=1.373$,ns). Thus, when considering the results of the correlational analyses, it was evident that although there was similarity in degree of participation in SJRs between dyads with different age compositions, the relation of participation in SJRs to the overall activity differed by age composition of dyads.

Assuming a differentiation of participation in SJRs from participation in the overall activity, it was predicted that degree of participation in the overall activity would be correlated positively with degree of participation by specific speakers in SJRs. The results of several correlations supported the prediction. There was a positive correlation that approached significance between children's participation in SJRs and participation in the overall activity for the whole sample ($r=.274$,$p<.07$). However, when analyzed separately, the correlation was not significant for the 4-year olds ($r=.295$,ns), while for the 7-year olds the correlation was considerably higher ($r=.389$,$p<.08$).

Similar to the results of participation in the overall activity, an analysis of covariance (with time for task completion as the covariate) revealed no significant difference between participation by children of different ages in SJRs. The adjusted mean number of utterances for the

4-year olds was 88.52, and for the 7-year olds was 83.54 ($F(1,29)=.101$,ns).

Analyses of mothers' participation were consistent with the findings for their children. The results revealed a positive correlation of mothers' participation in SJRs with participation in the overall activity ($r=.431$,$p<.008$). However, the correlation was not significant for mothers interacting with 4-year olds ($r=.278$,ns) while the correlation was significant for mothers interacting with 7-year olds ($r=.533$,$p<.02$). Yet, an analysis of covariance (with time for task completion as the covariate) revealed no significant difference between participation of mothers with 4- versus 7-year olds in SJRs. The adjusted mean number of utterances for the mothers of 4-year olds was 158.74 and for the 7-year olds was 126.51 ($F(1,29)=2.45$,ns).

Several results implied some regularities and contingencies between participation of mothers and their children in SJRs. As indicated by the results of a multivariate analysis of within cell differences of mean number of utterances, mothers of both age groups participated in SJRs to a greater degree than their children ($F(1,0,13)=7.89$,$p<.002$). While there were differences between mothers' and children's degree of participation, the results of correlational analyses revealed a positive correlation of mothers' and children's participation in SJRs ($r=.490$,$p<.003$).

Correlational analyses of mothers' and children's participation based on the age composition of dyads were also conducted. Results for the 4-year olds and their mothers indicated no significant correlations between mothers' and children's quantity of participation in SJRS (r=.269,ns). In contrast, for 7-year old dyads, there was a significant, positive correlation between mothers' and children's quantity of participation in SJRS (r=.848,$p<.001$).

Additional correlational analyses explored other differences related to particular speakers in dyads (mother or child). As shown in Table 2, there was a positive correlation between mothers' participation in SJRs and their participation in the overall activity. Correlations of mothers' participation in SJRs and their participation in the overall activity were also significant when the sample was broken down by age composition of dyads. For both mothers interacting with 4-year olds and mother interacting with 7-year olds, there was consistency between participation in SJRs and their participation in the overall activity. Furthermore, the magnitudes and directions of correlations of children's participation in SJRs with their participation in the overall activity, when analyzed by age, were similar to correlational patterns for mothers (see Table 2). The same variables were significant.

However, correlations of cross-speakers' participation in SJRs with participation in the overall activity were all

Table 2

Correlations of quantity of within and across-speaker participation in overall activity and participation in simple joint reconstructions with time of task partialled out

Full sample

	Mother	Child
Mother	.52**	.05
Child	.09	.44**

Four-year olds and mothers

	Mother	Child
Mother	.47*	-.06
Child	-.35	.58**

Seven-year olds and mothers

	Mother	Child
Mother	.50*	.18
Child	.27	.53*

*p<.05
**p<.01

non-significant. There were no significant correlations between children's participation in the overall activity and mothers' participation in SJRs (and vice versa). Correlations of cross-speakers' participation were also non-significant when the sample was broken down by age. Hence, there appears to be no interconnections between speakers in their participation in SJRs and the overall activity. One implication of these findings is that the rhythm or overall input by one participant in the activity neither facilitates nor inhibits the other person's participation in SJRs.

Assuming that younger children are less able to remember information than older children, a third prediction was that 4-year old dyads would have a greater proportion of JREs in the activity than 7-year old dyads. The prediction was supported by results yielded by oneway ANOVAs with age composition as the grouping factor. For dyads consisting of 4-year olds and their mothers, the mean proportion of JRE was .664, while for dyads including 7-year olds and their mothers, the mean proportion was .603. This difference was significant ($F(1,31)=8.58, p< .006$). As shown in Table 3, proportional use of individual reconstructions in the activity were the inverse of the reported data on JREs because individual and joint reconstructions were mutually exclusive and exhaustive coding categories of memory in the present study (see descriptions in coding section). Proportional uses of individual reconstructions in the

Table 3

Analysis of variance on mean proportion of joint and individual reconstructions by age composition of dyads

	Type of reconstruction	
	Individual	Joint
4-year old and mother	.336	.664
7-year old and mother	.397	.603

activity were .336 and .397 for dyads that included 4- and 7-year olds, respectively.

Additional analyses were conducted to examine differences in use of SJRs for different functions in the activity. In these analyses SJRs were examined because they were the dominant form of JRE in the activity in which dyad members always produced an agreed upon memory product.

As described in the coding section, macro-building function referred to remembrances of a place or its location. Oneway ANOVAs were conducted with age composition of dyads as the grouping factor. Mean proportions of SJRs for macro-building functions were: .107 and .133 for dyads that included 4- and 7-year olds, respectively. This difference was not significant.

The mean proportions of individual reconstructions for macro-building functions were: .151 and .256 for dyads that included 4- and 7-year olds, respectively. Cochran's test for the homogeneity of variances revealed significant differences between groups ($p<.001$). The variation was greater for dyads including 7-year olds, than for dyads including 4-year olds. A square root transformation was used to reduce variation between dyad groups. A oneway ANOVA on transformed data indicated a significant difference between groups ($F(1,31)= 11.76, p<.002$).

In contrast to the macro-building functions, micro-building functions referred to remembrances of attributes of places and/or locations of these attributes in a place. The

mean proportion of SJRs for micro-building functions were: .191 and .157 for dyads that included 4- and 7-year olds, respectively. A oneway ANOVA of SJRs revealed no significant difference between group ($F(1,31)= .687$,ns).

The mean proportions of individual reconstructions for micro-building functions were: .151 for dyads that include 4-year olds, and .185 for dyads that include 7-year olds. A oneway ANOVA revealed that the group difference approached significance ($F(1,31)= 3.661, p<.07$).

Assuming that older children are more sophisticated in their social exchanges with adults than younger children, it was predicted that 7-year old would initiate proportionally more SJRs than 4-year olds, and that mothers of 4-year olds would initiate proportionally more SJRs than mothers of 7-year olds. In general the results of several oneway ANOVAs, with speaker as the grouping factor, supported the prediction. The mean proportions of children's initiations of SJRs were: .079 for 4-year olds, and .140 for 7-year olds. The difference was significant ($F(1,31)= 7.64, p<.001$). Moreover, the mean proportions of mothers' initiations of SJRs were: .411 for mothers of 4-year olds, and .317 for mothers of 7-year olds, a significant difference between groups ($F(1,31)=7.99$, $p<.008$).

Oneway ANOVAs were conducted to assess if age-related differences in initiations of SJRs paralleled individual reconstructions, which by definition are self-initiated. The mean proportions of children's individual reconstructions

were: .137 for 4-year olds, and .187 for 7-year olds, a significant difference ($F(1,31)=6.79, p<.014$). In contrast, the mean proportion of mothers' individual reconstructions did not differ by age composition of dyads ($F(1,31)=.330$, $p<.570$, ns). The means were: .199 for mothers of 4-year olds, and .210 for mothers of 7-year olds. Thus, the differences in initiation of SJRs and productions of individual reconstructions were consistent for children, but were not for mothers.

Additional oneway ANOVAs were conducted, with speakers as the grouping factor, to investigate whether types of building functions were related to initiations of joint or individual reconstructions by speakers (mothers and children). The mean proportions of children's SJRs for macro-building function were: .005 for 4-year olds, and .028 for 7-year olds, a significant difference between groups ($F(1,31)= 13.95, p<.001$). In contrast, mean proportions of mothers' SJRs for macro-building functions were: .102 for mothers of 4-year olds, and .103 for mothers of 7-year olds, a non-significant difference ($F(1,31)=.001$, ns).

The mean proportions of children's individual reconstructions for macro-building function were: .009 for 4-year olds, and .031 for 7-year olds. Cochran's test for homogeneity of variances showed significant differences between groups ($p<.001$), with the variation greater for 7-year olds than for 4-year olds. A square root transformation was used to reduce variation. An oneway ANOVA on transformed

data indicated a significant difference between groups ($F(1,31)= 8.19, p<.008$). Similarly, the difference in mean proportions of mothers' individual reconstructions for macro-building function was significant ($F(1,31)=8.56, p< .007$). The mean proportions were: .020 for mothers of 4-year olds, and .044 for mothers of 7-year olds.

Oneway ANOVAs were also conducted for micro-building function, using the same variables employed in the macro-building function as grouping factors. The mean proportion of SJRs for micro-building function were: .021 for 4-year olds, and .040 for 7-year olds, a significant difference between groups ($F(1,31)=4.19, p<.05$). In comparison, differences in the mean proportions of mothers' SJRs for micro-building function approached significance ($F(1,31)= 2.91, p< .098$). The means were: .170 for mothers of 4-year olds, and .118 for mothers of 7-year olds.

The mean proportions of children's individual reconstructions for micro-building function were: .070 and .091 for 4- and 7-year olds, respectively. The difference was not significant ($F(1,31)= 2.20, p<.148$, ns). Similarly, the difference between groups for mothers' individual reconstructions was not significant ($F(1,31)= .752$, ns). The means were: .084 for mothers of 4-year olds, and .097 for mothers of 7-year olds.

With the expectation that SJRs in the activity function differently based on the individual skills that each participant brings to the activity, it was predicted that

for 4-year old dyads, individual memory competencies (see coding scheme) would have a positive correlation with proportional use of SJRs. In contrast, for 7-year old dyads, it was predicted that individual memory competencies would have a negative correlation with proportional occurrence of SJRs. Correlational analyses were conducted to test these predictions.

The results partially supported the prediction that differential correlations would occur. As shown in Table 4, for 4-year olds and their mothers, the directions of correlations between interview variables and proportions of SJRs were not consistently negative or positive across prompting conditions (see method section for description of prompting conditions). These data suggest that there was no global relation of individual to social reconstructions.

However, the magnitude and directions of all correlations were consistent between 4-year olds and their mothers. These patterns of correlation implied that there may be regularity between individual memory competencies and SJRs based on age composition of dyads. Most notable of the interview variables was the relatively high positive correlation of no name places to proportion of SJRs for both mother and child. On an intuitive level the positive correlation makes sense. If mothers and children have representations of places that were not fully articulated in the form of a label, then the information that they did

Table 4

Correlations of individual memory competencies with simple joint reconstructions (SJRs)

Coded variables of individual memory competencies	Proportion of SJRs	
	Four-year olds and mothers	
No prompts condition	Child	Mother
Total places recalled	-.04	NA
Generic named places	-.01	-.11
Specific named places	-.26	-.24
No named places	.36	.46*
Accuracy places recalled	.10	.08
Prompt condition		
Total places recalled	.30	NA
Generic name of places recalled	-.09	NA
Specific name of places recalled	-.09	NA
No name of places recalled	-.75*	NA
Accuracy recall of places	.19	NA

*p<.05

possess may constitute the conditions to engage or not engage in joint reconstructions.

While the predictions related to 4-year olds and their mothers were not supported, the negative directions of most correlations for 7-year olds and their mothers did support the prediction that individual memory competencies would have a negative correlation with proportional use of SJRs (see Table 5). The consistency in the directions of correlations suggests that the patterns were not totally random or due to chance. It was also interesting that the direction of many correlations for 7-year olds and their mothers were different from 4-year olds and their mothers (see Tables 4 and 5). Specifically, for the 7-year olds, the quantitative interview variables were negatively correlated with proportion of SJRs in the prompt condition, whereas they were positively correlated for the 4-year olds. These differences in correlational patterns may reflect differences in the relation of individual memory competencies to the functioning of SJRs in the activity.

Hypothesis II: Participation in Inquiries during joint reconstructions.

Scoring data for analyses.

Analyses of inquiries were undertaken to describe the structural features of joint reconstructions. Open- and closed-ended inquiries were thought to reflect important qualities of the social dynamics between dyad members during

Table 5

Correlations of individual memory competencies with simple joint reconstructions (SJRs)

Coded variables of individual memory competencies	Proportion of SJRs	
	Seven-year olds and mothers	
No prompts condition	Child	Mother
Total places recalled	-.25	NA
Generic named places	.33	.10
Specific named places	-.18	.04
No named places	-.39*	-.06
Accuracy places recalled	-.13	-.36*
Prompt condition		
Total places recalled	-.81**	NA
Generic named places	-.56	NA
Specific named places	-.25	NA
No named places	-.56	NA
Accuracy places recalled	-.87**	NA

*p<.10
**p<.01

SJRs. The proportion of types of inquiries (open- and closed-ended inquiries) that occurred during SJRs constitute the data used in the analyses. Specifically, the proportion of open-ended inquiries was calculated by dividing the total number of open-ended inquiries by the total number of inquiries in SJRs (summation of open- and closed-ended inquiries). Proportion of closed-ended inquiries in SJRs was also based on total number of inquiries in SJRs.

Further analyses of the proportion of open- and closed-ended inquiries initiated by different speakers (mothers and children) were calculated by dividing total number of open- or closed-ended inquiries in SJRs initiated by a speaker by total number of inquires in SJRs for a dyad. Additional analyses based on breakdowns of proportion of initiated SJRS were grouped by age composition of dyads. These proportions were calculated by a set of procedures that was similar to to initiation of SJRs.

Because both open- and closed-ended inquiries differ in the amount of structure they provide for responses, additional analyses of inquiries included proportion of different forms of open- and closed-ended inquiries. As described in the coding scheme, the different forms of open- and closed-ended inquiries included: simple, conditional, and embedded structures. Proportions of each form of inquiry received by speakers were calculated by dividing the total number of instances of a form during SJRs by the total number of open- or closed-ended inquiries in SJRs.

Data on interview variables (places recalled by a participant in the interview session) were grouped and calculated in the same way as specified in the scoring section of the first hypothesis.

Findings.

Open-ended inquiries are frequently used by adults as tutorial devices to probe, evaluate, and structure children's thinking (Sigel, 1970). Assuming that older children, in general, have greater individual memory competencies than younger children, and therefore require less tutorial; help than younger children, it was predicted that 7-year olds would receive proportionally fewer open-ended inquiries and more closed-ended inquiries during SJRs, as compared to 4-year olds. It is also assumed that older children are more adept than younger children at using their knowledge-base to ask specific, closed-ended questions. With respect to production of inquiries, 7-year olds were expected to produce proportionally fewer open-ended inquiries and more closed-ended inquiries during SJRs, as compared to 4-year olds.

Oneway ANOVAs, with age of children and mothers of different age children as grouping factors, were conducted to test the predictions. As shown in Table 6, the results confirmed the prediction that 4-year olds received proportionally more open-ended inquiries as compared to 7-year olds ($F(1,30)=5.04, p<.03$). However, the prediction that 7-year olds would receive more closed-ended inquiries than

Table 6

Mean proportions of types of inquiries within joint reconstructive episodes by age composition of dyads

Categories of inquiry types	Mean proportions of inquiry types			
	Reception		Production	
	Age composition of dyads		Age composition of dyads	
	4-year olds	7-year olds	4-year olds	7-year olds
Open-Ended	.443	.387*	.160	.165
Closed-Ended	.345	.344*	.104	.161*

*p<.05

4-year olds was not supported by the results. There were no significant differences in the mean proportion of closed-ended inquiries received by children of different ages ($F(1,30)=.0002$, ns).

The prediction that 7-year olds would produce more closed-ended inquiries was not supported by the findings. As shown in Table 6, there was no significant difference in mean proportion of open-ended inquiries produced by children of different ages ($F(1,30)=.007$,ns). However, as shown in Table 6, the prediction that 7-year olds would produce proportionally more closed-ended inquiries than 4-year olds was supported ($F(1,30)=4.63, p<.04$).

Together these results suggest that younger children were engaged in more inquiries during SJRs that shifted most of the responsibility for reconstructing information to them. This finding is consistent with the assumption that mothers' questioning of the young children is a tutorial and display mechanism. However, mothers seemed to provide similar support levels during SJRs for 4- and 7-year olds in the form of closed-ended inquiries. In contrast, older children provided mothers with more constraints on SJRs relative to younger children. Yet, both younger and older children provided similar open-ended challenges for their mothers to reconstruct information--fewer explicit limitations on their responses.

It was assumed that more specific orienting in the form of closed-ended inquiries would occur when a child or mother

has well developed individual memory competencies (see coding schemes), because the function of joint reconstructions would be more related to genuine needs to remember since memory competency does not require evaluation. It was, therefore, predicted that participants with higher individual memory competencies would receive proportionally more closed-ended and fewer open-ended inquiries during SJRs, as compared to participants with lower competencies. Correlations were used to explore which individual memory competencies were related to the types of inquiries used by participants to jointly reconstruct information.

In general, the results of the correlational analyses did support the predictions. As shown in Tables 7, 8, 9, and 10, across all speakers and in all prompt conditions of the interview, significant correlations of quantity and accuracy of places recalled with use of open-ended inquiries were all negative. Increasing quantity and accuracy in recalling places in the local environment interview was associated with decreasing proportions of open-ended inquiries. The directions of these correlations did not change with age of speakers. One interpretation of these data is that productions of open-ended inquiries, especially productions by mothers, were influenced by the level of individuals' memory competencies. However, a directional statement about the cause of this association between

individual memory competencies and open-ended inquiries will require study.

While the data supported the prediction that individuals with high memory competency will tend to receive fewer general orienting inquiries, the correlational data did not support the prediction that individual memory competency would be positively correlated with the proportion of closed-ended inquiries. For 4- and 7-year olds, of those correlations that ranged from .25 to .77, most results showed a negative correlation between individual memory competencies and proportion of closed-ended inquiries (see Tables 7 and 9). For mothers of both ages, high correlations were too infrequent to detect stable patterns in their directions (See Tables 8 and 10). Thus, mothers and children with higher individual memory competencies tend to receive fewer closed-ended inquiries during joint reconstructions.

In addition to the correlations reported above, other patterns were evident in the correlations of representational qualities of places recalled in the interview (see coding scheme) and types of inquiries. As shown in Tables 13 and 14, for both 7-year olds and their mothers, most significant correlations were localized in the embedded forms of inquiry. In particular, embedded open- and closed-ended inquiries increased when productions of specific name places in the interview decreased. Conversely, there were increases in receptions of embedded open-ended

inquiries for 7-year olds that produced more no name places in the interview. Interestingly, productions of embedded closed-ended inquiries by 7-year olds, a form of inquiry which places the most constraints on responses, tended to increase for mothers who produced more no name places and fewer specific name places in the interview. The directions and magnitudes of these correlations were consistent with correlations found for mothers of 7-year olds (see Table 14). Together these correlations give the impression that highly structured participation in joint reconstructions by both 7-year olds and their mothers was related to particular representational qualities of memory for places that participants bring to the activity.

In general, and for 4-year olds in particular (see tables 11 and 12), the magnitudes and directions of correlations between representational qualities of interview variables and types of inquiries in JREs were more consistent, than those found for correlations between quantitative indicators of recall in the interview and types of inquiries that occurred during SJRs. Thus, the implicit prediction that participants' quantity and accuracy of recall were the most salient constraints on productions of memory demands needs to be modified by considerations of how information was represented by each participant.

Table 7

Correlations of quantitative variables of individual memory competencies with types and forms of inquiries received by four-year olds in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies			
	Total recall	Accuracy recall	Total recall	Accuracy recall
Total open	-.14	-.10	.16	-.03
Total closed	.40*	.16	-.25	.26
Open-ended Simple	-.24	-.25	.44	-.16
Open-ended Conditional	.08	.20	-.12	-.15
Open-ended Embedded	.14	.17	-.35	-.54
Closed-ended Simple	-.03	.02	.02	.26
Closed-ended Conditional	.20	.18	-.26	.30
Closed-ended Embedded	.29	.14	-.58**	-.66**

*p<.07
**p<.05

Table 8

Correlations of representational qualities of individual memory competencies with types and forms of inquiries received by four-year olds in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies					
	No Prompt Condition			Prompt Condition		
	Generic	Specific	No Name	Generic	Specific	No Name
Total open	.22	.23	-.52**	-.33	.34	-.81***
Total closed	.38	.40*	.09	.30	-.04	-.32
Open-ended Simple	.22	.14	-.65***	-.34	.45	-.68**
Open-ended Conditional	-.43*	.27	-.01	-.20	.11	-.60*
Open-ended Embedded	-.09	.12	.10	-.09	-.33	-.14
Closed-ended Simple	-.27	.28	.46*	.21	.06	.68**
Closed-ended Conditional	-.03	-.01	.60***	-.06	-.15	.32
Closed-ended Embedded	-.22	.08	.44*	-.23	-.44	.01

*p<.05
**p<.10
***p<.01

Table 9

Correlations of quantitative variables of individual memory competencies with types of inquiries received by mothers (of four-year olds) in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies
	Accuracy recall
Total open	.07
Total closed	-.14
Open-ended Simple	-.67**
Open-ended Conditional	-.49*
Open-ended Embedded	-.26
Closed-ended Simple	-.01
Closed-ended Conditional	-.25
Closed-ended Embedded	-.03

*p<.05
**p<.01

Table 10

Correlations of representational qualities of individual memory competencies with types and forms of inquiries received by mothers (of four-year olds) in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies		
	No Prompt Condition		
	Generic	Specific	No Name
Total open	-.52**	.33	-.09
Total closed	.06	-.01	-.02
Open-ended Simple	-.15	.43**	-.46**
Open-ended Conditional	.12	.28	-.45**
Open-ended Embedded	.02	.40*	-.54**
Closed-ended Simple	-.43**	.16	.08
Closed-ended Conditional	-.10	.19	-.18
Closed-ended Embedded	.21	-.05	-.08

*p<.10
**p<.05

Table 11

Correlations of quantitative variables individual memory competencies with types and forms of inquiries received by seven-year olds in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies			
	Total recall	Accuracy recall	Total Recall	Accuracy recall
Total open-ended	.14	.14	-.65*	-.57*
Total closed-ended	-.36*	-.22	.04	-.31
Open-ended Simple	.15	.12	-.62*	-.56
Open-ended Conditional	.17	.05	-.47	-.13
Open-ended Embedded	-.24	-.14	-.64*	-.69*
Closed-ended Simple	-.23	-.08	.01	.29
Closed-ended Conditional	.20	.19	.03	-.36
Closed-ended Embedded	.01	.14	-.77**	-.38

*p<.10
**p<.05

Table 12

Correlations of representational qualities of individual memory competencies with types and forms of inquiries received by seven-year olds in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies					
	No Prompt Condition			Prompt Condition		
	Generic	Specific	No Name	Generic	Specific	No Name
Total open	-.14	.27	-.19	-.43	.03	-.40
Total closed	.32	-.44**	-.02	.37	-.79**	-.30
Open-ended Simple	.08	.24	-.15	-.37	-.08	-.40
Open-ended Conditional	-.29	.32	-.13	-.47	.77**	-.40
Open-ended Embedded	-.04	.42**	.44**	-.31	.25	-.35
Closed-ended Simple	.12	-.32	.11	.42	-.55	.39
Closed-ended Conditional	-.19	.18	.14	.52	-.42	.51
Closed-ended Embedded	-.41*	.20	-.10	-.51	-.01	.01

*p<.10
**p<.05

Table 13

Correlations of quantitative variables individual memory competencies with types and forms of inquiries received by mothers (of seven-year olds) in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies
	Accuracy recall
Total open-ended	.25
Total closed-ended	.22
Open-ended Simple	-.07
Open-ended Conditional	.10
Open-ended Embedded	-.12
Closed-ended Simple	.13
Closed-ended Conditional	.42*
Closed-ended Embedded	.10

*p<.05

Table 14

Correlations of representational qualities of individual memory competencies with types and forms of inquiries received by mothers (of seven-year olds) in simple joint reconstructions

Categories of inquiries	Coded variables of individual memory competencies		
	No Prompt Condition		
	Generic	Specific	No Name
Total open	-.27	.21	-.15
Total closed	.15	-.35*	.31
Open-ended Simple	-.31	.26	-.18
Open-ended Conditional	-.29	.21	-.15
Open-ended Embedded	-.17	-.07*	.11
Closed-ended Simple	.19	-.31	.26
Closed-ended Conditional	.09	-.16	.14
Closed-ended Embedded	-.18	-.36*	-.39*

*p<.10

HYPOTHESIS III: Memory Discrepancies between Mothers and their Children about Memory for Places

Scoring data for analyses.

Quantity of memory conflict episodes were defined as the total number of conflicts related to SJRs that was produced in the activity. These data reflect summations of memory conflicts initiated by mothers and children within each dyad. Additional analyses of memory conflict episodes were grouped by speakers and by age composition of dyads. Quantity of speaker initiated memory conflicts was defined as the total number of memory conflict episodes initiated by a speaker. Quantity of memory conflicts was then broken down for mothers and children separately by age composition of dyads. In these analyses, data were summed for each speaker (mothers and children) by age composition of dyads.

Data on memory checking episodes were scored in the same way as data on memory conflict episodes. Quantity of memory checking episodes was defined as the total number of checking episodes related to SJRs that was produced in the activity. These data reflect summations of memory checking initiated by mothers and children within each dyad. Additional analyses of memory checking episodes were conducted for mothers and children separately. Quantity of speaker initiated memory checking was defined as the total number of memory checking episodes initiated by a mother or child. Quantity of speaker initiated memory checking was then broken down for mothers and children separately by age composition of dyads. Data on memory checking were summed

for each speaker (mothers and children separately) by age composition of dyads.

Data on interview variables (places recalled by a participant in the interview session) were grouped and calculated in the same way as specified in the scoring section of the first hypothesis.

Two types of statistical analyses were performed on the data specified above: analyses of variance and correlational analyses. For non-proportional summations of data in which time of task completion affected the outcomes (e.g., quantity of memory conflict episodes), time of task completion was controlled in analyses of these data (covariate always refers to time for task completion) and group means were adjusted for time of task completion. Also, in all correlations that included these data, time for task completion was partialled out.

Findings.

Because older children tend to remember information more accurately than younger children, it was predicted that the mean number of memory conflict episodes would be significantly greater for 4-year old dyads, as compared to 7-year old dyads. The results yielded by several covariate analyses, with age composition of dyads and speakers as grouping factors and time of task completion as a covariate, did not support the prediction. As shown in Table 15, there was no significant difference in mean number of conflicts

between 4-year old dyads versus 7-year old dyads ($F(1,28)=.101$,ns).

Covariate analyses were also conducted to explore the possibility that differences in mean number of conflicts between dyad groups existed within particular building functions, or were related to particular speakers who initiated the memory conflict episodes. Differences in the mean number of memory conflicts between dyads with different age compositions within the macro-building function ($F(1,23)=.027$,ns) and the micro-building function ($F(1,23)=.573$,ns) were not significant (see Table 16). Similarly, differences in the mean number of memory conflict episodes initiated by children of different age groups ($F(1,23)=.102$,ns) and initiated by mothers of different age groups ($F(1,23)=.472$,ns) were not significant (see Table 16). Hence, there was no support for a more localized version of this hypothesis.

Assuming that initiation of memory conflicts requires the development of a more advanced system of social exchanges, it was predicted that the mean number of memory conflicts initiated by 7-year olds for macro- and micro-building functions would be significantly greater than mean number of memory conflicts initiated by 4-year olds. Within each of the building functions related to the activity, the results of several covariate analyses (with speaker as the grouping factor and time of task completion as a covariate) did not support the predictions.

Table 15

Mean number of memory conflict episodes by age composition of dyad, adjusted for time of task completion

Variables of analysis	Mean number of memory conflicts		
	Total conflicts	Total conflicts macro-function	Total conflicts micro-function
Dyads with 4-year olds	4.31	1.0	3.75
Dyads with 7-year olds	5.25	2.07	3.0

Table 16

Mean number of initiations of memory conflict episodes by age composition of dyads, adjusted for time of task completion

Variables of analysis		Mean number of memory conflicts		
		Total conflicts initiated	Total conflicts initiated macro	Total conflicts initiated micro
Children	4-year olds	2.09	.062	.688
	7-year olds	3.35	.938	1.19
Mothers	of 4-year olds	3.91	1.04	1.60
	of 7-year olds	2.13	2.06	.902

As shown in Table 16, breakdowns of memory conflict episodes initiated by speakers within the macro-building function showed no significant differences between children of different ages ($F(1,28)=.118$,ns), or between mothers of 4- versus 7-year olds ($F(1,28)=.116$,ns). Similarly, for the mean number of initiations within micro-building functions (see Table 16), breakdowns of memory conflict episodes initiated by speakers showed no significant differences between children of different ages ($F(1,28)=.956$,ns), or between mothers of 4- versus 7-year olds ($F(1,28)=.012$,ns).

Because older children tend to be more veridical in their recall, it was expected that the mean number of memory checking episodes would be significantly greater in 4-year old dyads, as compared to 7-year old dyads. Covariate analyses were conducted to test this prediction, with age composition of dyads and speaker who initiated the checking as grouping factors and time of task completion as a covariate. The results of these analyses did not support the prediction. As shown in Table 17, mean number of checking episodes was approximately the same for dyads that included 4- versus 7-year olds ($F(1,28)=.198$,ns).

Covariate analyses were also conducted to explore the possibility that differences between dyad groups existed within particular building functions, or were related to particular speakers who initiated the memory checking episodes. Differences in the mean number of memory checking episodes between dyads with different age compositions

within the macro-building function ($F(1,23)=.027$,ns) and the micro-building function ($F(1,23)=.573$,ns) were not significant (see Table 17). Similarly, differences in the mean number of memory checking episodes initiated by children of different age groups ($F(1,23)=.102$,ns) and initiated by mothers of 4- versus 7-year olds ($F(1,23)=.472$,ns) were not significant (see Table 17). Hence, there was no support for a more localized version of this hypothesis.

Assuming that initiation of checking episodes requires the development of a more advanced system of social exchanges, it was predicted that the mean number of memory checking episodes initiated by 7-year olds would be significantly greater than mean number of memory checking episodes initiated by 4-year olds. Within each of the building functions related to the activity, the results of several covariate analyses (with speaker as the grouping factor and time of task completion as a covariate) did not support the predictions.

As shown in Table 18, breakdowns of memory checking episodes initiated by speakers within the macro-building function showed no significant differences between children of different ages ($F(1,28)=.118$,ns), or between mothers of 4- versus 7-year olds ($F(1,28)=.116$,ns). Similarly, for the mean number of initiations within micro-building functions (see Table 18), breakdowns of memory checking episodes initiated by speakers revealed no significant differences

Table 17

Mean number of memory checking episodes by age composition of dyads, adjusted for time of task completion

Variables of analysis	Mean number of memory checking		
	Total checking	Total checking macro-function	Total checking micro-function
Dyads with 4-year olds	8.56	2.56	3.69
Dyads with 7-year olds	7.94	2.75	3.75

Table 18

Mean number of initiations of memory checking episodes by age composition of dyads, adjusted for time of task completion

Variables of analysis		Mean number of memory checking		
		Total checking initiated	Total checking initiated macro	Total checking initiated micro
Children	4-year olds	3.6	1.69	1.56
	7-year olds	2.6	.71	1.77
Mothers	of 4-year olds	3.8	1.70	1.54
	of 7-year olds	4.3	1.80	2.33

between children of different ages ($F(1,28)=.956$,ns), or between mothers of 4- versus 7-year olds ($F(1,28)=.012$,ns).

Discussion

Three major issues were addressed in the present study of social memory processes: 1) the relation of joint reconstructions to participation in the overall activity; 2) the relation of joint reconstructions to participation in inquiries; and 3) the relation of joint reconstructions to participation in discrepancies between speakers' memory for places. Discussions of the data are organized around these three issues.

It will be recalled that the data from this study, while based on theoretical considerations, were essentially descriptions of joint reconstructions. In this discussion, a summary of these descriptions will be given. Afterwards, efforts will be made to extend the current theoretical perspective of the study through emphasizing the developmental implications of the data. The objective of these speculations is to lay the groundwork for future research.

Relation of Joint Reconstructions to Participation in the Overall Activity

A primary interest of the study was the relation of joint and individual reconstructions. Assuming a more basic need by younger children as a means to remember and share remembrances of places, it was predicted that dyads that included younger children would engage in more joint reconstructions than dyads that included older children. The

findings supported these predictions. There was a greater proportional use of joint reconstructions in dyads that included 4-year olds relative to dyads that included 7-year olds. These data indicate that when faced with demands to remember information in the service of the activity, the ways in which dyads met these demands differed by their age composition. While joint reconstructions frequently occurred in all dyads, and were used in different proportions by dyads with different age compositions, the conditions under which dyads were more likely to engage in joint versus individual reconstructions needs to be explicated in future analyses.

An important follow-up analysis examined the relation of children's and their mothers' participation in joint reconstructions. These data indicated that increases in participation in joint reconstructions by 7-year olds were associated with increases in participation in joint reconstructions by their mothers. However, a surprising finding was that the correlation between participation by 4-year olds and their mothers in joint reconstructions was not significant. As compared to 7-year olds and their mothers, quantity of participation in joint reconstructions was less contingent for dyads that included 4-year olds. These results imply that a different set of functional and/or structural relations were associated with age composition of dyads.

Another central issue addressed in the study was whether participation in joint reconstructions was related to participation in the overall activity, and whether this relation differed by age composition of dyads and/or by speakers. Correlations indicated that there was a consistency between degree of participation in joint reconstructions and participation in the overall activity for all dyads. However, findings from other predictions also revealed that the relation of participation in joint reconstructions and participation in the overall activity varied by age composition of dyads. The correlation of participation in joint reconstructions and the overall activity was significant for dyads that included 7-year olds, but the correlation was not significant for dyads that included 4-year olds. While statements about developmental changes are limited by the cross-sectional design of the present study, it may be inferred from these data that consistency of participation in joint reconstructions and the overall activity was more stable for older children.

In sum, the data presented thus far suggest that both the relationship between mothers and their children within joint reconstructive episodes, and the relation between participation in joint reconstructions and the overall activity differed by age composition of dyads. Insofar as degree of participation was related to social dynamics and structure of the activity, these data indicate differences in the social exchanges that constituted joint

reconstructions and their role in the completion of the activity. However, the exact nature of these differences in social dynamics, whether they were quantitative and/or qualitative differences, were not specified.

In several predictions, the issue of initiation of joint reconstructions was addressed. The results showed differences between speakers in their initiations of joint reconstructions. All mothers initiated proportionally more joint reconstructions than their children. However, there were age-related differences between children in the initiation of joint reconstructions. Seven-year olds engaged their mothers in joint reconstructions more often than 4-year olds, and 4-year olds were mostly engaged in joint reconstructions by their mothers. It can be inferred from these data that older children and their mothers understood the functional relation between joint reconstructions and the goals of the activity. Joint reconstruction were initiated and/or maintained by participants because shared information about places modeled or to be modeled emerged from their efforts in reconstructions. In contrast, for four-year olds, their participation in joint reconstructions was frequently dependent upon their mothers' initiations and maintenance of these exchanges. Indeed, joint reconstructions were frequently used by mothers of 4-year olds to orient their children to representational aspects of the task (the goal of representing real places) as opposed to just building things of interest (e.g., a car or a

castle). It may be the case that younger children of do not fully realize (outside the context of their joint reconstructions with their mothers) the utility of joint reconstructions for the completion of the activity. .

While previous data implied age-related differences in initiations, the results also indicated that initiations of joint reconstructions were related to building functions. Specifically, age differences between children were maximized in the macro-building function -- older children initiated more joint and individual reconstructions than younger children. In contrast, age differences were minimized in the micro-building function -- there were no significant differences between children's initiations of joint reconstructions in the micro-building function. The increases in young children's initiations of joint reconstructions were related to the use of joint reconstructions in the activity. Moreover, these results suggest that age differences in initiations of joint reconstructions were not unitary. Age differences in quantity of initiations are regulated, in part, by the function of joint reconstructions in the activity. Thus, interpretations of age differences in children's initiations of joint reconstructions may be restricted to particular functions (e.g., micro or macro) of joint reconstructions in the activity.

Several predictions were made about the relation of memory competencies of individuals (assessed outside of the

joint activity) and joint reconstructions in the activity. For 4-year olds and their mothers, the results did not support the prediction that high individual memory competencies, as assessed by interview measures of total number of places recalled and accuracy of places recalled, would be negatively correlated with joint reconstructions. However, the negative pattern of correlations for 7-year olds and their mothers on the same variables supported the prediction. Thus, memory skills that participants bring to the activity seem to be related to the proportional use of joint reconstruction for seven-year olds and their mothers, but not for 4-year olds and their mothers.

It is not intuitively evident why linkages between individual memory competencies and joint reconstructions were not equally identifiable for all participants. One interpretation of these results is that the different correlational patterns reflected developmental changes in the relation between individual memory competencies and joint reconstructions. An alternative explanation is that the low correlations for the 4-year olds and their mothers only showed that the particular measures of individual memory competencies in the present study were not related to proportional use of joint reconstructions. Measures of other dimensions of individual memory competency (e.g., memory-span) or different measures of the same individual memory competencies (e.g., a more ecological assessment of individual memory skills) may have revealed higher

correlations and a more stable pattern for 4-year olds and their mothers.

While the majority of correlations were relatively low for 4-year olds and their mothers (i.e., correlations of .2 and below), several basic observations were distilled from data on representational variables (see coding scheme) that have some bearing upon the relation of individual memory competencies and proportional use of joint reconstructions for all speakers. In particular, the production of no name places in the interview typically showed relatively high correlations with proportional use of joint reconstructions (.36 to .56). Indeed, most of these correlations were significant. One explanation for these results might be that productions of no name places in the interview assessed individuals' upper limits of accessing remembrances of places without the help of others (cf., Baltes, Dittman-Kohli, & Dixon, 1984). When operating at the upper limit of individual competency, exchanges between participants may be primed for the use of joint reconstructions to articulate the name, location, and/or details of a place.

Relation of Joint Reconstructions to Participation in Inquiries about the Past

Analyses of inquiries were employed to describe structural features of joint reconstructions. Specifically, mothers' and children's inquiries were coded as open- or closed-ended inquiries (See coding scheme). Results indicated differences in mothers' and children's uses of

open- and close-ended inquiries during joint reconstructions. There were significant differences between mothers and their children in their proportional use of inquiries in general. When jointly reconstructing information about places, mothers made more inquiries of their children than vice versa. The results also revealed that mothers used proportionally more open- and closed-ended inquiries than their children. While this finding was not too surprising, it did confirm an intuitive prediction that greater production of inquiries by mothers relative to their children was not specific to open- versus closed-ended inquiries.

Overall, these descriptions indicated that the environment of inquiry in all dyads was very asymmetrical. Mothers dominated inquiries in joint reconstructions. Insofar as inquiries directed reconstructions, it would appear that mothers had more control over the content generated from joint reconstructions, and the quality of participation in joint reconstructions. However, the exact nature of this control needs to be specified in future research.

Differences in both mothers' and children's productions and receptions of types of inquiries were also related to age composition of dyads. Mothers of 4-year olds produced more open-ended inquiries than mothers of 7-year olds. In contrast, there were no significant differences in mothers' proportional use of closed-ended inquiries by age

composition of dyads. In addition, results indicated that differences in productions of open- and closed-ended for mothers of 4-year olds was greater than differences in production of question types for mothers of 7-year olds.

Children's productions of open- and closed-ended inquiries complemented their mothers' productions. There was an age difference in proportion of children's closed-ended inquiries. Older children produced more closed-ended inquiries than younger children. However, there were no age differences in children's proportional use of open-ended inquiries. Similar to the results of mothers' productions, differences in productions of open- and closed-ended for 4-year olds were greater than differences in types of inquiries produced by 7-year olds.

Insofar as closed-ended inquiries limit or restrict another persons' participation in a social exchange (Sigel & Saunders, 1979; Wertsch, 1979), use of closed-ended inquiries may have required more advanced functioning of representational skills to control or regulate the flow of information with another person. Furthermore, a motivation for production of closed-ended inquiries may be related to children's development of self-efficacy (cf., White, 1959). Older children may have engaged their mothers through closed-ended inquiries to confirm or disconfirm their internal reconstructions.

While a cognitive account of question use by children may be one source of these age differences, consideration of

power differences in mother-child interactions may provide some insights into social mediators of children's and mothers' productions of inquiries in joint reconstructions. Use of different types of inquiry may be restricted by "local politics" of interactions. The lower proportion of closed-ended inquiries produced by younger children may have reflected their lack of power in structuring their mothers' participation in joint reconstructions. Conversely, use of open-ended inquiries by children may be interpreted by mothers as an "appropriate" appeal for help in reconstructing information about places. Mothers may not interpret uses of most open-ended inquiries as tests, evaluations, or threats to their status or power in interactions.

Several predictions were made about the relation of individual memory competencies, as measured by the total number of places recalled and accuracy of places recalled in the interview, to open- and closed-ended inquiries. The overall results of correlational analyses did not support the predictions that higher individual memory competencies would receive more open-ended inquiries and fewer closed-ended inquiries during joint reconstructions. The results revealed that quantity and accuracy of recalled places in the interview were typically not correlated with open- and closed-ended inquiries and their various forms (usually .25 or below). In the case of 7-year olds only, correlations were frequently high but the directions of all significant

correlations were negative across open- and closed-ended inquiries. Hence, there was no support for differential patterns of correlations that were associated with types of inquiries.

While the patterns of significant correlations did not support the predictions, the directions of correlations did suggest another pattern. Across all speakers and in all prompt conditions of the interview, significant correlations of quantity and accuracy of places recalled with use of open-ended inquiries were all negative. With high performance on either quantity or accuracy variables, there was a tendency for proportions of open-ended inquiries received by participants to decrease. As noted by researchers of inquiries that occur during social exchanges (e.g., McGillicudy-DeLisa & Sigel, 1982), open-ended inquiries are frequently used in a tutorial manner by adults to orient children to a response. The negative correlation of the occurrence of open-ended questions to quantity and accuracy of responses on the local environment interview may have been related to the "tutorial" use of open-ended inquiries by mothers. Thus, these data imply that productions of open-ended inquiries, especially productions by mothers, were contingent upon individuals' memory competencies, and individuals' memory competencies had consistent relations to productions of open-ended inquiries.

The relative lack of significant correlations in general may be interpreted as evidence that there was no

relation between types of inquiries during joint reconstructions and the memory skills that each participant brings to the activity. This line of argument would constitute a strong version of a social perspective which claims no relation between individual memory processes and social processes of reconstruction.

An alternative explanation of these results is that other dimensions of individual memory that were not represented in the analyses may be correlated with open- and closed-ended inquiries during joint reconstructions. For example, data on representational qualities of places recalled in the interview were also correlated with proportion of joint reconstructions. The results of these analyses suggest that representational qualities of places recalled in the interview had significant relations to types of inquiry for a wider range of speakers, and types and forms of inquiries than the quantitative variables. Quantity and accuracy variables best described receptions of inquiries by 7-year olds only under highly circumscribed conditions. In contrast, for representational variables, there were increases in the number of significant correlations for all speakers.

Patterns of correlations between representational qualities of places recalled and types of inquiries were relatively consistent, especially for no name places and specific name places. The most noteworthy results for these representational qualities were as follows. Four-year olds'

who produced more no name places in the interview were more likely to receive closed ended inquiries by their mothers. Mothers' receptions of open-ended inquiries during joint reconstructions were positively correlated with mothers' production of specific name places in the interview. Children who produced more no name places when prompted in the interview (see method section) were more likely to receive closed-ended questions by their mothers during joint reconstructions. Finally, for both 7-year olds and their mothers, significant correlations were localized in the embedded forms of open- and closed-ended inquiries (see section on coding). These and other results imply that the individual memory competencies that each participant brings to the activity (i.e., representational qualities) may have enabled or inhibited the use of open- and closed-ended inquiries during joint reconstructions. Indeed, future research efforts may find it more profitable to explore the relations of representational qualities of individual memory competencies and types of joint reconstructions, as opposed to the more quantitative assessments of individual memory competencies such as total recall and accuracy of recall.

Relation of Joint Reconstructions to Discrepancies Between Speakers about Memories for Places

Contrary to the results that were predicted, separate analyses of the occurrence of conflict and checking episodes by age compositions of dyads and by speakers consistently showed no significant differences. Moreover, discrepancies

as they occurred within macro- and micro- building functions also yielded no differences.

The lack of significant differences in discrepancies may be explained in several ways. It may be the case that the number of discrepancies was not a variable which is subject to developmental change, or at least not for these age groups. An alternative explanation is that mothers and children avoided memory discrepancies that suggested incompetency. This implicit rule may be especially prevalent in research situations. For instance, videotaping the sessions may have heightened participants' awareness of potential discrepancies that threatened the smoothness of their interactions, and/or discredited their competencies in front of a stranger. Similar to the social dynamics discussed by Goffman (1959), participants may have "engineered images" of smoothness and competency. As such, data on mother-child discrepancies in the present study may have reflected only the upper limits of their displays in a research setting, and these upper limits may not have differed by age composition of dyads.

However, while separate analyses of types of discrepancies revealed no differences, a comparison of difference between mean number of checking episodes versus mean number of conflict episodes were more substantial in magnitude for dyads that included 4-year olds. The mean number of checking episodes was twice the mean number of conflict episodes for these dyads, as compared to dyads that

included 7-year olds. Also, the difference between mean number of initiations of conflict and checking episodes by 4-year olds was greater relative to other speakers. This increase in the number of checking episodes may indicate some change in 4-year olds' participation in mother-child discrepancies relative to participation by 7-year olds.

Developmental Implications of the Results

The previous cross-sectional descriptions suggest two lines of social memory development: 1) a shift from social to individual reconstructions, and 2) a continued development of social dynamics that constitute joint reconstructions. The two developments are briefly discussed below.

With respect to the first line of development, joint reconstructions may be a prevalent means of remembering in the service of a formal activity for dyads that consist of a young child and an adult. In comparison, the use of joint reconstructions in an activity may decrease in dyads that include an adult and older child. For adults interacting with older children, individual reconstructions may become a more prevalent means of meeting memory demands in the activity.

Data in the present study support these descriptions of social memory development. Based on the higher proportional use of joint reconstructions by young children and their mothers and the high participation (dominance) of mothers in

these episodes, it may be inferred that young children's participation in the activity was often interlocked with the support and guidance offered by their mothers (i.e., "scaffolded").

However, developmental changes in social memory processes may be more complex than a simple shift in proportional use of joint reconstructions. The structure of participation between younger children and mothers in joint reconstructions may also change. For example, findings in the present study implied that there was not a strong contingency between the participation of 4-year olds and their mothers in joint reconstructions. As compared to other domains of development, such as language (Ninio & Bruner, 1978), the "scaffolding" of cognitive processes by mothers may not have been as finely tuned to the specific participation of younger children in joint reconstructions. Rather, mothers may have provided general support and guidance for their children's remembrances when memory demands were encountered in the activity. Thus, while younger children's remembrances were more frequently scaffolded, the engagement of children in joint reconstructions by mothers may not have been fully contingent upon children's functional needs for support and guidance of the remembering. Mothers may have been motivated to reconstruct jointly information about places with their children as a means of displaying or exploring their children's competencies, and/or sharing the meaning of

places with their children for the purpose of completing the activity together.

In contrast, 7-year olds and their mothers engaged each other in fewer joint reconstructions. Yet, older children and their mothers may have been more selective in their engagements of joint reconstructions and more attuned to one another in their efforts to reconstruct information. Together, heightened selectivity and attunement by both 7-year olds and their mothers may have mutually enhanced their participation in joint reconstructions. These developmental changes in the social dynamics would account for the higher proportional use of individual reconstructions and the positive correlations between dyad members in their participation in joint reconstructions.

Further research is necessary to verify that these cross-sectional differences reflected developmental changes. In addition, future descriptions should identify social and individual processes that contribute to shift from external, social processes of reconstruction to internal, individual processes of reconstruction. Also, the effect(s) of these developmental changes in social memory processes upon the development of individual memory competencies needs to be examined.

With respect to the second line of development, the increase proportion of individual reconstructions in dyads that include older children does not necessitate a concomitant decline or end in the development of social

memory processes. Rather, it is suggested that other changes are embedded in the shift from higher to lower proportional use of joint reconstructions. These changes may constitute a continued development of memory operations between mothers and their children on a social plane. As such, new forms and functions of social memory may develop in particular activities. For example, in the present study the continued development of social memory processes was evident in several differences between younger and older children as participants in joint reconstructions. The most notable change in social dynamics was related to the initiation of joint reconstructions. The results showed that older children initiated more joint reconstructions than younger children. This increase in initiations of reconstructions may be indicative of a localized developmental change in the social dynamics underlying joint reconstructions, a development which is particular to a specific activity.

Future research on social memory should focus on the continued development of social dynamics, especially in everyday settings. Indeed, it may be through practice in initiating joint reconstructions in a range of everyday activities that children eventually acquire social skills to structure and guide the remembrances with others, to structure and guide how others help them to recall information, and to collaborate with others to maintain, restructure, and conclude joint reconstructions. These descriptions might then provide the basis for linking

developments in social memory processes with developments of internalized memory processes.

Summary and conclusions

The question of how memory functions occur in a social context was addressed in the present study. The results indicated that dyads that included younger children used proportionally more joint reconstructions in the activity than dyads that included older children. Conversely, dyads that included older children used proportionally more individual reconstructions than dyads that included younger children. Moreover, findings indicated several differences in speakers' proportional use of inquiries during joint reconstructions. These differences were interpreted as further developments in children's participation in joint reconstructions. Finally, findings revealed no differences in the mean number of conflict episodes and checking episode by age composition of dyads and by speakers.

There were three methodological concerns that limited the application of findings in this study to other contexts. First, the structure of the joint activity, a model building task, possesses certain qualities that influenced the production and operation of joint and individual reconstructions. Indeed, the activity was constructed in such a way that social memory processes could be observed over a brief period of time. Second, and a related issue, the contrived situation may created "artificial" behaviors that affected the production of individual and joint reconstructions in the activity. While it is evident from informal reports of parents who participated in the study

that social memory processes did occur under everyday circumstances, mothers and their children in a research setting may have altered their styles of interacting and participating in activities. Third, findings from the present study may have been culturally specific and restricted to samples of white, middle-class children and their mothers. Other significant adults in the lives of children (e.g., fathers and teachers) may have interacted differently with the same children. Also, the functional significance of joint and individual reconstructions for other social classes may differ from the white middle-class sample of the present study. Hence, the production of reconstructions in activities in the present sample of subjects may differ from other samples (e.g., mothers and children from working class backgrounds). Together these social considerations of the method in the present study must be seriously considered when generalizing findings to other activities, non-research settings, and other samples.

In sum, some researchers have implied social accounts are often appropriate levels of description and explanation of cultural differences and changes in memory processes (Cole, Gay, Glick & Sharp, 1971; Cole & Gay, 1972; Cole & Scribner, 1977; Wagner, 1982; Luria, 1976). While the findings of this study require confirmation and elaboration through additional research, the perspective and descriptions of the present research may provide a framework for further considerations of how memory processes operate

within a cultural-specific framework of values, beliefs, and meanings; and how memory processes are potentially organized in social exchanges through cultural practices. In particular, the changing qualities of children's participation in social memory processes may provide a "dynamic medium" to describe and explain how socialization of memory processes and functions occurs during early childhood. In future research, differences in memory processes and their functions may be informed by analyses of their operation within particular cultural systems of social exchanges.

APPENDIX A

Phase I: Local environment interview

A) Open ended interview question.

Around where you live is a place is called Park Slope. That's all the places that are around your house. Well I (experimenter) don't know many of the places in Park Slope, and its part of my homework to find out about places you know in Park Slope. So tell me the names of some places that you know in Park Slope. The place can be any place in Park Slope, but these places must be real places--places that you could show me and tell me if I wanted to go there and see them.

Standardized prompt: What other place? or Anything else?

B) Closed ended interview question.

If a subject does not respond with ten places to the question above, then give the subject the following prompt:

What places do you go to around your house with your mother?

APPENDIX B-1

Phase II instructions for mother-child map-making task

Beginning of task instructions.

I want you (addressing child) and your mother to make on the plastic places that you know in Park Slope, the neighborhood you live in. There are blocks of different shapes and sizes over here (point to location). I put these things over here, but you can move them if you want.

You can make any place in Park Slope that you want. But there are two important rules. First, the places must be real places--places that I could go to and see if I wanted to. Second, the places must be in Park Slope.

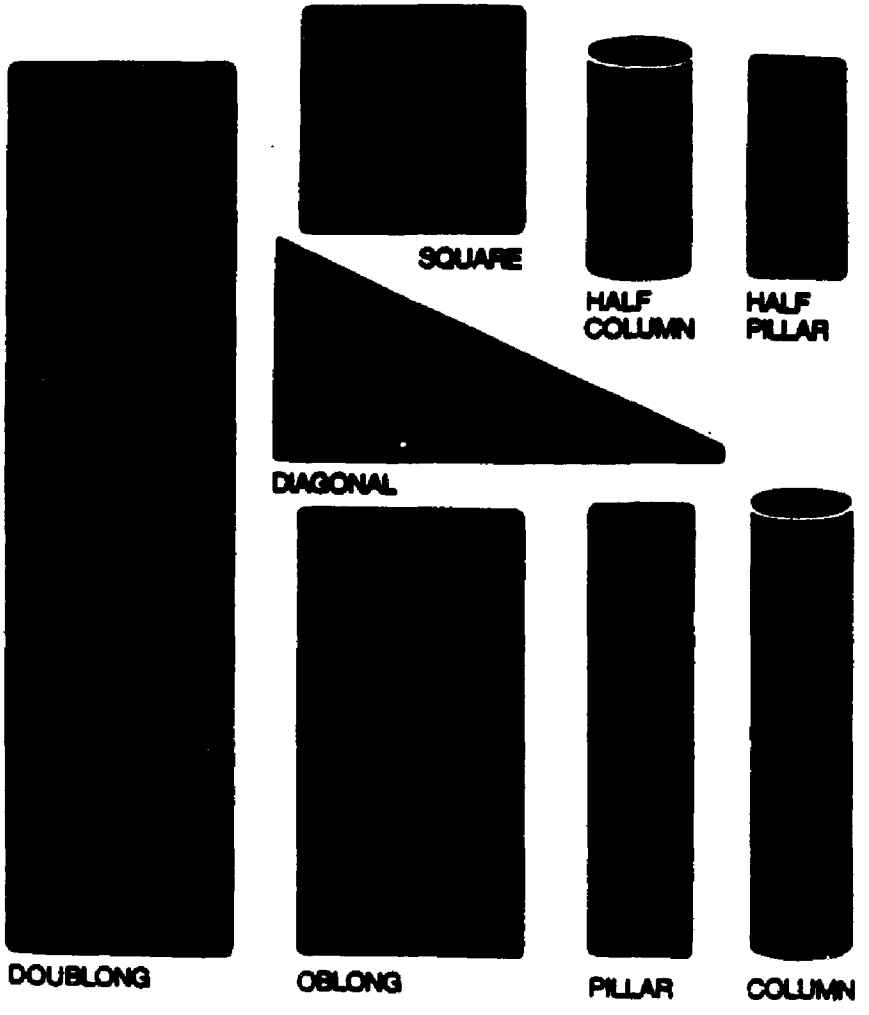
You can work on these places separately or together, and you can help each other in any way you want. I want you to make a total of eight or nine places, and if you want to make more that's okay. So I'll move out of your way so that you can begin.

End of task instructions.

Well that's great. I think this is one of the best Park Slopes I've seen. Let me take some more pictures of the places that you made, and then I'll ask you (addressing child) and you mother some questions about the places you made.

Appendix B-2

Shapes and sizes of wooden building blocks used in Phase II model-making activity



Appendix C-1

Example of a joint reconstructive episode

Seven-year old and his mother:

M: What else is in the park? (pause) Right by this area (mother points to location in the model)

C: Uhmm. (child looks at model where mother pointed)

M: Think. When you're all sweaty, where do you go?

C: In the picnic house.

M: Yeah, but where else? When you're all sweaty from playing ball? You go, "Mommy I need a ..."

C: The water fountain?

M: Right.

Appendix C-2

Example of setting the boundaries of a joint reconstruction

Four-year old and his mother:

M: So that's the wall (refers to block just placed down).

1. Participant establishes a goal to remember which is different from the previous discourse topic

M: And what's at the back?

C: What?

2. Participants contribute to the reconstruction by structuring and guiding each other until information is shared

M: As we walk in? You walk to the back (mother gestures sounds and moves fingers to simulate walking)

C: (looks at model) Tables.

M: And what do you see in the back?

C: The man who serves.

M: Right.

3. Participants begin a new discourse topic

C: Bring these over (refers to blocks to build with)

Appendix C-3

Several forms of joint reconstructions were identified in the present study. Examples of the various types are outlined below.

Example of simple joint reconstruction

Four-year old and his mother:

M: So that's the wall (refers to block just placed down).

C: And what's at the back?

M: What?

M: As we walk in? You walk to the back (mother gestures sounds and moves fingers to simulate walking)

C: (looks at model) Tables.

M: And what do you see in the back?

C: The man who serves.

M: Right.

C: Bring these over (refers to blocks to build with)

Example of complex joint reconstruction

Seven-year old and her mother.

1. Establishes a goal or initiates an effort to remember information with the other participant.

C: How many doors are there?

M: Oh, forgot about the doors.

2. Establishes a subgoal to remember other information.

C: Wait, How many kindergartens?

M: Well, there's Mrs. McPadden's,..and Mrs. Lipson's, and Mrs. Morgan's, Miss Morgan's..and Miss Lamdoff's, right?

C: So how many is that? Four?

M: MM. Hmm.

3. Re-establishes a primary goal to remember and links the subgoal to the primary goal.

C: So...They're are four windows. One for each classroom, right?

M: Yeah. I think so.

Example of partial joint reconstruction

Seven-year old and her mother:

M: Now, where are the st..steps where you go in? Where will they be?

C: Oh, I forgot the swings.

M: Okay, where do the swings go.

Appendix C-4

Example of an individual reconstruction

Seven-year old and his mother:

1. Events prior to the individual reconstruction:

C: (Finishes making some benches in the park)

M: (Building a house)

C: I don't know what to build.

M: What? (mother turns to hear what child said)

2. Child recalls something in the park that he can build.

C: I know. I'll make a tire. The tire swings (referred to play materials in the playground in the park).

3. Events following the child's recall.

M: Yeah, good idea.

C: Do you have any of those yellow blocks?

Appendix D-1

Example of a macro-building function

Seven-year old and his mother.

M: Where should we put the laundry mat?

C: Put it...you know...together.

M: Let's see. We have Pino's.

C: And then we have Mario's.

M: And then the laundry mat.

Appendix D-2

Example of a micro-building function

Seven-year old and her mother.

C: What's the place where you.. After a little while there's that place where the food is?

M: Inside the store?

C: There's a foo...There's a piece of glass and it like, and its like their, an awning sometimes, there's an awning up and over? And there's a lot of stores you can look in and see what they have.

M: Oh. And there's a shelf there where they keep things like plantains and the banana. Yeah.

Yeah. Yeah. In the corner of the store.

Appendix E-1

Example of a memory conflict episode

Seven-year old and his mother

C: No, you put everything backwards.

M: What?

C: See what I mean? This is Seventh Avenue here. (child points)

M: Yeah.

C: And...

M: That's the fence around it. And I'm looking at the ...

C: No. Everything's backwards.

M: It's not backwards. See...

C: Look. If this is Seventh Avenue...You're thinking of the schoolyard here. Right?

M: No. the front yard.

C: Mom. Wha..Look. The yard would be (child points).

M: Oh. And the fence would be here.

Appendix E-2

Example of a memory checking episode

Seven-year old and his mother:

C: (Gets some blocks to build their house)

M: So where does our house go?

C: Uhh, here (child points to location in the model)

M: Is this the entrance to the park on Garfield (mother points to where they made the entrance to the park)

C: Yeah.

M: So where would our house go?

C: Here? (child points to location across from the entrance to the park in the model)

M: Right.

Reference Notes

Note 1: Data were collected when piloting different methods for the the dissertation

Note 2. The method outlined in this section was part of a larger study in which a third phase was included. This additional phase consisted of two follow-up interviews that assessed participants' recognition and recall of places built in Phase II. Assessments were made under individual and social conditions.

Note 3. In addition to the Local Environment Interview, six other tasks were administered. These tasks included: list recall of semantically related words, list recall of unrelated words, two sentence recall tasks, and scripted-story recall task. Analyses of Phase I measures were limited to data yielded by the Local Environment Interview.

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