

ANTECEDENTS OF INFANT-SIBLING INTERACTION  
IN THE STRANGE SITUATION

by

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## ABSTRACT

Title of Dissertation: Antecedents of infant-sibling interaction in the strange situation.

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The purpose of this study was to examine infant-sibling behavior in a modified version of the strange situation. Thirty-five mother-older sibling-infant triads were recruited for participation in this study. The sibling pairs were divided into four groups: Male-Male, Male-Female, Female-Female, Female-Male. Mothers filled out a questionnaire developed to assess the degree of sibling involvement in caregiving at home as well as a measure of infant temperament. Predictive relationships were sought between Gender Composition of the dyad, Sibling behavior at home toward the infant, Mother Work Status and Infant Temperament on episode measures of Distress, Play and Contact/Comforting.

Results indicated that older siblings can function to reduce infant anxiety in the presence of an unfamiliar person. Low sensitive caregiving by the older sibling predicted higher infant distress and greater contact and comforting by mother during a mother reunion episode. Infants of the gender pair Male-Female exhibited significantly greater distress and required more contact

and comforting by mother when she returned than any other pair. Infant shyness was negatively related to sensitive caregiving by the older sibling and to Play in the episodes but positively related to infant distress. The findings are related to the importance of examining the social network within the family when predicting interactive patterns.

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## Table of Contents

Section	Page #
A. Statement of the Problem.....	1
B. Review of the Literature.....	6
1. Infant-Mother Attachment Relationship.....	6
2. Critical Review of Attachment Theory.....	20
3. Infant-Sibling Interaction.....	28
C. Method.....	50
1. Research Questions.....	50
2. Research Sample.....	50
3. Research Setting.....	52
4. Play/Interaction Session.....	53
5. Modified Strange Situation.....	55
6. Characteristics of families who did not complete the procedure.....	57
7. Behavior Codes and Reliability.....	61
8. Data Reduction.....	62
9. Statistical Procedures.....	65
D. Results.....	66
1. Summary of the Results.....	66
2. Analysis of gender Groups and Sensitive Caregiving.....	68
3. Analysis of Gender Groups and Home Play.....	76
4. Analysis of Gender Groups and Birth Interval.....	77

5. Differential Effects of Mother, Stranger and Sibling on Episode Dependent Measures.....	78
a. Comparison of sibling reunion with stranger present vs mother reunion with stranger present.....	79
b. Comparison between mother separation with sibling present and sibling separation with the stranger present..	80
c. Mother reunion with sibling preset vs mother reunion with stranger present.....	81
d. Sibling reunion with stranger present and infant alone with stranger.....	81
9. Analysis of Mother Work Status and Birth Interval on Episode Measures.....	81
10. Analysis of Mother Work Status and Home Play on Episode Measures.....	89
11. Analysis of Mother Work Status and Sensitive Caregiving on Episode Measures.....	90
12. The Relationship between Infant Temperament and Caregiving Questionnaire Factors.....	90
13. The Relationship between Infant Temperament and Episode Measures.....	95
14. Interaction of Gender Groups, Sensitive	

Caregiving and Infant Shyness.....	96
E. Discussion.....	98
F. Appendices.....	115
G. References.....	137



### Statement of the Problem

The aim of this paper is to examine the nature of infant-sibling relationships. Siblings spend a great deal of time together and they engage in a wide variety of interactions (Abramovitch, Corter & Lando, 1979; Dunn & Kendrick, 1982). The major global descriptor of sibling relationships in much of the research has been in terms of sibling rivalry. While this construct comprises a part of the sibling relationship, it has been shown that children as young as 4 to 6 years old provide spontaneous caregiving to their infant siblings (Stewart, 1983) as well as being able to facilitate infant environmental exploration (Samuels, 1980). It seems premature to speak in terms of infant-sibling attachment as the term is used for the infant-caregiver relationship. The term attachment as it is used in the literature has a recognized, albeit disputed, meaning in terms of the early caregiver-child relationship. The assumptions of this paper recognize the primary importance of infant-caregiver relationship within the social network of the family. However, research has shown that siblings do engage in behavior that when described in the context of the infant-mother relationship, is termed attachment behavior. These behaviors are seeking contact, seeking proximity and sibling comforting etc. (Stewart, 1983; Stewart & Marvin, 1984). The attachment literature and methodology is

being used purely to create a framework for understanding certain aspects of the early infant-sibling relationship. Research in the area of infant-mother interaction has focused a large part of its efforts in determining the nature and function of the infant-mother attachment relationship. The function of the attachment relationship manifests itself in terms of later competence in social and emotional areas of development. Prerequisites of this competence have been the degree of felt security if separated from the mother and the ability to use mother as a secure base during exploration.

Earlier work on attachment stressed the biological underpinning of attachment, drawing from ethological, psychoanalytic and systems theory (Bowlby, 1969). In this view, the infant is viewed as possessing an innate behavioral system that when activated signals to the caregiver that the infant is in distress. This triggers proximity-seeking behavior on the part the infant, who requires bodily contact to reduce distress. Later additions included a secure base organization which mediates exploration of the environment (Ainsworth & Bell, 1970). Other models of attachment include Psychoanalytic, Contiguity Theory, and Social Learning theories which will be reviewed in another chapter of this paper.

Challenges to the concept of attachment have arisen

in several areas including the lack of a relationship between attachment and dependency (Maccoby & Masters, 1970), situational factors within the strange-situation procedure (Brooks & Lewis, 1974) and the high cross-situational variability in the behaviors that index attachment (Masters & Wellman, 1974). It has been suggested that the basis for the trichotomized classification system (secure, avoidant, anxious/resistant attachments) was arbitrary and that quality of attachment may be more precisely viewed as lying along a continuum (Lamb, Thompson, Gardner, Charnov & Estes, 1984).

The security of attachment seems to be dependent upon a previous history of contingent responsive parenting and or positive interaction between the infant and the primary caregiver (Blehar, Leiberman, & Ainsworth, 1977). Consequently, most of the attachment research has focused upon the relationship between nurturant and responsive behavior of the mother and the quality of attachment. It seems that the concept of a network of social relationships, each having its own set of interactions patterns and developmental significance, may assist in guiding the research in early socialization (Weinraub, Brooks & Lewis, 1977). The Bowlby-Ainsworth organizational construct theory of attachment, since it is a model of infant-adult caregiver attachment does not address itself to early



infant-sibling interaction and its relationship to future sibling-sibling outcomes.

The social network view of early social relationships does contain testable propositions concerning the infant's relationships with a variety of social objects. These relationships are also presumed to vary according to object, function and the situation of the specific interaction (Weinraub, Brooks & Lewis, 1977).

It would seem to be important to examine an infant's interactions with other family members, specifically older siblings. The concept of a social network would predict that siblings serve an important function for infants wither directly or indirectly through other family members. When the older sibling is involved in certain interactions with the infant at home, i.e. feeding, bathing, dressing, playing, the sibling's involvement in these functions may be related to infant-sibling behavior in other contexts with different people. The design and hypotheses of this study are guided by these propositions and other research in sibling-sibling interaction.

For the present study, the infant-sibling relationship is assumed to be related to the amount and quality of infant-sibling interaction, degree of responsiveness as well as to mother-mediated involvement in the care of the infant. In this regard, the sibling is presumed to be a source of social reinforcement for

the infant much like the social learning model proposed for infant-mother attachment (Gewirtz, 1972). The degree and quality of interaction between infant and sibling appears to be mediated by mother. Consequently, early infant-sibling interaction will be framed in a triadic system including mother, infant and sibling. One would expect that teaching and modeling positive interaction by mother and inclusion of the older sibling in a variety of caregiving situations or in play with infant would increase the likelihood of a positive relationship. Sibling behavior in this case would be more rewarding and less aversive for the infant and the nature of this positive relationship may have an influence on later developmental outcomes.

Research in early sibling interaction has also shown that differences in behavior may be explained in part by the birth interval of the siblings (Pepler, Abramovitch & Corter, 1981) and composition of the sibling dyad (Dunn & Kendrick, 1981). There may also be gender differences in the ability of the older sibling to foster a relationship based on positive interaction as well as influences due to the temperament of the infant (Buss & Plomin, 1984).

The reserch design will permit the prediction of behavior associated with infant-sibling interaction in the home as it varies depending upon the degree of positive interaction, caregiving experience, birth

interval as well as the gender composition of the dyad. The design will also permit the assessment of infant behavior during both separation and reunion episodes of a modified strange-situation procedure, the relationship of infant strange situation behavior to at home behavior of the sibling and the situational effects of the strange situation on infant-sibling behavior.

The results of this study are expected to contribute to understanding of the social network and the function of early sibling-sibling relationships.

#### Literature Review

The literature review will examine the following areas of research: The infant-mother attachment relationship from an historical perspective and current trends, critiques of attachment theory and methodology, and infant-sibling interaction. The review will attempt to show: one, that infant-mother interaction within the context of the attachment relationship, while continuing to be a viable developmental construct, is undergoing needed revision and reformulation; two, that infant-sibling interaction can be a very important social influence to the infant, assisting the infant to gain mastery over the environment.

#### The infant-mother attachment relationship

In an attempt to understand the nature of a child's relationship to his/her mother during early social development, various theoretical models were devised by



early theorists and researchers. Early psychoanalytic formulations relied on presumed instinctual processes to explain the attachment of infant to mother. This attachment was viewed as an "object cathexis" in which the chosen object (in this case the mother) became the object of instinctual gratification whose aim was to obtain and manipulate the object. This choice occurred during the last third of the infant's first year of life and was termed "anayclytic". This means that the social bond was based on the child's need to be fed and experiences surrounding feeding were deemed to be important in the formation of this bond (Freud, 1946). Most theorists who adhere to psychoanalytic principles view this attachment as important for the development of healthy, mature relationships in later life.

Psychoanalytic formulations received little support when tested using research methodologies. A significant refutation was the finding that contact comfort was more important than feeding as a factor in the development of early relationships and their effect on later social behavior (Harlow, 1961). Humans also seem to form attachments independent of their feeding experiences (Ainsworth, 1969).

Later, the concept of dependency was used to describe and explain the relationship of the infant to the mother (Maccoby & Masters, 1970; Gewirtz, 1972), with support from early learning theory. Dependency was originally

conceived of as an acquired drive based upon the observation that the mother, by gratifying all of the infant's needs, became a secondary reinforcer through the process of pairing. The behaviors that were considered to be related to dependency were seeking physical contact, seeking to be near, seeking attention, praise or approval and resisting separation (Maccoby & Masters, 1970). Therefore, it follows that attachments should occur only to those who have responsibility with the care and feeding of the infant. That this is not the case is supported in the work of Shaffer & Emerson (1964) who found that 22% of their sample of children formed strong attachments to people who had no caretaking responsibilities.

Gewirtz (1972) criticized the acquired drive model of attachment/dependency in preference for a social learning model. He viewed attachment and dependency as being based upon the same principles. In this view, the development of the infant-mother attachment could be explained using the principles of operant reinforcement along with the concept of the reinforcing stimulus. Dependency as well as attachment could be viewed as terms that describe a class of behavior that have come under stimulus control. The particular controlling stimuli will be dependent upon the individual's discriminative reinforcement history vis a vis the mother's responsiveness to infant cues. The emphasis



here are the patterns and contingencies between the child's behavior and the reinforcing conditions (Gewirtz, 1972). It follows that the behaviors that index attachment and those that index dependency are not differential in terms of a distinction. The distinction being made is solely in terms of the controlling stimuli. The stimuli that acquire positive control over certain approach behaviors related to dependency of the child may be provided by any member of a discriminable group of people while those stimuli that have controlling properties for various behaviors indexed as attachment stem from a particular person. When one person is the sole source of social stimuli, then their appearance and characteristics may come to have unique properties characteristic of a functional system that could connote attachment (Gewirtz, 1972).

The weaknesses of the social learning model for explaining infant-mother attachment lies in its failure to describe the controlling stimuli for the process of detachment and its silence when attempting to explain the process of stimulus control for the apparent existence of attachment behavior, albeit disturbed, in children with physically abusive, neglectful parents (Rajecki, Lamb & Obrmascher, 1978).

Attempting to clarify this distinction, Ainsworth (1972) views dependency as preceding attachment. Attachment is viewed as the affectional bond that is

formed between the infant and another specific individual, the hallmark behaviors being seeking proximity and contact under certain conditions. Dependency is a generalized or non-specific response characteristic functioning more like a trait. Dependency, when viewed as a trait predicts that the behaviors that index it are highly intercorrelated. This has been shown to be the case (Maccoby & Masters, 1970). However, when using the trait explanation for attachment, one must assume a central motive state which underlies the behaviors that index attachment thereby providing consistency to attachment behavior across settings. Also, it would need to be demonstrated that the behaviors that are indicative of attachment are highly intercorrelated as well as stable. This criterion is not met and in fact the intercorrelation of behaviors presumed to index attachment are quite low (Masters & Wellman, 1978). More recently, Sroufe, Fox and Pancake (1983) have tried to further clarified this distinction, hypothesizing that attachments evolve over the first year while dependency begins before attachment. They compared the critical behaviors that index dependency with with overall quality of attachment and found that they were unrelated. Behaviors indicative of dependency did not differentiate between attachment classifications.

Cairns (1966) also viewed learning as occupying a

crucial role in the development of the early infant-mother relationship. Borrowing from contiguity theory (Guthrie, 1935), he suggests that attachments can form to any object, animate or inanimate, through the process of simple associative conditioning, as long as there has been a consistent, maintained presence of that object in the environment. The more continuously present an object or person is, the more likely that it will acquire the characteristics necessary to control the responses of the organism. In terms of infant attachment, it then follows that the longer the period of separation from the object that acquired associative significance, the greater the likelihood that attachment would diminish over time. The model also predicts that it is the frequency of interactions between mother and infant and not the quality of these interactions that determine the strength of the attachment. However, this view does not account for the observation that once attachment are formed, especially in humans, they are capable of being sustained over a long period of separation. Also, at the time of reunion after a long separation, behavior that appears to indicate attachment seems to increase in intensity rather than extinguish (Ainsworth, 1972). The notion that by merely being present in the social environment during the time that an infant is forming attachments has implications for infant-sibling attachment.



Attachment as an ethological/organizational construct received its first formulation for infant-mother relationships in the work of Bowlby (1958), with further elaboration in future theoretical writing (Bowlby, 1969; 1973). Before describing this view, a brief discussion into the comparative literature may put this work into perspective. In the ethological literature, Lorenz (1937) described a process by which the newly born of various avian species through the behavior of following, formed a social bond to a conspecific, a human or even an inanimate objects. This bond was irreversible and stimulus specific. Reviewing the comparative literature, Rajecki, et al (1978) concluded that there was no evidence that non-primate species exhibit attachment behavior as is defined in humans i.e. preference for the attachment figure, differential proximity-seeking following removal of the attachment figure and distress at separation differential to a reduction in social stimulation in itself. However, in primate species, comparative literature has discovered a variety of phenomena and behavioral responses in the non-human primate infant-mother relationship that has parallels in humans. It is known that in primate species, the young recognize a specific mother (Harlow & Harlow, 1965). Pigtail monkeys spend most of their time with mothers, 50% of it in actual contact (Rieter & Short, 1980) and shows signs of

behavioral depression and physiological disorganization when separated, even if adopted by another female (Rieter, Seiler, & Short, 1978). In addition, infant monkeys who were seriously abused by their isolation-reared mothers persisted in their attempts to cling to them (Seay, Alexander, & Harlow, 1964) and attachment behavior appears to be accentuated under repeated stressful experiences between mother and infant, with infants usually choosing the least aversive caregiving alternative (Harlow, & Soumi, 1970). Mason and Berkson (1975) found that surrogate mother presence reduced distress vocalizations.

The literature in non-human primate species does seem to provide support for the biological basis and genetic predisposition toward attachment in the early infant-mother relationship.

Borrowing heavily from psychoanalytic object relations theory, ethological work and cybernetic models, Bowlby (1958, 1960) coined the term "attachment" to describe a specific functional process in human infants and to separate this process from the dependency literature with its implication of a negative affective state. Attachment is characteristic of strong positive affect and does not refer to a state of helplessness. Bowlby (1982) views attachment behavior as being driven by a separate motivational system apart from feeding or sexual drives. He defines attachment as "any form of

behavior that results in a person attaining or maintaining proximity to some other clearly identified individual who is conceived of as being better able to cope with the world" (p. 668). This becomes more apparent during such organismic states as fright, fatigue, illness and distress. Bowlby (1969) outlined 3 main phases of the attachment process: first (0-7months) an initial phase during which behaviors that may be considered as presursors to attachment are exhibited before adequate discriminatory skills have been developed. Crying as a signal becomes supplanted by smiling and visual regard. In the second phase (7-10 months), preferences are formed and attachment behaviors become preferentially focused on those individuals with primary caretaking and socially reinforcing functions. The third phase (10-15 months) is characteristic of the formation of immutable attachments which have formed with the mother and other specific figures. At this phase, a control systems model is developed that comprises a proximity-seeking, contacting-maintaining system between the infant and caregiver. This is not equated with the strength of the bond nor with the discrete behaviors that may be indicative of attachment. This behavior system is activated by variations in the degree of temporal or spatial distance from the caregiver around a internal set goal, similar to a negative feedback loop. When the set goal is exceeded



in time or distance, the infant's behavioral system is activated and signals are emitted to activate the mother's caregiving behavioral system. The primary function of these signals is to achieve proximity to the attachment figure thereby reducing fear and distress. From an ethological/evolutionary perspective, this behavior decreases the probability of harm and ensures survival. The model also predicts separation distress when the infant is separated from the attachment figure with recovery following reunion. Infants who are separated from the mother for lengthy periods (such as institutionalized children) will enter a period of depression characterized by protest, agitated locomotion then marked inactivity, depressed postures and depressed expressions (Bowlby, 1960).

One conceptual weakness of the Bowlby model of attachment is that it focuses on one salient function of the attachment system, i.e. proximity-seeking, without adequately addressing the child's complex motivations toward the environment (Waters, 1980). The model seems to lack the flexibility to accomodate the interaction of the attachment system with other behavioral systems. Some other issues needing clarification are concerned with individual differences between infants in emotional expressiveness and responsiveness.

Early experimental work on attachment (Ainsworth, 1969, 1973) extended the construct beyond its original

formulation to include the notion that another major function of the attachment bond is to mediate the exploration of the environment. This work began to integrate the attachment system into other behavioral systems. The process and patterning of interaction between mother and infant is developed to a degree that an attachment-separation balance is created which shifts from exploration to proximity-seeking depending upon the situation encountered and the degree of security felt by the infant. In this framework (Ainsworth, Blehar, Waters & Wall, 1978), an unfamiliar, strange situation may be expected to activate three behavioral systems: exploratory, wary/fearful, and attachment. The attachment and wary/fearful system can work in conjunction with one another but the attachment and exploratory systems are mutually exclusive. It has been demonstrated that exploratory behavior decreases when the attachment figure is absent and that the infant will seek contact and proximity with the caregiver upon her return (Ainsworth & Bell, 1970). Attachment behavior is terminated when fear or distress is relieved at which time exploratory behavior may resume. Jones (1985) examined the relationship between exploration and attachment motivation. Fifteen to 18 month old infants were allowed to alternate between play and visits to mother. Results suggested that when attachment motivation was high, this behavior dominates the infant



regardless of the level of exploratory motivation. However, under conditions of high exploratory motivation, the contact with mother was much shorter than when exploratory motivation was low. This research suggests that attachment and exploration may operate as different yet intertwined motivational mechanisms.

In response to Bowlby, Ainsworth posited that the set goal of attachment is not only based upon the monitoring of the degree of distance from the caregiver but includes the appraisal of a variety of stimuli both internal and external to the infant which are compared to an internal feeling of security (Jaffe & Vaughn, 1983). The work of Bowlby was further extended to include an individual differences construct based upon how caregivers interact with their infants and the resultant quality of attachment (Ainsworth, Blehar, Waters & Wall, 1978). The quality of the attachment appears to predict success in a variety of developmental outcomes and later social relationships (Waters, Wippman, & Sroufe, 1979).

It is generally agreed that an attachment relationship cannot be developed in humans before the infant has acquired certain cognitive capabilities and experienced a significant amount of interaction with a primary caregiver. Since the primary caregiving figure in Western society is the mother, investigators focused on maternal influences in the development of attachment.

It is presumed by some (Ainsworth, et.al., 1978; Sroufe & Waters, 1982) that caregiver responsiveness to the infant during the first few months predicts the quality of the attachment relationship at the end of the first year. Ainsworth (1979) observed 26 infants at home for 3 hours every 3 weeks for a period of several months. Narrative accounts were made from the objective reports of interaction and revealed that maternal sensitivity to infant signals during feeding, face-to-face play and physical contact was predictive of attachment quality at the end of the first quarter. The quality of attachment was assessed in a procedure called the "strange situation" (Ainsworth & Wittig, 1969). The procedure is a series of eight episodes designed to examine the exploratory behavior of infants in the presence and absence of mother, a stranger, or both as well as infant behavior during separation and reunion. Behaviors observed during the procedure include proximity/contact-seeking, contact-maintaining behavior, resistance to proximity or contact, during reunion search behavior during separation and exploratory behavior. Using the strange situation procedure, Ainsworth and Bell (1970) discovered that there was a significant drop in all forms of exploratory behavior when the stranger entered the room occupied by mother and infant. Also, there was a significant increase in contact-maintaining, and proximity-seeking both in the presence of the stranger

and in the reunion episodes following a brief separation from the mother. Stayton, Ainsworth and Main (1973) traced the development of separation and reunion responses in infants aged 15 to 54 weeks. Home observations were made at 3 week intervals. Data revealed that separation protest was differential to mother from the outset. Crying occurred more frequently when mother left a room than when stranger left. Intensity of greeting upon reunion was found to be greater to mother than to an unfamiliar persons.

These results seem supportive of the conclusion that behaviors indexing attachment are directed differentially to the mother and that the presence or absence of the mother affects exploratory behavior and the level of distress of the infant. After separation, infants made attempts to regain contact and proximity to the mother. By seeking similarities and differences in reunion behavior, infants can then be classified into one of the three following categories: secure attachment, avoidant attachment or anxious/resistant attachment. Each of these three groups contains subgroups that are differentiated based upon the qualitative responses of the infant in the strange situation (Ainsworth, 1973). Other research has focused on the maternal variables that seem to be predictive of behavior in the strange situation in contexts such as separation and reunion (Stayton & Ainsworth, 1973),



physical contact interaction (Ainsworth, et.al, 1978), maternal affection (Tracey & Ainsworth, 1981), crying and distress relief (Bell & Ainsworth, 1972) and passivity toward the infant (Blehar, Lieberman, & Ainsworth, 1977).

It has been shown that dimensions such as sensitivity, cooperation acceptance and accessibility differentiated between the three attachment groups. The dimension that most clearly differentiates between groups in a broad sense was sensitivity to infant cues and contingent responsiveness (Blehar, Lieberman, & Ainsworth, 1977).

In summary, the above research suggests that during the period of 30 to 48 weeks of age, behaviors assumed to indicate attachment seem most prevalent. Infants are distressed upon separation from their mothers and attempt to regain proximity and contact at reunion. Also, the extent of exploratory behavior is affected by the presence or absence of the mother suggesting that the attachment system is linked to other behavioral systems as they work in conjunction to assist the infant to master the environment. In addition, individual differences in attachment can vary along a qualitative dimension which seems to be associated with the quality of maternal behavior, i.e. sensitivity, accessibility, and responsiveness.

Critical Review of Attachment Theory

Difficulties with the concept of attachment have arisen due to the confusion between attachment as an emotional state and the behaviors that index it. Earlier criticism was based upon the finding that attachment behaviors do not display a high degree of cross-situational consistency or intercorrelation thereby nullifying any trait explanations (Masters & Wellman, 1974). Coates, Anderson and Hartup (1972) found little stability in attachment behavior such as visual regard, crying, smiling, vocalizing but long term stability for touching and proximity to mother in a 14 to 18 month old sample.

Other criticisms have been addressed to the strange situation procedure itself. Feldman and Ingham (1975) suggested that attachment behavior may be affected by the invariant order of presentation of the episodes, the types of toys and the degree of familiarity with the adult who accompanies them to the procedure. They found that differences in the time required to resume play were related to whether the child was accompanied by father, mother or an acquaintance. There were few other differences in reunion behavior. They concluded that if one of the criteria for attachment is that it be exhibited preferentially to one person; that criteria was not supported in this study and brings into question the use of reunion behavior as an index of attachment. Ross and Goldman (1977) have shown that the degree of

infant approach and avoidance to the stranger is affected by the behavior of the stranger. Twelve month old infants were observed in a situation where there was an opportunity to approach a female stranger. The behavior of the stranger was predetermined to be active or passive. In the active stranger condition, infants spent more time near the stranger, less time near mother and cried or fussed less than infants in the passive stranger condition. They conclude that the behavior of the infant in the strange situation procedure may be explained by the passive role given to the stranger and not a within-the-infant attachment construct. Brooks and Lewis (1974) examined the dimension of length of time in a situation as a variable that could affect the degree of frequency of the behavior observed in various attachment paradigms. One year old infants were observed for 15 minutes of continuous play in the presence of mother. Mother was instructed to not initiate interaction but to respond if the infant attempted to engage her. The free play period was divided into five three minute periods. Results showed that over the five periods, touching, proximity and vocalization increased significantly while manual manipulation of toys and visual exploration decreased significantly. They concluded that since these behaviors increased over time independent of any manipulation such as the epochs of the strange



situation, then what really accounts for the increase in proximity and decrease in exploration are not the epochs but boredom on the part of the child. In defense of attachment theory, the results of the above study do support the prediction that attachment behavior increases as a result of fatigue or boredom. Others have challenged the position that separation protest can be used to index attachment since infants seem to protest the departure of fathers as well despite differences in caregiver availability (Kotelchuck, Zelazo & Kagan, 1975). The above results, on the other hand provide support for multiple attachments with differing antecedent conditions.

In summarizing, the above studies seem to question some aspects of attachment as it is presently measured in the strange situation procedure, while supporting others. Some of this confusion is related to efforts to equate the attachment with the bond with behaviors that may be situationally specific.

Clarification of the distinction between attachment behaviors and attachment as an emotional state have been advanced. Lamb (1974) supports the position that situational and contextual variables may affect the patterning of attachment behaviors over time but that these effects may be independent of the quality of the attachment bond. While manifestations of attachment may vary, the emotional bond endures. The distinction

between the emotional bond and the behaviors that index this emotional bond is important to the view that attachment is an organizational construct (Sroufe & Waters, 1977; Ainsworth, et.al., 1978). Attachment is viewed as more than the discrete behaviors that are manifested by infants in attachment paradigms. Attachment as a behavioral system is adaptive and flexible so as to be able to adjust to a variety of contexts where the degree of felt security is monitored and behavior exhibited to modulate this feeling. A large class of infant behaviors may become organized to serve the needs of the infant regarding security modulation vis a vis the caregiver. These behaviors develop a degree of equivalence so that some are employed in one context while others are employed in different contexts but all in service of the attachment system. In support of this formulation, Waters (1978) found that while individual discrete behaviors that index attachment were variable at 12 and 18 months, there was stability in overall attachment classifications.

Recently, efforts have been made to replicate Ainsworth's findings and to clarify in more detail the nature of the antecedent conditions or maternal behaviors that have become associated with various attachment classifications. Egeland and Garber (in press, cited by Lamb, Thompson, Gardner, Estes &



Charnov, 1984) examined 267 mother-infant pairs in the Strange Situation at 12 and 18 months. Sixty maternal variables were recorded as well as several infant characteristics. While 11 of the 60 maternal measures could differentiate attachment groups (secure vs non-secure), no measure was related at both 12 and 18 months. There was no consistent relationship found across a 6 month period between measures of maternal characteristics and security of attachment. Another replication of Ainsworth' work was completed by Grossman and Grossman (1982). Using a German sample, maternal sensitivity to infants signals during the first year was correlated to behavior in the Strange Situation at 12 months. It was discovered that when maternal variables were matched to attachment classifications, mothers of secure (B) infants were significantly more sensitive than mothers of anxious/resistant infants (C) but not mothers of avoidant (A) infants at 2 months of age. The Group B and Group A mothers were equally sensitive to 10 month old infants. Grossman, Grossman, Spangler, Suess and Unger (1985) evaluated infants at home with the Neonatal Behavioral Assessment Scale and based upon these assessments attempted to predict later attachment classifications. They also used the Ainsworth Maternal Sensitivity Scale to create global ratings of maternal behavior. Results showed that at 2 months, there were no difference in maternal sensitivity between avoidant

and secure infants. Maternal sensitivity at 10 months did not predict attachment classifications. Crockenberg (1981) examined the relationship among infant irritability in the neonatal period, maternal responsiveness to distress and social support at 3 months to the infant's behavior in the Strange Situation at 12 months. Chi Square analysis discovered a significant relationship between social support, maternal responsiveness and security of attachment. However, regression analysis found that maternal responsiveness predicted infant proximity-seeking but failed to predict infant avoidance. Lamb, et al. (1984) examined some of the basic assumptions underlying the Bowlby-Ainsworth model of attachment and its measurement. In reviewing some of the original work of Ainsworth, it was discovered that the findings appeared to be weaker than previously thought. Difficulties with the methodology and the intercorrelation of some of the variables measured seemed to affect the reliability of the results concerning the degree to which antecedents such as caregiver responsiveness actually predict attachment behavior. In spite of great differences in infant behavior, the mothers of groups A and C (avoidant, resistant/anxious) were similar to each other (Lamb, et. al., 1984).

These findings bring into question the assumption that the behavior of the infant in the Strange Situation

is a function of prior specific patterns of maternal interaction. The evidence suggests that global characteristics in conjunction with other variables may be related to future infant Strange Situation behavior but there is inconsistent support regarding specific mechanisms of maternal-infant interaction that are predictive of later attachment classifications. Temperament, prior experience with strangers, experience with separation in familiar and unfamiliar contexts, reinforcement history and cultural context may all be important variables. In this context, one must include the responsiveness and quality of interaction of other family members who have emotional significance. Fathers and siblings may have influence on the development of attachment within the context of the family social-emotional system. Much of the early work on attachment was completed in one child families or if there were more than one child, the influence of the sibling on attachment was rarely considered as it may affect infant-mother attachment or infant-sibling early emotional relationships. Maternal behavior may be only one of the many important influences that affect infant behavior. Other direct and second-order effects may become apparent as research in this area continues. In the next section, research will be presented showing that siblings exert a powerful influence on infant behavior in both dyadic interaction and during



interaction which includes the mother and father.

#### Infant-Sibling Interaction

The arrival of an infant to a family that already had one child is a momentous event which results in a complex realignment of the family's relationship patterns. Mothers and fathers now have to adjust their behavior to meet the needs of two children and the older sibling must learn to adjust to the presence of another child in what was previously an exclusive domain. The creation of a definition of a relationship as applied to siblings has been attempted by several researchers. Schvaneveldt and Ihinger (1979) define the sibling relationship as "the nature of interaction between brother and sisters" interaction referring to "the social behaviors involved when two or more people interstimulate each other by means of communication and hence modify each others behavior" (p.457). Others have introduced the concepts of affective involvement and cognition as two important aspects of a relationship (Hinde, 1981). Nadelman and Begun (1982) have suggested that the cognitive and emotional elements of a sibling relationship may begin to become apparent even before the child's birth.

Early sibling interactions are attracting the interest of many researchers (Dunn, 1983; Dunn & Kendrick, 1983; Legg, Sherrick & Wadland, 1974; Lamb, 1978) due to their potential developmental importance.

Sibling rivalry has been the most frequently applied dimension to sibling relationships (Levy, 1934; Bank & Kahn, 1982). This dimension, while still important to the sibling relationship does not adequately describe the complex nature of many sibling interactions. The sibling rivalry literature is based upon the idea that the majority of sibling interactions are based upon the competition between siblings and possible differing evaluations given to them by important figures. Jealousy is considered to be the driving emotion. This concept does not address those aspects of the sibling relationship that develop independent of the competition between siblings. Recent work with mothers, fathers and young siblings has begun to challenge the assumption that the only important relationship in the child's early life is the one between the child and mother (Dunn & Kendrick, 1982). Sibling rivalry can be increased or lessened depending upon the intervention of parents. The same can be said of the positive aspects of the sibling relationship (Dunn & Kendrick, 1982).

Dunn, Kendrick and Macnamee (1981) interviewed mothers both before and after the birth of a second child with an interest in discerning if there were changes in the behavior of the older child as a result of the birth of the infant. Deliberate teasing and irritation of the infant was reported as occasional in 13 families and completely absent in 19 families. Twenty-

one families reported that the older sibling showed frequent attempts to help mother with the care of the baby while 16 families reported occasional physical affection. The following variables accounted for 84% of the variance in the older child's behavior toward the infant: interest in the baby, helpfulness with the baby, and affectionate physical contact. Legg, Sherrick and Wadland (1974) also interviewed parents to determine the changes in behavior of an older sibling regarding the birth of an infant. Anecdotal accounts were provided during three periods: before the birth, during delivery and after the arrival of the baby in the home. Incidents of toileting accidents for older children who were toilet trained were reported as well as an increased desire for oral gratification. No data were reported from independent observation indicating that the results may have been biased. Any reports of positive interaction between siblings was conspicuously absent from the accounts although the authors noted that some of the older children were reported to behave more maturely after the arrival of the sibling.

As the sibling pair develops and each acquires mastery in social behavior and emotional expression, the frequency of interaction between the infant and the sibling increases, especially during the second half of the infant's first year of life (Dunn, 1983). This is also the phase during which attachments are being



organized (Ainsworth, 1973). Lawson and Ingelby (1974) studied 54 two-child families four times during the infancy of the second child. By the time the infant was 1 year old, the two children spent as much time in interaction with each other as with their mothers and more than with their fathers. Lamb (1978c) examined the nature of sibling interaction as it varied depending upon the presence of either and both parents. Infants were 18 months old and the older child was of preschool age. Results showed that infants looked at siblings more often than at parents and were more likely to imitate the behavior of the sibling if only one parent was present. While the overall frequency of interaction was low, siblings seemed to assist the infant in his/her attempts to gain competence in the environment. Siblings seemed to provide experiences that may be less likely to occur during parent-infant interaction. Siblings also seemed to function as a novel stimulus for the infant.

In a similar study which occurred 6 months later, Lamb (1978d) documented that sibling-infant play increased and shifted to play that was more reciprocal in nature, indicating a developmental shift in the relationship. Also, sibling interaction seemed less affected by which parent was present suggesting that the sibling system may have elements that are independent of the parent-child system.

In summary, the arrival of an infant may set into motion a complex series of behavior between the infant and sibling as this interactive system develops and gains independence. Over time, the frequency of interaction increases, particularly during the period of infant attachment development and the quality undergoes a developmental shift toward increased reciprocity. While aggressive and rivalrous behavior does occur, a high percentage of siblings experience the infant in a positive manner with numerous occasions of positive physical contact and attempts to assist in the care of the infant.

In order to create a more detailed understanding of sibling relationships, research has examined the effects of age, gender composition of the dyad and birth interval in conjunction with designs focusing on the process of behavior rather than categorical variables. Abramovitch, Corter and Lando (1979) examined prosocial, imitative and aggressive behavior of same-sex dyads during two home visits. They discovered a high frequency of interaction that was unrelated to gender composition or birth interval. While boys were more physically aggressive in the dyad, girls were more verbally aggressive. Older girls were more prosocial than boys independent of birth interval. In a follow-up study, Abramovitch, Corter and Pepler (1980) observed mixed-gender dyads under the same experimental



conditions. Results showed that the overall level of interaction was equivalent to the same-sex dyads as was the frequency of prosocial, imitative and aggressive behavior. They concluded that the gender composition of the dyad appeared to have no effect of the types or patterning of sibling behavior. Dunn and Kendrick (1981) analyzed both positively directed and negatively directed behavior on two home visits. One visit occurred when the infant was 8 months old and the second when the infant was 14 months old. The age of the older sibling ranged from 26 to 51 months. Results showed an increase in positive social behavior directed by the older child to the infant in the same gender pairs but no change in the mixed gender pairs. Negatively directed behavior increased in the mixed-gender pairs. Other longitudinal work found an increase in prosocial behavior over an 18 month period for both younger and older children in both same and mixed gender pairs (Dunn, 1983; Pepler, Abramovitch & Corter, 1981). Recently, Abramovitch, Corter, Pepler and Stanhope (1986) did a third follow-up of the original group of same-sexed and mixed-sex dyads. The younger siblings were now 5 years old and the older sibling between 7 and 9 years old. The patterning of interaction appeared to remain stable with no significant effects of age or birth interval and few effects of sex of child or gender composition of the dyad.

Research in the area of problem-solving behavior and sibling assistance has demonstrated continued variability in sibling behavior as a function of gender. Ciricelli (1975, 1976) found that when exhibiting prosocial behavior during a problem solving task, older girls verbalized more often to younger siblings than did older boys. Also, mothers seemed to delegate a helping role to older girls but not to older boys. In terms of the variability of behavior in siblings due to gender composition of a dyad, the research is not quite clear. Age and birth interval seem to have little impact on the behaviors examined in this research.

The research presented above seems to provide evidence that jealousy and rivalry are only two dimensions that may underlie the types of interactions available to siblings. It has been shown that older siblings frequently engage in prosocial behavior toward their younger siblings. The consequences of this behavior for the infant-sibling relationship in other settings has not been well explored. The relationship between sibling involvement in mother-mediated caregiving and later infant-sibling behavior has also not been adequately examined.

Direct sibling caretaking is relatively rare in the U.S.. However in other less industrialized countries it is common. In Malaysia, it has been reported that children as young as 6 years of age, usually girls have

some caregiving responsibilities for younger children (Weisner & Gallimore, 1977). Sibling caregiving seems to result in a less intense attachment to the mother, less intense separation distress and more attachments relationships to others (Weisner & Gallimore, 1977). During these observations, it was discovered that up to 70 % of the day was spent in the presence of or in contact with a caregiver who was also a child. Whiting and Whiting (1975) observed that child care responsibilities promoted the development of prosocial, nurturant and responsible behavior in children. In terms of parenting, nurturant responsiveness occurs when a caregiver responds to the signals of the infant and exhibits positive interaction toward the infant. Contingent responsiveness creates a positive context for the developing relationship (Whiting & Whiting, 1975).

Research with U.S. samples has shown that the correlates of caregiving behavior are present in very young children. Hoffman (1975) discovered that the rudiments of role-taking (or perspective taking) may be present in children as young as 2, however, the performance of these skills may vary as a function of task and setting. Borke (1971) used a task within the response capabilities of children as young as 3 to test the hypothesis that very young children are aware of the feeling of others. It was discovered that by age 3 1/2 to 4 a significant number of children selected the



appropriate emotion from a picture after being told a story designed to accentuate a particular emotion.

Behaviorally, responsiveness to others is learned most effectively through observation of nurturant models and being exposed to nurturant interaction with a parent (Yarrow, Scott, Zahn-Waxler, 1973; Staub, 1971). When models behaved in a nurturant, responsive manner versus a non-nurturant manner during a symbolic modeling task, imitation of symbolic nurturant responses was greater (Yarrow, et.al., 1973). Yarrow and Scott (1972) examined the likelihood of a child imitating a variety of behaviors exhibited by nurturant and non-nurturant models. These behaviors were displayed intentionally as well as incidentally in an ongoing context of social interaction. Results showed that the content of imitated responses given by preschool children was consistent with the type of model to which they were previously exposed. There was a significantly higher frequency of attentive interest and help provided by children who observed a nurturant model. Children who observed a nurturant model also produced more novel nurturant behavior.

In summary, there is support for the hypothesis that very young children, aged 3 to 6 are aware of the feelings of others and can respond in certain contexts with nurturant, prosocial behavior. One antecedent to this behavior is the prior exposure to an adult model



who has behaved in a similar manner.

Within the context of the family, one area that has contributed to greater understanding of the degree to which children respond appropriately to younger siblings is in language. In a study by Sachs and Devon (1976), children aged 3 to 5 years were recorded talking to a variety of predetermined listeners: an adult, a peer, a baby and a baby-doll. The intent of the study was to determine the extent to which young children have incorporated the knowledge of an appropriate speech style for infants. The results showed that some children changed their mean length of utterance, used simpler tense, frequently used the listener's name and made a significantly greater number of repetitions in their speech to a baby as compared to a peer or adult. Dunn and Kendrick (1982) found that children as young as two made changes in their speech to their infant siblings. In addition, they discovered that the number of questions, repetitions and diminutives were positively correlated with the occurrence of prosocial behavior by the older sibling to the infant. These siblings were more affectionate toward their infant siblings and appeared to be more motivated to engage them in play.

This research appears to suggest that young children with infant siblings are cognizant that adjustments must be made in verbal interaction with their infant

siblings. Those children who are aware of and make these adjustments seem to behave in an overall more positive fashion. The impact of these efforts in terms of infant behavior toward the sibling in a variety of contexts needs further research.

It has been shown that a stranger acting in a nurturant manner can induce a young child to imitate this behavior. This inducement process is even more powerful in the family due to repetitive experiences and strong emotional rewards for the imitation of certain behaviors. Bryant and Crockenberg (1980) compared the behavior of mother toward two daughters in relation to its effect on prosocial behavior between the siblings. Four games were used to measure the degree of sharing, helpfulness, cruelty and selfishness. Mothers were observed for the expression of prosocial values, sensitivity and responsiveness. Results supported the hypothesis that maternal sensitivity and responsiveness would be related to comforting and sharing behavior between the siblings. It was also found that meeting overtly expressed needs rather than giving unsolicited nurturance was most significantly related to prosocial behavior. Mothers who gave their daughters unsolicited help and encouragement had daughters who gave the other sibling unsolicited disapproval.

It appears that by giving unsolicited, non-contingent nurturance, mothers may be creating a context

in which feelings of jealousy and favoritism arise between siblings. It may not be clear to the sibling just why the other is receiving positive attention since it appears to be unnecessary.

The manner in which siblings interact with each other seems to be partly related to the degree of contingent responsiveness they observe and experience in the home environment. At the early stages in the developing sibling relationship, many of the interactions that the older sibling has with the infant occur during caregiving and play with mother present. The sibling can observe mother's style of interacting with the infant and later may imitate this style on interacting. Dunn and Kendrick (1982) in their sample of 14 month old infants and preschool aged siblings found that 85% of the siblings in their sample were extremely eager to help with the care of the baby. Thirty of the mothers in the study described situations in which the sibling imitated the infant's noises and facial grimaces. The frequency with which the sibling desired to interact with the infant was dependent upon the frequency of conversation between mother and sibling about the infant. Mothers who discussed the baby frequently had first borns who were encouraged to take joint responsibility with the baby in terms of cuddling, giving toys and assisting mother with care. In 65% of the families, it was observed that there were occasions



during which the sibling showed empathic behavior and concern about the infant. The style of caregiving is notably different from that of mother and expectations about sibling caregiving are different than that of parents (Bryant, 1979).

The results presented in the above research concerning the ability of an older sibling to respond to an infant sibling with nurturant, prosocial and appropriately adjusted language seems to provide a basis for hypotheses concerning the developmental importance of early infant-sibling interaction and relationships. It seems that much of the early sibling-infant interactions are mediated by mother. Whether or not an attachment relationship between infant and sibling can be developed based upon sibling responsiveness and interaction style as mediated by mother is a question that has not yet been answered. If infant-sibling interaction were presumed to contain elements of an attachment relationship it must be shown that the behaviors that are present in the infant-mother attachment relationship are also present in infant-sibling interaction and there has has been no theoretical framework to guide the research seeking answers to this type of question. Some clinicians working within a psychoanalytic framework have made the observation that there does exist clinical evidence that infants exhibit attachment behavior toward their older



siblings. However, when an attachment bond between siblings is inferred from behavior, it is usually assumed that this attachment has resulted in order to compensate or substitute for inadequate mothering or parental deficiencies (Bank & Kahn, 1982). Bank and Kahn (1982) describe sibling attachment as

"incomplete, unsatisfactory and of an anxious nature. In such cases, the sibling is providing a supplementary life-giving force, filling a void left by the less available parent" (p. 28)

The authors present no actual data that could support this claim nor do they adequately describe what is meant by sibling attachment. Other writers in psychoanalytic theory view the sibling as a transitional object (Winnicott, 1971). In this view, the sibling may assist the infant towards independence during a transitional phase when the infant is beginning to reduce the dependency on mother. If an older sibling is present in the home, the infant may begin to gradually transfer his/her dependency needs and means of gratification to the sibling as mother and infant begin to separate emotionally. This view has not been developed fully nor has it been tested in controlled experimentation. Research presented earlier showed that attachment behavior is different from dependency and not associated with need gratification in the sense that dependency is. In Bowlby's conceptualization, which has strong psychoanalytic roots in object relations theory,

multiple attachments can create psychological problems for the infant (Bank & Kahn, 1982). Here, the primary attachment figure should be the mother. While it is true that the infant-mother attachment relationship is "primary" in most U.S. families, research was presented earlier to demonstrate that multiple attachment relationships occur with regularity in other cultures without undue psychological damage to the infant. If multiple attachment relationships are deemed to be psychologically damaging, then are infant-father attachment relationships to be included in this value judgement? Multiple attachment relationships may actually serve an adaptive function to ensure that the infant will develop a trusting, emotionally secure, continuous relationship with someone, preferably an adult. This adult does not have to be the mother of the child or even a woman. Dunn and Kendrick (1980) noted in their home observations that 20 of the 40 younger siblings were described by their mothers as seeming to miss the older sibling if he/she was not present. Infants were found to be more likely to approach the older sibling for comfort when the reciprocal was shown or when fighting was infrequent.

In the clinical literature, there are reports of the observation of signs of depression in infants who have been separated from their siblings. Meyendorff (1971) reports a case of depression in a 19 month old

infant subsequent to the separation from two siblings. There was no apparent reaction to a brief separation from the parents as long as the infant remained with the sibling group. When the sibling group was dissolved for a brief period, the infant became withdrawn, refused food, was agitated, terminated her speech and resisted the affections of others including the parents when they returned. However, when the infant was reunited with the other siblings, she resumed her usual behavior.

The attachment relationship has been shown to mediate an infant's ability to explore the environment by reducing fear and promoting security. It has been shown that this process is facilitated by the presence of a sibling as well. Samuels (1980) observed infants and their 3 to 5 year old siblings in the home setting while they played together. Play conditions were controlled in terms of the presence of mother or sibling or infant alone. The measure used was the distance traveled by the infant in a backyard area recorded every 10 seconds. Results showed that infants behaved differently with the sibling present than when alone with mother. Infants traveled greater distances from mother, locomoted through a larger area and left mother more quickly. The effect of the sibling's presence was shown to add a significant portion of the variance of locomotor behavior over and above the infant's familiarity with the environment. In addition, 6 of the



14 infants showed distress when the sibling was not present.

This study seems to support the hypothesis that a sibling can assist an infant to master/explore the environment by providing a source of security. It is also noteworthy that a dependent measure was used that is presumed to be crucial to the internal setting of security/fear in the Bowlby-Ainsworth model of attachment, that is, physical distance from the mother. Also, infants showed distress upon separation from their siblings. One can conclude that siblings as well as parents are relatively constant aspects of the infant's social environment whose absence may create temporary confusion and distress.

There is very little research devoted to the examination of infant-sibling relationship from the perspective of the infant or how future behavior on the part of the infant is related to specific antecedent behavior on the part of the sibling. Stewart (1983) addressed the question of whether an older sibling can act in a caregiving manner during a brief separation from mother with a stranger present. In this study, the interpersonal behavior of mothers, infants and siblings was observed in a modified strange situation. The behavior recorded was categorized a priori into three domains: fear/wariness, attachment and affiliation. Behavior was recorded during only 2 episodes of a



modified Strange Situation procedure, one when the infant and sibling were alone and one when they were with a stranger. Results showed that 52% of the older siblings did act to reassure and comfort the infant in the presence of the stranger if the infant exhibited distress. It was also discovered that the gender composition of the dyad did have an effect on caregiving behavior. Older brothers were observed to be more active in providing reassurance to their younger sisters and older sisters did so for younger brothers. In addition, older brothers responded to the infant with as much care as was needed while older sisters seemed to provide more attention than was necessary.

This study, while providing useful information regarding the propensity for caregiving behavior by the older sibling does not adequately address the issues salient to the examination of infant-sibling attachment behavior. It is important to examine the behavior of an infant toward the sibling during a reunion with the sibling following a brief separation as well as with differential figures available. The design in this study did not capitalize on reunion behavior but only on the behavior of the older sibling when alone with the infant and in the presence of a stranger. The study reported that within 10 seconds of the departure of mother, most of the siblings responded to the infant with some form of caregiving behavior (N=28). This observation supports

the views presented earlier that siblings often respond positively to their infant siblings. However, it is not clear from this research whether an attachment relationship exists and it seems premature to frame infant-sibling interaction as attachment. That siblings did act in a reassuring manner does not necessarily mean that the infant would respond to the sibling as an attachment figure. In a later study Stewart and Marvin (1984) attempted to determine the relationship between conceptual perspective-taking ability and the older sibling's potential to act as a subsidiary attachment figure. They reasoned that the older sibling must possess three cognitive skills in order to provide caregiving behavior to the infant. The sibling must be able to: 1) take a non-egocentric perspective thereby creating some explanation for the child's distress 2) make a more detailed, accurate prediction concerning mother's return than the infant and 3) carry-out shared behavioral plans regarding caretaking behavior. If the older sibling cannot perform these tasks, he/she will most likely also be distressed about mother's brief absence. This will interfere with the potential to act in a caregiving manner. Results showed that 51% of the children exhibited caregiving behavior toward the infants and conceptual perspective-taking ability was functionally related to caregiving. Seventy-two percent of the children classified as caregivers were also

classified as perspective-takers. Mothers tended to request caregiving behavior from the older sibling only if they were perspective-takers. In addition, there were some indications that in the presence of a stranger, 62% of the infants appeared to use the sibling as a secure base. None of the infants of non-caregiving siblings did so. Again, this research used only two episodes of the strange situation and did not fully examine separation and reunion behavior between the sibling and infant in a variety of contexts. More research needs to be done to determine the antecedents of infant-sibling behavior in the sibling sub-system as well as to clarify infant behavior toward the sibling. In addition, direct observation of infant behavior in a variety of social contexts including mother, stranger and sibling and in both separation and reunion episodes would give a relatively clear indication of the function of behavior patterns between the infant and the sibling. In addition, it would be important to determine what types of experience or interaction is important to the infant as well as determining whether other factors such as gender composition and/or infant temperament impact upon the sibling relationship.

Teti and Lamb (1986) also examined the issue of infant-sibling attachment behavior. They compared the ability of the infant to respond with less distress to the older sibling versus an unfamiliar child. Over a 10



episode procedure, they examined attachment behavior, affiliative behavior and fear/wariness as the infant was exposed to a separation and reunion with mother, sibling and unfamiliar child. The aim of the study was to determine if there are any differences between infant behavior with the sibling and infant behavior with an unfamiliar child. Results showed that infants directed more fear and wariness to unfamiliar children than to older siblings. A trend was noted in that infants tended to direct more attachment behaviors to their older siblings than to unfamiliar children. They note that this was due to a high percentage of attachment displays of 8 infants in particular. When these infants were removed, there was no difference in infant attachment behavior between siblings and unfamiliar children. They concluded that infants tend to act in an affiliative manner with their older siblings and do not exhibit clear attachment behavior, except when the attachment between infant and mother is "insecure". When this is the case, infants may direct attachment behavior to their siblings to compensate for deficits in the infant-mother relationship (Teti & Lamb, 1986). One difficulty with this study is the fact that caregiving and social interaction were measured concomittantly with attachment and affiliative behavior. An important element of the attachment relationship as measured in the strange situation or modified versions of it



is the pattern of interaction between the infant and sibling prior to the assessment of attachment behavior. A sibling who exhibits caregiving behavior in the strange situation may be responding to cues in the experimental situation that are eliciting this behavior, namely, instructions from mother or the experimenter. The sibling may not be likely to exhibit this type of behavior at home when mother is clearly the attachment figure. An important finding is the systemic nature of relationships in the family. This level of analysis is much needed to assist in determining how other members of the family affect the relationship that the infant has with specific figures.

An important conclusion to be made from this body of literature is that a sibling is an important source of experience and stimulation to the infant both positive and negative. A sibling is also a constant feature of the home environment. Their absence in the context of a positive relationship may constitute a disruption for the infant which can only be alleviated by reunion with the sibling. It is of interest to know whether the relationship that develops between infant and sibling is based upon: 1) how the sibling interacts with the infant, 2) whether it is a mirror of the relationship that the infant has with mother or 3) whether specific patterns of sibling behavior toward the infant have future significance for the infant-sibling relationship

in other settings. Is it merely the quantity and frequency of interaction that is important or are their differences in infant behavior that are a function of a specific manner of interaction with an older sibling?

This study will attempt to investigate early infant-sibling behavior patterns that may have significance to the infant in other settings. Structural and behavioral variables both at home and contemporaneously will be included in the analysis.

### Method

#### Research Questions

1. Is sibling behavior at home during caregiving assistance and play related to infant behavior in the strange situation?
2. Is the gender composition of the dyad related to infant-sibling behavior in the strange situation?
3. Is mother work status related to infant-sibling behavior patterns in the strange situation?
4. Is the birth interval between the siblings related to infant-sibling behavior in the strange-situation?
5. Is infant temperament related to infant-sibling behavior?

#### Research Sample

The families that participated in this study were

recruited from daycare and preschool programs, pediatrician's offices and advertisements in newsletters of various child related organizations. Participants included an infant, an older sibling and the mother of the children (Total N = 35). The mean age of the infants in this study was 12.4 months (S.D.= 2.59 months) with a range of 8.0 to 18.0 months. The percentage of infants who attended some form of day care was 2.9% for group daycare (N=1) and 14.3% (N=5) for daycare in a private home. The remaining infants did not attend formal daycare (82.9% N=29), being cared for at home by the mother. The mean age of the siblings in the study was 58.8 months with a range of 48.0 to 75.0 months (S.D.= 7.50 months). In the sibling group, 88.6% (N=31) attended a preschool program while 11.4% (N=4) did not. Of the parents in the study, 41.2% (N=14) worked outside the home (14.7% fulltime and 26.5% partime) while 58.8% (N=21) did not work outside the home.

Educational level of the mother varied from a high school diploma to a masters degree with 5.7% (N=2) having a high school diploma, 2.9% (N=1) an associates of arts degree, 65.7% (N=23) a bachelors degree, 8.6% (N=3) having attended some graduate school and 17.1% (N=6) obtained a Masters degree. With two exceptions, all the families were two-parent families.

Four groups based on the gender composition of the infant-sibling-dyad were created; male-male (N=8), male-



female (N=8), female-female (N=11), female-male (N=8).

The Strangers in the study were undergraduate women recruited from area colleges. A total of 5 strangers were used in the study but the same stranger was used for each family.

#### Research Setting

The study was conducted at the University of Maryland, Baltimore County. The experimental room consisted of a play area in one quadrant of a large room. The dimensions of the play area were approximately 4 ft by 7 ft.. Within the play area were two chairs, one designated for mother and one for the stranger or sibling. Adjoining the large room was a smaller room which was used as the holding room for the sibling, stranger and mother as they departed from the play area. Diagonal to the play area was a small foyer which contained the video camera mounted on a tripod. A large screen was placed in front of the camera so that only the lens of the camera was visible. The room was arranged to prevent the children from entering the foyer during filming by placing an adjustable child-proof gate in front of the camera area. The experimenter operated the camera by remote control from the holding room. The setting also contained a set of toys that remained constant for all subjects. These were a variety of popular toys including; Rolling Circus, Shape Sorter, Spin-A-Sound, Geometric shapes and a doll. Each mother

was also requested to bring an assortment of toys that would be appropriate for both children.

When the families came to the lab, they were greeted by the experimenter. Following introductions and allowing time for the families to get settled, the procedure was explained to the mother. The mother and the older sibling were then introduced to the "Stranger" but the infant did not meet the stranger at that time.

#### Play/Interaction Session

The first part of the procedure consisted of a 10 minute free play period. The children were requested to play together while their mother filled out 3 rating scales. A Caregiving/Positive Interaction scale was developed for use in this study. It consisted of 27 questions which were to be rated from 1 (Never) to 5 (Always). The questions were designed to elicit information concerning the amount and type of caregiving involvement that the sibling typically had with the infant at home during dressing, feeding and bathing. In addition, the scale contained items pertaining to the degree of positive interaction during play and sensitivity of the sibling toward the infant. In addition, the mother completed the EAS temperament survey (Buss & Plomin, 1985) for both the infant and the sibling. This scale is also a rating scale in which the parent rates from 1 (not characteristic or typical of your child) to 5 (very characteristic or typical of

Table 1

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Strange Situation Episodes

M - Mother; C - Child; STR -Stranger: I - Infant

E1	M C I	
E2	M I	(Child separation)
E3	M I STR	(Stranger enters)
E4	I STR	(Mother separation)
E5	C I STR	(Child reunion)
E6	C I	(Stranger departs)
E7	M C I	(Mother reunion)
E8	C I	(Mother separation)
E9	C I STR	(Stranger re-enters)
E10	I STR	(Child separation)
E11	M I STR	(Mother reunion)
E12	M I	(Stranger departs)
E13	M I C	(Child reunion)

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your child) factorially derived dimensions of temperament. These are Activity, Emotionality, Sociability, and Shyness.

During the play episode, mothers were requested to sit in a designated chair and to fill out the rating scales while the children played. The instructions to the mother were to interact normally but briefly with the children and not to initiate interactions or play. If the mother finished the rating scales before the 10 minute period was over, she was to continue behaving as per the instructions. Mothers who did not finish the rating scales completed them after the entire procedure was completed. Recording of the play episode began as soon as the experimenter left the room and ended after 10 minutes.

#### Modified Strange Situation

The second part of the procedure consisted of a modified version of the Ainsworth and Wittig (1969) "Strange Situation" (Zelazo, Kagan, et al, 1975). Immediately after the end of the play episode, the recording was paused and the experimenter re-explained the procedure to the mother and sibling. The procedure consisted of 13 episodes that alternately varied the presence of the mother, sibling and the stranger while the infant remained in the room. (see table 1).

The episodes were balanced in an order that permitted for 2 separations and 2 reunions each for

mother, sibling and stranger. It was thought that this particular order of separations and reunions would create a higher probability that the infant would be able to sustain him/herself through the rather long procedure since the mother would be in the room during the last 3 episodes when the infant would most likely be tired of the procedure. Participants were signaled when to enter and leave the play area. Instructions were given to the sibling just prior to entering the play area so that they were followed more easily. The instructions to the sibling were to play with the infant and to care for him/her when he/she felt it was necessary. During the time that the older sibling was waiting in the holding room, an activity was provided (a spelling game). The stranger was instructed to refrain from interacting with the infant during episodes when the mother or sibling were also present, but to converse with the mother or sibling. After the mother or sibling left the play area, the stranger was to wait approximately 20 seconds and then try to engage the infant in play (Episodes 5 and 10 when the stranger was alone with the infant).

If an infant became distressed during an episode, the mother was then given the option of making a decision to continue with the procedure or going in and caring for the infant. The experimenter stopped the episode after 30 seconds if the mother wanted to wait

and the infant continued to be distressed. If the mother did decide to interrupt an episode to care for an infant, an attempt was made to continue with the procedure after the infant was calm. If the infant became distressed again, the procedure was terminated at that time. Infants in 27 of the 34 families in the study were able to complete the entire procedure. Infants in 8 of the families completed Episodes 1 through 8 only and could not continue. Three families were dropped from the study due to infant distress when left with the stranger for the first time (Episode 4).

Characteristics of those who did not complete the procedure

The infants who did not complete the procedure were evenly distributed across the gender groups. One of the infants came from a male-male pair (2.9%), three were in male-female pairs (8.6%), one was in a female-female pair (2.9%) and three were in female-male pairs (8.6%). For the distribution of daycare attendance, all (N=8) of the infants were cared for in the home (22.9%). For the mothers of these infants, one (2.9%) worked full-time (2.9%), two worked part-time (5.9%) and five did not work outside the home (14.7%). In terms of education, one (2.9%) had a high school diploma, five (14.7%) had obtained a bachelor's degree and two (5.9%) had obtained a master's degree.

At the end of the modified strange situation, the



Table 2  
Behavioral definitions and reliability estimates  
for each behavioral code

<u>Category</u>	<u>Reliability</u>	<u>Definition</u>
I-Infant		
S-Sibling		
M-Mother		
STR-Stranger		
Looking		Direction of gaze is on
I-M	.881	an individual; coded only
I-S	.779	when it occurs separately
I-STR	.525	from other behaviors.
S-M	.712	
M-S	.833	
S-I	.842	
M-I	.862	
Vocalizing		Includes all instances
I-M	.876	of directed non-
M-I	.842	distress vocaliza-
M-S	.805	tions.
I-S	.953	

S-I	.822	
I-STR	.781	
S-STR	.789	
Proximity		Being within 1 foot of a
I-M	.867	specified individual.
I-S	.841	
S-M	.927	
I-STR	.909	
S-STR	.894	
Fuss/cry		Any distress vocalization
I	.981	directed toward a specific
S	.968	individual.
Touch		Brief contact that occurs
M-I	.908	between specified
I-S	.867	individuals.
M-S	.926	
I-STR	.854	
Contact		More prolonged physical
I-S	.954	contact such as hugging,
I-STR	1.000	and/or clinging.
I-M	.950	
S-M	.986	
Play		Active manipulation of the
I	.793	toys and other objects.
S	.800	
I-S	.935	

STR-I	.839	
M-I	.975	
Comforts		Pats, hugs kisses or
M-S	1.000	reassures when other
M-I	1.000	is in distress.
S-I	.984	
Prox/door		Standing near the door
S	.984	(within 1 foot).
I	.982	
Prox/mother's chair		Standing near or sitting
I	.986	in the chair used by
S	1.000	mother (within 1 foot).



recording was stopped and the experimenter and assistant entered the play area. Any questions were answered and/or aspects of the study or procedure were discussed. The family members were then thanked for their participation in the study and were offered to be sent a brief summary of the results.

#### Behavioral Codes and Inter-rater reliability

All of the video tapes were coded independently by two coders. The coders were trained on the behavior codes for 1 hour on a tape that was not used for the study. Reliability was assessed by having each coder rate the same 3 families independently. One coder then completed the coding of the data. Reliability was calculated using the following formula:  $R = \frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}}$  for each 15 second interval. Table 2 contains the behavioral definitions and the reliability estimates for each interpersonal behavior. The same behavior codes were used for the play session and the modified strange situation. The play session and the strange situation episodes were each divided into 15-second intervals. There were forty 15-second intervals for the play session and ten 15-second intervals for each of the strange situations episodes. A behavior was scored as occurring once if it occurred during the 15-second time interval.

A frequency measure was derived for each behavioral code in the play session and in each episode that

consisted of the proportion of occurrences of the behavior to the total number of 15-second intervals.

#### Data Reduction and Analysis

All of the items in the Caregiving/Positive Interaction questionnaire were divided into three factors based upon the content of the item. These factors were Home Play, Care and Sensitivity. The items associated with these factors were then totaled and an item analysis was performed to determine their correlations with the total factor score. All items not having a statistically significant correlation with the total factor score were discarded. Based upon the results of this procedure, three items were deleted from the scale leaving a total of 24 items. Six items were significantly correlated with Home Play (Items 1,4,23,24,26,27), 8 items were significantly correlated with Sensitivity (Items 3,5,8,9,12,16,20,25) and 10 items were significantly correlated with Care (Items 3,5,8,9,12,16,20,25). (see Appendix A)

The inter-correlation of these three factors Home Play, Care, and Sensitivity showed that Care and Sensitivity were significantly correlated with each other ( $r = .54$   $p < .01$ ) and were combined into a single variable called Sensitive Caregiving. The following variables were then used as predictors of infant-sibling behavior in the Strange Situation procedure: Home play, Sensitive Caregiving, Gender Composition, Birth Interval,

Mother Work Status and Infant Temperament.

To more adequately test the hypotheses of the study, the raw data observations from the Strange Situation episodes were transformed to create a more normal distribution for these variables. Since the data were proportional data, an arcsine transformation was employed (Winer, 1971). This transformation was performed on all variables whose kurtosis value was greater than 1 or less than -1, which indicates a skewed distribution. The range of values created by this transformation is .000 to 3.6 and it is the reason why some of the means of the variables are greater than 1. Variables whose kurtosis values were between 1 and -1 were not transformed since they were normally distributed.

Although there were 13 episodes in the Strange Situation, 5 were used in this study. These were episodes 5,7,8,10,11. Episode 5 examined infant behavior upon reunion with the sibling while a stranger is present in the room. Episode 7 examined infant behavior after a reunion with mother while the older sibling was present in the room. Episode 8 examined infant behavior after mother departs from the room but with the older sibling present. Episode 10 examined infant behavior while alone with a stranger. Episode 11 examined infant behavior after mother returned to the room while the stranger was still present. The



rationale for the selection of these five episodes is derived from the purpose of this study in that it is mainly concerned with infant-sibling interaction. Episodes 1 through 4, 12 and 13 were predominantly related to infant-mother interaction and therefore were not used in the analysis. Episodes 6 and 9 were predominantly concerned with stranger separation and reunion. It was thought that it would be more ecologically valid to examine infant-sibling and infant behavior during mother separation and reunion (Episodes 8 and 11). Episode 7 was used to examine infant-sibling behavior at mother reunion and Episodes 5 and 10 were directly concerned with the infants behavior vis a vis sibling reunion and separation with a potentially anxiety-eliciting person present.

Summary dependent variables were created for each episode. Contact/Comforting was created by combining all contact and comforting behavior between infant, sibling, mother and stranger during an individual episode depending upon who was in the room. The summary variable Play was created by combining all instances of infant play and infant-sibling (or stranger) interactive play for each episode. The third variable, Infant Distress consisted of the total frequency of distress, crying and/or fussing exhibited by the infant in each episode. There were 3 dependent measures in each of the 5 episodes in the study.

### Statistical procedures used in the data analysis

The major research questions in this study concerning the relationship between sibling behavior at home and structural measures and infant episode behavior were tested by creating multiple regression equations that had three parts. To assess the unique predictability of each element toward the criterion dependent measure these components were entered into the equation in the following order. The main effect of the continuous variable (regression effect) was entered first, followed by the main effect of the grouping variable (gender composition) and then the interaction between the continuous variable and the grouping variable. If the interaction term was significant, post hoc analyses were performed using the Neyman-Johnson technique. This statistic is used to decompose an interaction between a grouping variable and a continuous variable. It functions by searching along the covariate for a region of significance or non-significance. There are two possible solutions: the groups could be significant within a region of significance but not outside of it or the groups could significantly differ at the two extremes of the covariate but not in the region of non-significance.

The research question concerning the contemporaneous differential effect of the individual in the room with the infant was examined by comparisons of the means of

the episode dependent measures through the use of multiple T-tests. Correlational analyses were used to examine the infant temperament variables as they related to behavior at home and the episode dependent measures.

## Results

### 1. Summary of results

The results indicated that there was an interaction between Gender Composition and sibling Sensitive Caregiving at home for both infant distress and contact and comforting by mother. Infants in the dyad older male, younger female exhibited greater distress and a higher frequency of contact and comforting by mother when the older sibling was low in Sensitive Caregiving. The episode in which this result occurred was one in which mother returned to the room occupied by the infant and sibling. Results also revealed that siblings with a larger birth interval engaged in a greater frequency of contact and comfort after the sibling was reunited with the infant while the stranger was present in the room.

In addition, episode by episode comparisons indicated the following: that more play occurred when mother was present than when sibling or stranger were present; the infant used both the sibling and the mother for contact and comforting but clearly preferred mother; and there was more distress when the stranger was present than when sibling or mother are present.



Post-hoc analyses revealed an interaction between mother work status and Birth Interval on infant play and distress. This result occurred in an episode in which mother briefly separated from the infant and sibling. Mothers who worked had infants who played less and were more distressed during this separation when the birth interval was small.

Another post-hoc analyses involving infant temperament found that infant temperament exerts an influence on sensitive caregiving by the sibling at home and also influences infant behavior within the episodes. Infant shyness appeared to be the predominant temperament dimension. High infant shyness was related to increased distress during two episodes: sibling reunion with a stranger present and mother separation with the sibling present. High infant shyness was also negatively related to infant play across all episodes except when the infant was alone with the stranger. In addition, there was a negative correlation between infant shyness and sibling sensitive caregiving at home.

There were no other significant relationships between sibling behavior at home and infant behavior in the strange situation.

The results will be presented in sections explaining the findings in more detail. There are 10 sections. The first three sections describe the findings for the interactions analyzed between Gender Composition of the

sibling dyad and Sensitive Caregiving at home, Home Play, and Birth Interval. The fourth section will describe the results associated with the differential effects of each of the episodes. The fifth, sixth and seventh sections will describe the results associated with the analysis of the interactions between mother work status and birth interval, sibling sensitive caregiving at home, and home play. Sections 8,9,and 10 will describe the results of the analyses involving infant temperament as it related to the caregiving/positive interaction questionnaire factors, the strange situation episodes and the interaction between gender composition and sensitive caregiving at home.

## 2. Analysis of the Main Effects and Interaction between Gender Composition and Sensitive Caregiving

Analysis of the relationship between Gender Composition and Sensitive Caregiving at home revealed no significant differences between gender composition groups on Sensitive Caregiving,  $F(3,31) = 1.46$ ;  $p < .24$ . There are no significant differences between the gender composition dyads on how they interact in terms of sensitivity in caregiving behavior.

Results of the analyses between at home behavior and behavior in the strange situation revealed that the interaction between Gender Composition and Sensitive Caregiving by the older sibling significantly predicted

Infant Distress,  $F(7,26) = 4.08$ ,  $p < .003$ ; R Square = .523, R Square Change = .422. This result occurred in only one episodes in which mother was reunited with infant and sibling (episode 7). Results also found that the interaction between Gender Composition and Sensitive Caregiving of the older sibling predicted Infant Contact/Mother Comforting behavior in the same episode,  $F(7,26) = 2.60$ ,  $p < .03$ ; R Square = .411, R Square Change = .237. These significant interactions suggest that differences in Infant Distress and Infant Contact/Mother Comforting when mother is reunited with the infant while the sibling is present are a function of gender group differences in the degree of sibling Sensitive Caregiving at home.

The interaction between Gender Composition and Sensitive Caregiving on Infant Distress upon mother reunion with the sibling present in the room was further analyzed by using the Neyman-Johnson technique. This technique searches for a region on the covariate (in this case the Sensitive Caregiving measure) where there are significant differences between pairs of means. All possible combinations of gender group were tested in this manner. The following comparisons were also tested: Same vs. Opposite sex, Male older vs. Female older and Male Younger vs. Female Younger. Results showed that there were no significant differences in infant distress between same vs opposite sex pairs, male



Table 3

Means and Standard Deviations of Infant Distress  
in Episode 7 across Gender Composition Groups for  
Low Sensitive Caregiving Older Siblings

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<u>Gender Composition</u>	<u>N</u>	<u>Mean</u>	<u>SD</u>
Male-Male	8	.242	.316
Male-Female	7	.328a	.353
Female-Female	11	.151	.207
Female-Male	8	.116	.109

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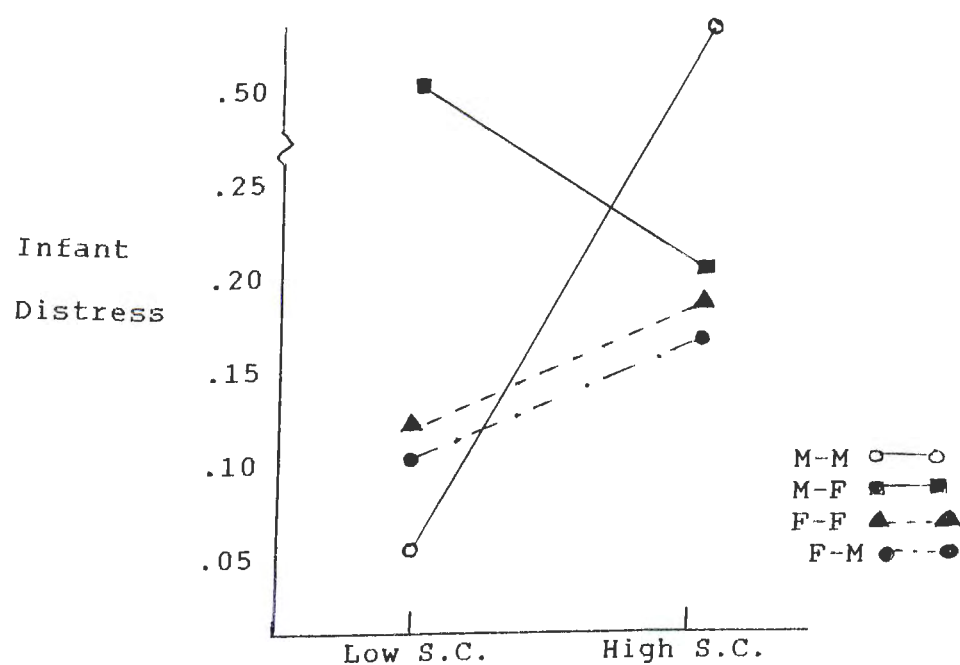
a (M-F > M-M, F-F, F-M)  $p < .01$

Note 1: Low Sensitive Caregiving = scores < 64.0

Note 2: M-F > M-M for High Sensitive Caregiving  
 (> 73.0);  $p < .01$

Figure 1

Interaction between Gender Composition Groups  
and Sensitive Caregiving on Infant  
Distress in Episode 7



Note: Values are the means of each Gender Group for Low and High Sensitive Caregiving divided at the median value of Sensitive Caregiving.

older vs. female older, or male younger vs. female younger for any values of Sensitive Caregiving. For the individual sibling pairs, female infants who had older male siblings (M-F group) exhibited greater distress than all other gender pairs in the region of the covariate where scores fell below 58.0 (Low Sensitive Caregiving)  $p < .01$ . Also, female infants with an older male sibling (M-F pair) exhibited greater distress than male infants with an older male sibling in the region of the covariate in which Sensitive Caregiving scores were above 73.2 (High Sensitive Caregiving)  $p < .01$ . (see Table 3 and Figure 1). There were no other gender group differences on any other area of the covariate Sensitive Caregiving for infant distress.

The interaction between Sensitive Caregiving and Gender Composition on Infant Contact and Comforting was analyzed in the same manner. The Neyman-Johnson technique was used to determine in what region of the covariate (Sensitive Caregiving) did the gender groups differ significantly. Comparisons were also performed on the following pairs of means: Same vs. Opposite sex, Male Older vs. Female Older, and Male Younger vs. Female Younger. Results revealed that there were no significant differences between Male Older vs. Female Older or Male Younger vs. Female Younger sibling pairs on infant contact and comforting by mother on any region of the Sensitive Caregiving measure. Infants in



Table 4

Means and Standard Deviations of Infant Contact  
and Comforting by Mother in Episode 7 across  
Gender Composition Groups for Low  
Sensitive Caregiving Older  
Siblings

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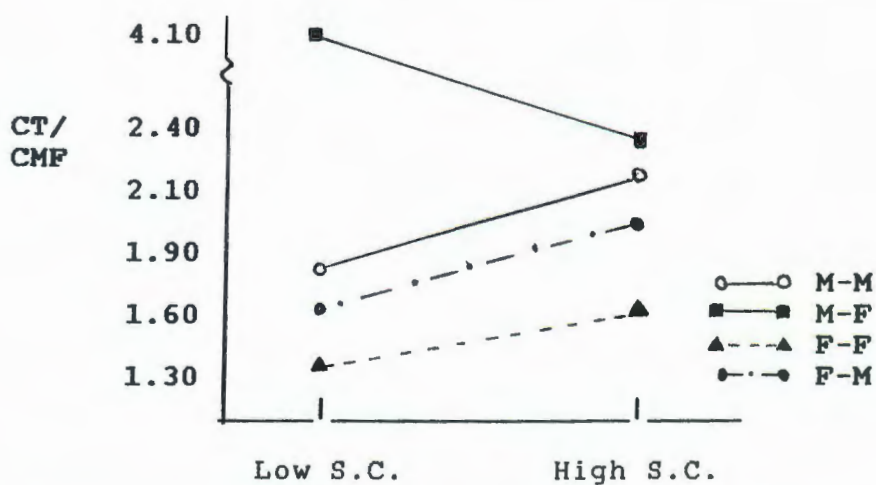
<u>Gender Composition</u>	<u>N</u>	<u>Mean</u>	<u>SD</u>
Male-Male	8	1.95	1.01
Male-Female	7	3.12a	1.83
Female-Female	11	1.54	1.35
Female-Male	8	1.74	1.37
<u>Pairs Comparisons</u>			
Same sex pairs	16	.824	.626
Opposite sex pairs	18	1.062b	1.04

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a (M-F > M-M, F-F, F-M),  $p < .01$   
b Opp. > Same,  $p < .01$

Figure 2

Interaction between Sensitive Caregiving and  
Gender Composition Groups for Infant  
Contact and Comforting by  
Mother in Episode 7



Note: Values are the means for each level of Sensitive Caregiving created by splitting at the median value.

Opposite sex pairs exhibited a greater frequency of contact and comforting by mother than infants in Same sex pairs in the region of the covariate in which scores were below 62.0 (Low Sensitive Caregiving),  $p < .01$ . Also, female infants with an older male sibling (M-F group) exhibited a greater frequency of contact and comforting by mother than all other gender groups. This result occurred in the Low Sensitive Caregiving region of the covariate,  $p < .01$  (see table 4 and figure 2). There were no gender group differences in an other area of the covariate Sensitive Caregiving for contact and comforting by mother. The median value of Sensitive Caregiving was 64.0 with a range of 51 to 80.

There were also no other significant interactions or main effects for Gender Composition and Sensitive Caregiving that could predict a significant portion of the variance in any other episode dependent measure.

In order to insure that these results were not an artifact of differences in the frequency distribution of Sensitive Caregiving behavior across the Gender Composition groups, a chi-square analysis was performed on the data. This showed that there were no significant differences in the distribution of Sensitive Caregiving scores across the gender pairings, Chi-Square = 3.08,  $p < .37$ .

The results indicate that sibling behavior at home does not directly affect infant-sibling behavior in the



strange situation but that Sensitive Caregiving by the sibling toward the infant is a factor in the pattern of infant-mother attachment behavior. The presence of the sibling at home appears to act by affecting the interaction of the infant-mother dyad. Infants were more distressed (less easily soothed) and required more contact and comforting by mother during a mother reunion while the sibling was still present in the room. The older sibling of these infants typically exhibited low Sensitive Caregiving behavior at home. This was particularly the case for sibling pairs in which there was an older male child and a female infant. When the M-F pair was compared with the M-M pair, it appears that an inverted U-shaped function best describes the relationship between Sensitive Caregiving at home and infant distress. That is, high and low Sensitive Caregiving behavior on the part of the older male sibling toward the female infant appears to be related to increased distress when compared with the M-M group but there was no difference between these pairs at the mid-range of Sensitive caregiving.

### 3. Analysis of the Main Effects and Interaction between Gender Composition and Home Play

Analysis of the relationship between Home Play and Gender Composition revealed that there were no significant differences between gender groups on Home Play,  $F(3,31) = .421$ ;  $p < .738$ . There were no

differences between sibling pairs in terms of how they played together.

Results involving strange situation behavior showed that the main effect of Home Play did not significantly predict any episode dependent measure. Also, the main effect of Gender Composition did not significantly predict any episode dependent measure. There were no significant interactions between Home Play and Gender Composition for any dependent measure. These results suggest that neither the quality of play between the infant and the sibling at home nor the gender composition of the sibling dyad can account for a significant portion of the variance in infant/sibling behavior in the Strange Situation episodes.

#### 4. Analysis of the Main Effects and Interaction between Birth Interval and Gender Composition

Analysis of the relationship between Gender Composition and Birth Interval revealed that there were no significant differences between Gender Composition groups on Birth Interval,  $F(3,31) = .659$ ;  $p < .583$ .

Results involving strange situation behavior showed that Birth Interval predicted Infant Contact/Sibling Comforting during a sibling reunion with the stranger present in the room (episode 5),  $F(1,34) = 10.00$ ,  $p < .003$ ;  $R = .482$ ,  $R \text{ Square} = .232$ . Birth Interval did not predict any other episode dependent measures. There was no main effect of Gender Composition and no interaction

between Birth Interval and Gender Composition on any episode dependent measure. No post hoc analyses were performed since the result described is a main regression effect.

These results suggest that the larger the Birth Interval, the higher the frequency of Infant Contact/Sibling Comforting when the infant and sibling were with a stranger. This effect was unrelated to the gender composition of the dyad. (A complete table of the non-significant main effects and interactions can be found in Appendix D).

#### 5. Differential Effect of Mother, Sibling and Stranger on Infant Behavior on the Episode Dependent Measures

##### a. Comparison between sibling reunion with stranger present (Episode 5) and mother reunion with stranger present (Episode 11)

To examine the effect of separation, reunion and stranger presence on each of the dependent measures, pairwise comparisons of the means were performed. Comparisons between episodes in which there was a sibling reunion with the stranger present (episode 5) and the reunion of mother with the stranger present (episode 11) compared the differential effect of the reunion of mother and the sibling on infant behavior with a stranger present. It was found that there was significantly more infant Play in episode 11 than in episode 5,  $T = 4.11$ ,  $p < .001$ , a significantly greater



amount of Contact/Comforting behavior in 11 than in 5,  $T = 3.54$ ,  $p < .001$ , and no significant differences in infant Distress between episodes 5 and 11,  $T = .69$ ,  $p < .86$ .

These results indicate that the infant responds differently to stranger presence depending upon whether the infant is with the sibling or the mother. Infants clearly preferred contact with mother to contact with sibling and exhibited greater frequency of play in the presence of a stranger when mother was present. The finding that there was no difference between mother versus sibling presence in the amount of infant distress suggests that the sibling can assist in mediating stranger fear in the infant.

b. Comparison between episodes in which there is a mother separation with the sibling present (Episode 8) and a sibling separation with the stranger present (Episode 10)

This comparison provides some information on infant separation behavior when being left with a stranger versus the sibling. There was no significant difference in infant Play between episodes 8 and 10  $T = 1.08$ ,  $p < .28$ . Infant Contact/Comforting behavior was significantly greater in episode 8 than in 10  $T = 2.59$ ,  $p < .01$ . In terms of infant Distress, there was no significant difference between these episodes,  $T = .69$ ,  $p < .49$ . Results show that the infant appears to prefer



contact with the sibling as compared to the stranger, despite the fact the the infant was equally distressed in both episodes. This could also mean that the sibling engaged in a greater frequency of comforting behavior than did the stranger in episode 10 since these measures are connected.

c. Comparison between mother reunion with the sibling present (Episode 7) and mother reunion with the stranger present (Episode 11)

This comparison gives an indication of the effect of sibling presence versus stranger presence on infant behavior during a reunion with the mother. Results showed that there was significantly more Play in episode 7 than in 11,  $T = 5.35$ ,  $p < .001$ , no difference in Contact/Mother Comforting behavior in episodes 7 and 11,  $T = 1.89$ ,  $p < .07$ , and a significantly higher amount of Distress in episode 11 than in 7,  $T = 4.53$ ,  $p < .001$ . The results suggest that there is a greater degree of play when the sibling is present with mother than when the stranger is present. The presence of the stranger during mother reunion elicits greater infant distress than when the sibling is present at mother reunion. However, the higher degree of infant distress does not result in greater infant contact and comforting by mother during stranger presence.

d. Comparison between sibling reunion with a stranger present (episode 5) and the infant alone with the

### stranger (episode 10)

This comparison gives an indication of the ability of the sibling to mediate infant behavior that is due to stranger presence. Infant Contact/Sibling Comforting behavior was greater in episode 5 than in 10,  $T = 2.70$ ,  $p < .01$  and infant Distress was higher in episode 10 than in episode 5,  $T = 1.92$ ,  $p < .06$ . Infant Play was greater in episode 10 than in episode 5,  $t = 4.44$ ,  $p < .001$ . The significant difference in infant distress when the sibling and the stranger are present compared to when only the stranger is present suggests that the presence of the sibling serves to alleviate stranger fear on the part of the infant. The infant seemed to prefer the stranger as a play partner most likely due to the greater skill level or persistence on the part of the stranger. However, there was greater contact and comforting behavior with the sibling in episode 5 suggesting that the sibling is preferred for contact (see table 5).

### 9. Analysis of the Interaction and Main Effects of Mother Work Status and Birth Interval on Episode Dependent Measures

To examine the relationship between Mother Work Status and Birth Interval, regression equations were calculated for each episode dependent measure. They contained the main effects of Birth Interval, Mother Work Status and the interaction of these two variables.

Table 5

Means for Pairwise Comparisons of Infant Play,  
Infant Contact/Comforting, and Infant Distress  
Across Episodes

	<u>E5 vs E10</u> (N = 26)	<u>E5 vs E11</u> (N = 28)	<u>E7 vs E11</u> (N = 28)	<u>E8 vs E10</u> (N = 26)
Infant Play	.62-1.50c	.55-1.44c	2.19-1.44c	1.24-1.50
Infant Cnct/ Comf.	1.11-.23b	1.1-2.3c	1.70-2.30	.75-.23b
Infant Dis.	.77-1.19a	.86-.90	.18-.90c	1.38-1.19

a =  $p < .06$   
b =  $p < .01$   
c =  $p < .002$

Results showed that the interaction between Mother Work Status and Birth Interval significantly predicted Infant Play in episode 8,  $F(5,27) = 2.92$ ,  $p < .03$ ; R Square = .35, R Square Change = .13. This result was significant in the episode in which mother separated from the infant and sibling. The interaction between Mother Work Status and Birth Interval also predicted Infant Distress in the same episode,  $F(5,27) = 3.23$ ,  $p < .02$ ; R Square = .37, R Square Change = .20.

These results suggest that infant distress upon experiencing a separation from mother may be a function of mother work status and birth interval. Infants appear to be differentially affected by mother separation depending upon the length of the birth interval between siblings and whether or not mother works.

To assess the interaction between Birth Interval and Mother Work Status for Infant Play the Neyman-Johnson technique was performed as described earlier. Results revealed that infants of mothers who did not work outside the home played more in this episode than infant of mothers who did work outside the home. This difference was significant in a region of the covariate (Birth Interval) where score were below 46.0 months (Low Birth Interval),  $p < .05$ . There were no significant differences between Mother Work Status groups at regions of larger Birth Intervals. These results suggest that



Table 6

Means and Standard Deviations for Infant Play  
in Episode 8 for Low Birth Interval across  
Mother Work Status Groups

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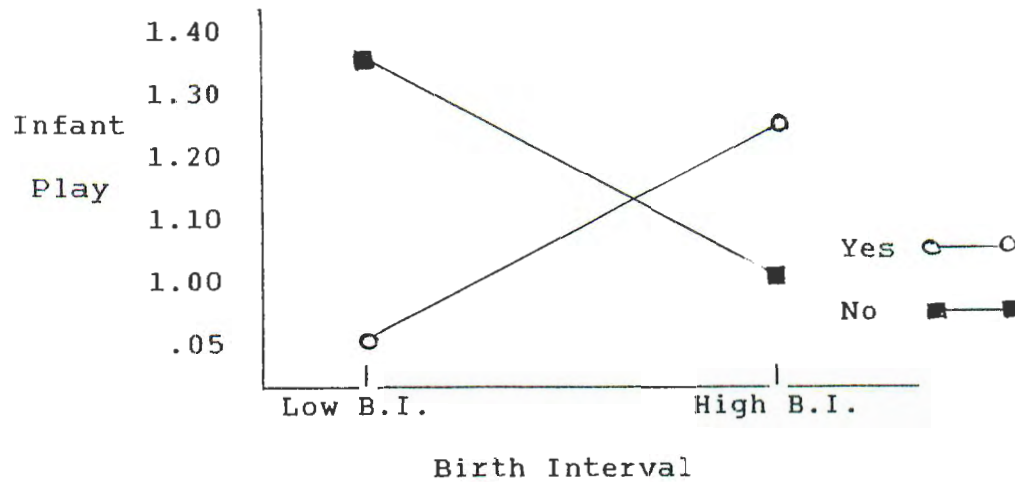
<u>Work Status</u>	<u>N</u>	<u>Mean</u>	<u>SD</u>
Yes	13	.681	1.01
No	19	1.191a	.787

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a No > Yes,  $p < .05$

Figure 3

Interaction between Birth Interval and Mother Work  
Status for Infant Play in Episode 8



Note: Birth Interval was divided at the median value to form two groups of means for Mother Work Status

Table 7

Means and Standard Deviations of Infant Distress  
in Episode 8 for Low Birth Interval across  
Mother Work Status Groups

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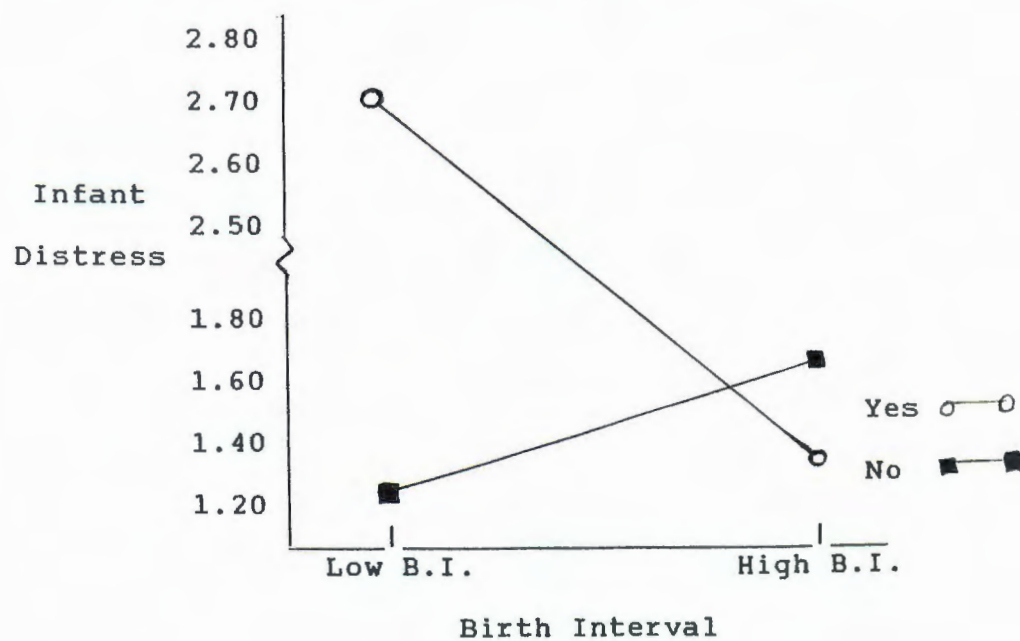
<u>Work Status</u>	<u>N</u>	<u>Mean</u>	<u>SD</u>
Yes	13	2.075a	1.26
No	19	1.467	1.06

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a  $p < .05$ , (Yes > No)

Figure 4

Interaction between Birth Interval and Mother Work  
Status for Infant Distress in Episode 8





infants seem to play more upon separation from mother when being left with a sibling, especially if mother does not work and the birth interval is high (greater than 46.0 months in this study). Mother being more frequently available and a greater interval between siblings seems to assist the infant to play more frequently after a brief separation (see table 6 and figure 3).

Using the same procedures as described above to test the interaction between Mother Work Status and Birth Interval for Infant Play in the episode, the interaction between Mother Work Status and Birth Interval for Infant Distress was examined. It was found that mothers who worked had infants who exhibited greater distress upon separation in episode 8 than mothers who did not work outside the home but only in a region of the covariate where scores were less than 46.0 months (Low Birth Interval),  $p < .05$ .

There were no significant differences in Infant Distress in between infants of mothers who worked outside the home versus mothers who did not in regions of the covariate considered to be High Birth Interval (see table 7 and figure 4). The median value for Birth Interval was 46.0 with a range of 33 to 62.

Mother work status did not significantly predict any other episode dependent variables either alone or in interaction with the other measures. (A complete table

of the non-significant results regarding Mother Work Status appears in Appendix E).

In order to insure that these results were not an artifact of biases in the frequency distribution between Mother Work Status and Birth Interval groups, a chi-square analysis was performed. Results revealed that there were no significant differences in the frequency distribution between Mother Work Status and Birth Interval Groups, Chi-Square = .046,  $p < .82$ .

The results indicate that whether or not mother works seems to be a factor on infant behavior during mother separation with the sibling still present. This influence was a factor for siblings with a low birth interval (less than 46.0 months) but not a high one. Low birth interval and a working mother combine to produce greater infant distress and less infant play after mother leaves the infant alone with the sibling.

#### 10. Analysis of the Interaction and Main effects of Mother Work Status and Home Play on the Episode Dependent Measures

Results indicated that the main effects of Home Play and Mother Work Status did not account for a significant portion of the variance in any episode dependent measure. The interaction between Home Play and Mother Work Status was also not significant. These results suggest that there are no differences in infant/sibling behavior in the Strange Situation that could be

attributed to the work status of the mother and the manner in which the sibling plays with the infant at home.

#### 11. Analysis of the Interaction and Main Effects of Mother Work Status and Sensitive Caregiving on the Episode Dependent Measures

The relationship between Mother Work Status and Sensitive Caregiving was assessed in the same manner as described above for Mother Work Status and Home Play. Regression equations were calculated to test the main effects of Mother Work Status and Sensitive Caregiving and the interaction between these two variables for each episode dependent measure. There was no significant main effect for Sensitive Caregiving and no significant interaction between Sensitive Caregiving and Mother Work Status. These main effects and interaction could not account for a significant portion of the variance in infant/sibling behavior in the Strange Situation.

#### 12. The Relationship between Infant Temperament and Caregiving Questionnaire Factors

To examine the nature of the relationship between Infant Temperament and the dependent measures, multiple regression and correlational analyses were performed. It was found that there was a significant negative correlation between Infant Shyness and Sensitive Caregiving of the older sibling,  $r(34) = -.28, p < .05$ , and a positive correlation between Infant Shyness and

Table 8  
Intercorrelations between Infant Temperament  
and Caregiving/Positive Interaction  
Scale Factors

	IACT	IEMOT	ISOC	ISHY	SC	HP
Infant Activity	.00	-.04	-.13	-.32a	.21	-.07
Infant Emotionality		1.00	-.06	.57c	.01	-.31a
Infant Sociability			1.00	-.32a	.05	.22
Infant Shyness				1.00	-.28a	-.40b
Sensitive Caregiving					1.00	.40b
Home Play						1.00

N = 34

a =  $p < .05$

b =  $p < .01$

c =  $p < .001$



Table 9

Intercorrelations between Infant Temperament  
and Infant Play Across Episodes

	<u>Infant Play</u>				
	<u>Ep 5</u>	<u>Ep 7</u>	<u>Ep 8</u>	<u>Ep 10</u>	<u>Ep 11</u>
Infant Activity	-.02 (35)	.12 (34)	.05 (33)	-.12 (26)	.17 (28)
Infant Emotionality	-.11 (35)	-.14 (34)	.02 (33)	.07 (26)	-.45c (28)
Infant Shyness	-.43c (34)	-.45c (33)	-.29a (32)	-.04 (26)	-.40b (28)
Infant Sociability	.27a (34)	-.04 (33)	-.08 (32)	.04 (26)	.02 (28)

a =  $p < .05$

b =  $p < .01$

c =  $p , .005$

Table 10  
Intercorrelations between Infant Temperament  
and Infant Contact/Comforting Behavior  
Across Episodes

		<u>Infant Contact/Comforting</u>			
	<u>Ep 5</u>	<u>Ep 7</u>	<u>Ep 8</u>	<u>Ep 10</u>	<u>Ep 11</u>
Infant Activity	-.02 (34)	.06 (34)	-.03 (33)	.02 (26)	-.20 (28)
Infant Emotionality	.06 (34)	.03 (34)	-.001 (32)	.29 (26)	.47b (28)
Infant Shyness	.10 (34)	.27 (33)	.34a (32)	.14 (26)	.26 (28)
Infant Sociability	.16 (34)	.11 (33)	.01 (32)	-.002 (26)	.11 (28)

a =  $p < .05$

b =  $p < .005$

Table 11  
Intercorrelations between Infant Temperament  
and Infant Distress Across Episodes

	<u>Ep 5</u>	<u>Ep 7</u>	<u>Infant Distress</u>		<u>Ep 11</u>
			<u>Ep 8</u>	<u>Ep 10</u>	
Infant Activity	-.13 (34)	.35b (34)	-.20 (33)	.009 (27)	.11 (28)
Infant Emotionality	.18 (34)	-.17 (34)	.02 (33)	.04 (27)	.46c (28)
Infant Shyness	.56c (34)	-.15 (34)	.36b (33)	.10 (27)	.26 (28)
Infant Sociability	-.10 (34)	-.15 (34)	.07 (33)	-.07 (27)	-.07 (28)

a =  $p < .05$

b =  $p < .02$

c =  $p < .006$

Infant Emotionality,  $r(34) = .57, p < .001$ .

(see table 8).

Results indicate that infants who are higher in shyness experience significantly less Sensitive Caregiving and play significantly less with the sibling at home than infants who are lower in shyness. Shy infants were also significantly more emotional and significantly less sociable than their less shy counterparts.

### 13. The Relationship between Infant Temperament and Episode Dependent Measures

Correlations were also calculated between the Infant temperament measures and the episode dependent measures. Infant Shyness was significantly negatively correlated to infant play in all episodes except the episode when the infant was alone with the stranger (episode 10). Infant Shyness was also correlated with infant Contact/Comforting behavior when mother separated from infant and sibling,  $r(33) = .34, p < .02$ , Infant Distress in episode 5,  $r(34) = .56, p < .001$ , and Infant Distress in episode 8,  $r(33) = .36, p < .02$  (see tables 9, 10 & 11).

Infant Sociability showed a significant positive correlation with infant Play when the sibling was reunited with the infant while the stranger was present,  $r(34) = .27, p < .05$ . Infant Emotionality showed a significant negative correlation with infant Play in



episode in which mother was reunited with infant with the stranger present,  $r(28) = -.45$ ,  $p < .005$  and a significant positive correlation with Infant Distress and Infant Contact/Mother Comforting in the same episode,  $r(28) = .46$ ,  $p < .006$ ;  $r(28) = .47$ ,  $p < .005$ , respectively.

These results indicate that infant temperament is related to infant behavior in the Strange Situation, especially during mother separation and in episodes when a stranger is present. Infants who are higher in shyness played less in all episodes except in episode 10. They also exhibited greater distress when with the sibling and stranger together and also when mother left them with the sibling. When left with the sibling, shy infants were more likely to have more Contact/Sibling Comforting than infants lower in Shyness after mother's departure.

Infants who were high in Emotionality played less, showed more Distress and required more Contact/Comforting after being reunited with mother while the stranger was still present. Infants who were higher in infant Sociability played more with the sibling when they were both with the stranger.

#### 14. Analysis of the Interaction of Gender Composition, Sensitive Caregiving and Infant Shyness

Since infant Shyness was significantly related to Sensitive Caregiving, the possibility of a 3-way

interaction between Gender Composition, Sensitive Caregiving and infant Shyness was examined. The two dependent variables used were the ones in which the interaction between Gender Composition and Sensitive Caregiving had previously been found to be significant (Infant Contact/Mother Comfort and Infant Distress in the episode in which there is a mother reunion with the sibling present). This was done to determine the effect of the infant on the sibling's efforts at sensitive caregiving in the home for the various gender groups. Shyness was dichotomized at the median value (2.30) into two groups, Low Shyness and High Shyness. Results revealed that the 3-way interaction for Infant Distress upon mother reunion with sibling present was not significant,  $F(2,15) = .342$ ,  $p < .71$ ., nor was the same 3-way interaction for Infant Contact/Comforting behavior by the mother in the same episode,  $F(2,15) = 1.74$ ,  $p < .20$ . The 2-way interaction between Infant Shyness and Gender Composition for Infant Contact/Comforting in the same episode was not significant,  $F(3,15) = .272$ ,  $p < .84$  nor was the 2-way interaction between Sensitive Caregiving and Shyness,  $F(1,15) = .04$ ,  $p < .84$ . The 2-way interactions between Gender Composition and Infant Shyness and between Sensitive Caregiving and Infant Shyness for Infant Distress were also not significant,  $F(3,15) = .265$ ,  $p < .85$ ;  $f(1,15) = .11$ ,  $p < .74$ , respectively.

Shyness was then entered into a multiple regression equation to test its unique predictability after Sensitive Caregiving had already been entered into the equation. This effect was also tested by entering Shyness first and then Sensitive Caregiving. This was done for both infant Distress and infant Contact/Comforting behavior by mother upon reunion with the infant with the sibling present. Results showed that Infant Shyness alone could predict little of the variance in Infant Distress or Infant Contact/Comfort in an episode in which there is a mother reunion with the sibling present. R Square = .02, p < .67; R Square = .07, p < .56, respectively.

#### Discussion

The research questions of this study were concerned with structural variables and sibling behavior patterns that could be predictive of infant-sibling behavior over a series of separations and reunions involving different target figures. The investigation involved the behavior of an older sibling toward the infant at home and its relationship to the behavior of the infant toward the sibling in a different context. Also of interest was differential infant-sibling behavior in the modified version of the strange situation procedure as it varied according to the different target figures available.

Other research has only partially examined the reunion behavior of infants with older siblings,



comparing the reunion behavior of an infant with the sibling and an unfamiliar child (Teti & Lamb, 1986) or examining infant/sibling interaction with and without a stranger present (Stewart, 1983; Stewart & Marvin, 1984). The conclusions presented in the work of Stewart that suggested that the older sibling can act as an attachment figure to the infant appeared to be premature. The present study sought to make a more systematic effort at examining the behavior of infants in a modified strange situation over a series of reunions and departures of mother, sibling, and a stranger. It was hoped that these comparisons would provide more information concerning variations in infant behavior that would be due to having different target figures available.

Results indicated that the infant does appear to recognize the sibling as someone who can assist in modifying the impact of a potentially anxiety-eliciting situation. How this function is developed and maintained is not yet clear. Results did indicated that the sibling cannot act as an attachment figure in the pure sense of the term. When reunited with the sibling in the presence of the stranger, the sibling dyad did engage in contact and the sibling did attempt to comfort the infant if the infant was distressed. However, this behavior in the Strange Situation was not based upon the behavior of the older sibling toward the infant



antecedent to the episodes of the strange situation procedure. The ability to mediate the anxiety of the infant was independent of any antecedent behavior patterns involving sensitive caregiving or positive play at home. That is, by being a familiar person in the room with the infant and being able to read the cues exhibited by the infant that perhaps suggested that contact and comforting was needed, the sibling was able to be used to reduce infant distress in the presence of the stranger. However, the infant was not able to play with the same frequency as when s/he was reunited with mother when mother and the stranger were present. The overall frequency of play after the sibling was reunited with the infant with a stranger present was lower than all other episodes. Since attachment and exploration are presumed to be derived from separate mutually exclusive motivational systems (Jones, 1985), the observation that infants did not play to a significant extent when sibling was present compared to when mother was present suggests that the presence of a sibling was not sufficient to engage the attachment organization of the infant and reduce infant distress so that play could resume. These results are different from but not necessarily contradictory of the results of Stewart & Marvin (1984) who concluded that the infant and sibling engaged in secure-base behavior. In that research, 62% of the infants of caregiving older siblings sought

proximity with their siblings and then resumed play. A true comparison of the results of this research and the research of Stewart & Marvin (1984) is problematic since a proximity measure was not analyzed for the present study and the Stewart and Marvin (1984) study did not compare infant attachment behavior to sibling and mother. Stewart & Marvin (1984) also found that the greater the perspective-taking ability of the sibling, the more likely that the sibling would engage in caregiving behavior to the infant. Non-perspective-taking siblings were observed to seldom act as caregivers. This ability appears to be related to the age of the sibling in that Teti & Lamb (1986) found that infants spent more time in close proximity to older versus younger sibling.

#### Is birth interval related to infant-sibling behavior?

The present study suggests that the birth interval is also a factor in determining an infant preference for contact with a sibling in that those sibling pairs with a large birth interval had infants who were more likely to engage in contact and comforting behavior when the stranger was present. Since a larger birth interval would be likely to be associated with an older versus a younger sibling, the results of this study appear to be supportive of that finding in the work by Teti & Lamb (1986).

The infant preferred contact with the sibling versus

the stranger, but preferred play with the stranger, most likely due to the greater skill and persistence of the stranger in exhibiting appropriate play behavior. The infant also exhibited greater distress when alone with the stranger than with the stranger and the older sibling. This appears to indicate that the older sibling can assist the infant in the mediation of social anxiety.

That infant fatigue was not responsible for infant distress is indicated by the finding that there was no difference between infant distress in episode 5 when the sibling and infant were with the stranger and episode 11 when mother and stranger were present. If fatigue was a factor, one would expect more distress in this episode as well. Therefore, it is likely that the reduced distress and preference for contact with the sibling is due to the familiarity of the sibling.

Is infant-sibling behavior at home during caregiving assistance and play related to infant behavior?.

The hypothesis anticipating a relationship between antecedent sibling caregiving/sensitive behavior and infant behavior directed toward the sibling in a different context was not supported. However, the results appear to indicate that the behavior of the sibling toward the infant is a factor in infant-mother attachment behavior. Infants were more distressed (less easily soothed) and required more contact and comforting



during a mother reunion while the sibling was still present in the room. The older sibling of these infants typically exhibited low sensitivity and was less involved in the caretaking of the infant at home.

When the behavior of the older sibling toward the infant at home is taken into account as an antecedent in the analysis of infant-sibling behavior, its effect appears to be an indirect one. Siblings low in sensitivity and less involved in caregiving may require more attention from mother that may detract from her ability to be consistent and sensitive with the infant. These sibling behaviors appear to be more characteristic of sibling rivalry for mothers attention. It appears that when the infant-sibling relationship is stressful for the infant by having to interact with a less than sensitive sibling, the result seems to be more need for contact with mother due to the increased probability of distress when with the sibling. Review of the video tapes showed several infant-sibling relationships that were very stressful for the infant. There was little effort on the part of the sibling to interact with the infant and when the infant was distressed, the sibling completely ignored the infant. When the mother returned and tended to the infant, the sibling clearly tried to gain the attention and contact with mother as well, thereby interfering with the mothers' efforts to comfort the infant. Other infant-sibling relationships were the



model of caregiving and sensitivity. Teti & Lamb (1986) found that infants who used the sibling as an attachment figure also had insecure or ambivalent attachments with the mother. The results of this study suggest that an insensitive, non-caregiving sibling may contribute to distress by the infant and increased contact and comforting by mother. This indicates that the emotional climate of the home may be an uncertain one if it contains a sibling who does not exhibit positive behaviors toward the sibling. This type of infant-sibling relationship may create problems for the infant-mother attachment relationship.

Is the gender composition of the sibling dyad related to infant-sibling behavior?

The greater frequency of contact/comfort during mother reunion with the sibling present was more apparent in opposite sex groups than same sex groups. The gender pair in which the degrees of distress and frequency of contact and comfort on the part of the infant were much higher than all other gender pairs was the older male with a female infant sibling for both infant distress and contact and comforting by mother.

Mother reunion with the sibling present was the only episode in which the gender composition of the dyad was related to infant behavior through its interaction with Sensitive Caregiving behavior on the part of the sibling. Stewart (1983) found no significant main

effects or interaction between exchange rates of attachment/caregiving behavior between siblings. However, he examined only two episodes, and neither involved the mother of the children. He also reported a non-significant trend toward greater attachment/caregiving exchanges between opposite-sex siblings versus same-sex siblings in the lab. The results of the present study also found no significant main effects for gender composition as it related to strange situation behavior. The results of the present study are also not supportive of the research examining sibling interaction in the home (Abramovitch, Corter, & Lando, 1979). In that research, opposite sex siblings engaged in more physical aggression than same-sex siblings at home, especially if the older sibling was male. Later research appeared to contradict this finding (Abramovitch, Corter & Pepler, 1980). Dunn & Kendrick (1981) found that prosocial behavior directed by the older child to the infant increased over time in same-sex pairs but remained the same in opposite-sex pairs. What is interesting is that gender composition appears to affect infant-mother behavior. It is interesting that female infants with an older male sibling were significantly more distressed during mother reunion than their male counterparts with a older male sibling for both low and high degrees of Sensitive Caregiving. These results appear to be similar to



findings by Belsky, Rovine and Taylor (1984) in which mother behavior toward the infant that was characterized by either under or over stimulation was associated with avoidant and anxious attachment patterns. Reciprocal interaction within the midrange was associated with a secure attachment relationship. For the infant-sibling relationship in M-F pairs, the principle of extremes appears to operate. Over stimulation in which the sibling is too involved with the infant and under stimulation (or low sensitivity) appear to each have an adverse affect on later infant-sibling behavior. More research is needed to elucidate the specific patterns of interaction that seem to result in the apparent inverted U-shaped function regarding male sibling behavior toward a female infant.

Stewart (1983) also noted a non-significant trend indicating that older female siblings exhibited more caregiving behavior than their male counterparts. Although there were no other significant main effects for gender group on any of the episode measures in the present study, examination of the means of male and female older siblings on contact/comforting appears to support this trend as well. Abramovitch, Pepler & Corter (1982) also found that older girls engaged in more prosocial, nurturant behavior than older boys in their sibling dyads at home. However, since there are no interactions between gender composition and sensitive

caregiving at home on any direct infant-sibling behaviors in the present study, the basis for older females being more adept at exhibiting caregiving behavior in the Strange Situation is not to be found in their prior relationship with the infant. One possible explanation is the one offered by Stewart which suggests that older siblings simply model the behavior of the same sex parent. Since adult females are more involved in caregiving behavior and fathers more involved in play or other household tasks, a division along rather traditional sex roles occurs early in the sibling relationship. Older female siblings model more closely the efforts of their mothers than their fathers and vice versa for male siblings. Future research on early sibling relationships needs to examine in more detail the processes by which this modeling pattern occurs and how it effects the infant-sibling relationship. It is likely that the nature of triadic and polyadic interactions in the home during the period of early socialization are a function of a variety of elements such as gender composition, temperament of the participants and contextual factors.

Is infant temperament related to infant-sibling behavior?

It should be noted that many siblings were unsuccessful in their efforts to comfort a distressed infant in spite of what appeared to be suprising skills.



There is a body of research that suggests that there is important variability in the infant-mother relationship that is due to within-the-infant variables such as temperament (Buss & Plomin, 1985). It has been suggested that a significant portion of the variance in the attachment relationship derives from temperament variables as soothability, emotionality/fearfulness and sociability (Chess & Thomas, 1982). There appears to be continued debate concerning the influence of temperament variables on infant behavior. In the interactionist view, Chess & Thomas (1982) suggest that consistency in behavior between the assessment of attachment at 12 months and again at 24 months may be a function of consistency in infant temperament as much as maternal caregiving characteristics. They view the infant-mother attachment relationship as having different degrees of developmental significance, from important to unimportant, depending upon what the infant brings to the relationship. Another view asserts that temperament and attachment classification are orthogonal (Sroufe & Waters, 1982). They suggest that since the infant's reaction to a stranger and the amount of distress shown at separation (two behaviors that appear to have a degree of temperament influence) are both irrelevant to the assessment of an attachment classification, they conclude that it is entirely the quality of mothering during the first year of life and beyond that determines

the quality of infant attachment. They cite research findings to support their view, namely, that attachment classification has not been found to be predictable from the early assessment of infant temperament (Vaughn, Denard, & Egeland, 1980), but that it is related to early maternal behavior (Ainsworth, et al, 1978). The basis for the latter assertion has been challenged by Lamb, et al (1982). Another piece of evidence used to support this view is that the infant may have different attachment classifications to each parent (Main & Weston, 1981). One can accept the findings that the quality of maternal care is important in the development of the early infant-mother attachment relationship but clearly, infant temperament is an influential factor in predicting various elements of maternal care (Chess & Thomas, 1982). In terms of the relationship between infant-sibling behavior and infant temperament, the latter appears to influence both sibling behavior toward the infant at home as well as infant behavior in the strange situation.

Sibling presence in itself may be sufficient to prevent distress in the presence of a stranger for a certain group of infants who are more sociable and less emotional than others. When infants are quick to respond emotionally and exhibit high degrees of distress, the efforts of the sibling are bound to fail. Infants who were shy and emotional played less with

their older siblings and had older siblings who were less sensitive at home. From the perspective of the older sibling, those who live with a shy, emotional infant at home may not have the skill to interact effectively with the infant thereby causing infant distress and increased mother involvement. They may simply avoid the infant more frequently perhaps being less able to tolerate such emotional displays. Infants who are not shy and/or emotional may interact more effectively with their siblings thereby increasing the probability of future contact when in an uncertain context.

Infant temperament may have mediated the relationship between sibling presence and reduced infant distress when in the presence of a stranger. It appears that a combination of sibling familiarity and a lower degree of shyness resulted in less distress in the presence of a stranger. The fact that shyness did not emerge as a factor in episode 10 when the infant was alone with the stranger could have been due to familiarity of the stranger since the same person acted as the stranger for all episodes.

Each of the 13 episodes of the strange situation could be viewed by the infant as a disconnected series of novel contexts due to the unpredictable entrance and departure of the people involved. Recent research on inhibition (Kagan, Resnick, Clakre, & Snidman, 1984)



suggests that this temperamental factor exerts its influence in novel situations during the first 10 - 20 seconds of exposure to a novel stimulus. Cognitive assimilation of a novel stimulus or event (i.e. departures and reunions) is made more difficult for an infant high in shyness (Kagan, et al, 1984). In the present study, these infants were too distressed to be comforted by the presence and/or behavior of the sibling when with a stranger and required the presence of mother to ameliorate their distress. For infants high in shyness/emotionality who have siblings who are low in sensitivity, it may take longer for the intervention of the mother to be successful when mother returns after leaving the infant and sibling to interact together.

Is mother work status related to infant-sibling behavior patterns?

Another factor that appeared to account for infant behavior in the Strange Situation episodes was mother work status. Work status of the mother was a factor in terms of its interaction with birth interval as it influenced infant behavior during mother separation from the infant. Other research on the effect of working mothers on infant behavior has generally concluded that there are no differences in attachment behavior patterns (Portnoy & Simmons, 1978) or distress at separation (Kagan, Kearsly, & Zelazo, 1976) between groups of infants whose mothers work while they attend day care



and infants of mothers who do not work. Ragozin (1980) observed differences in negative behaviors of day care infants during day care separation but no differences between day care versus home reared in the strange situation. Field, Gewirtz, Cohen, Garcia, Greenberg, & Collins (1984) found that the behavior of infants at day care leave-taking was related to the behavior of each parent at the time of the leave taking with differential parental behavior patterns cueing different infant behavior. The above research has not examined structural variables such as gender composition, birth interval or infant temperament as factors that may influence infant attachment behavior as related to working mothers.

The results of the present study suggest that low birth interval and a working mother combine to produce greater distress and less play with sibling when mother leaves the infant alone with the sibling. This result was independent of sibling behavior at home and the gender composition of the dyad.

Siblings with a low birth interval may require more involvement from mother. Due to their close age, they may have similar needs in terms of contact and comfort. It should be noted that infant temperament may be a factor that influences the relationship of work status and birth interval as infants who were high in shyness tended to be more distressed after a mother departure.

Infants who are shy (with related emotionality) may be more susceptible to the repeated separations that accompany the schedule of a working mother, especially if there is a sibling who is close in age making similar demands upon the working parent.

One can conclude that the results of this study provide support for the importance of considering the social network of the infant. The results of this study and the other work on infant-sibling behavior suggests that the behavior of other family members must be taken into account both in their direct effects as well as indirect effects on the development of attachment relationships in the family. Models of socio-emotional behavior that extend only to the dyad are containing less and less explanatory power as models which include reciprocal and systemic patterns with multivariate analyses are gaining more. This is stated not to discredit the work that was and is based on dyadic models but to stress the complexity of the family and the need for new paradigms.

This study is limited in its ability to state clearly whether the infant has an attachment organization to the sibling since the infants were not rated in the Ainsworth classification system. It appears that the temperament of the infant and the fact that the sibling is a familiar person appeared to be significant influences on direct infant-sibling behavior

in this design.

Future work could be directed at determining the socially reinforcing functions of the sibling for the infant perhaps using social learning theory as the theoretical context within the constraints associated with evolutionary biology and behavioral genetics (Petrovich & Gewirtz, 1985). More research also needs to be done to determine how the early sibling relationship may predict later developmental outcomes.

The practical application of these results appear to lie in considerations involving the spacing of children, modeling sensitivity when interacting with the infant and the issues around repeated separations for working mothers. It is not suggested that mothers should avoid returning to work during the first 12 months of a second child's life if the older sibling is from 4 to 6, but that arrangements may need to be made to ensure consistent, high quality caregiving. Parents should also be aware that the emotional and social climate of the home affects all the relationships within it. The quality of the relationships that form in the family are the product of the interaction of many variables within the systemic framework of the social-network of the family. The sibling-sibling relationship must be included for a more comprehensive view of early socialization within the family.

## APPENDIX A

## CAREGIVING/INTERACTION RATING SCALE

Name: \_\_\_\_\_ ID No. \_\_\_\_\_

Infant's Name: \_\_\_\_\_ Age: \_\_\_\_\_ (Mon)

Sibling's Name: \_\_\_\_\_ Age: \_\_\_\_\_ (Mon)

1. Does the older sibling attend day/care or pre-school? Y N

2. Does the infant attend day care? Y N

3. If yes, what type of day care

a. private family home b. group situation

4. Are you working at the present time? YY N

5. If yes, full time \_\_\_\_\_ part-time \_\_\_\_\_

6. Type of home situation two parents \_\_\_\_\_

single parent \_\_\_\_\_

7. Mother Educational Level \_\_\_\_\_

Please respond to each item by choosing the number that best describes the behavior of the older sibling toward the infant.

1 (NEVER) 2 (RARELY) 3 (SOMETIMES) 4 (USUALLY) 5 (ALWAYS)

---

\_\_\_1. Child spontaneously shares toys with the infant.

\_\_\_2. Child follows along when the infant is crawling or walking.

\_\_\_3. Child talks to the infant at a level that the



infant can understand.

\_\_\_4. Child plays with the infant in a cooperative, sharing manner.

\_\_\_5. Child shows spontaneous physical affection toward the infant(hugs, kisses, pats).

\_\_\_6. Child offers to watch the infant while mother does something in another room.

\_\_\_7. Child attempts to soothe the infant through touch when the infant becomes upset.

\_\_\_8. Child talks and smiles to the infant while in close face-to-face contact.

\_\_\_9. Child imitates the infant's speech and/or vocalizes while in face-to-face contact.

\_\_\_10. Child is present during the feeding of the infant.

\_\_\_11. When the child is present during feeding, he/she talks to the infant, but does not touch the infant.

\_\_\_12. When the sibling is present during feeding, he/she talks to and touches the infant in a positive manner.

\_\_\_13. When the sibling is present during the feeding of the infant he/she directly assists mother with the tasks associated with feeding as well as talks to and touches.

\_\_\_14. Child is present during the bathing of the

infant.

\_\_\_15. When present during bathing, he/she only talks to the infant.

\_\_\_16. When the sibling is present during bathing, he/she talks to and touches the infant.

\_\_\_17. When the sibling is present during bathing, he/she directly assist mother in the bathing tasks as well as talks to and touches the infant.

\_\_\_18. Child is present during the dressing of the infant.

\_\_\_19. When the sibling is present during dressing, he/she only talks to the infant.

\_\_\_20. When the sibling is present during the dressing of the infant, he/she talks to and touches the infant.

\_\_\_21. When the sibling is present during dressing, he/she directly assist mother in that activity as well as talks to and touches the infant.

\_\_\_22. Child is present during times in which mother and/or father is playing with the infant.

\_\_\_23. When child plays with the infant, he/she talks to and touches the infant.

\_\_\_24. Child attempts to upset the infant during play.(R)

\_\_\_25. Child raises his/her voice or yells at the infant.(R)

\_\_\_26.Child takes toys away from the infant.(R)

\_\_\_27.Parent has to intervene during play between  
child and infant.

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Appendix B  
EAS Temperament Survey

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Rate each of the items for your child on a scale of  
1 (not characteristic or typical of your child) to  
5 (very characteristic of your child).

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1. Child tends to be shy. (SH) \_\_\_\_
2. Child cries easily. (E) \_\_\_\_
3. Child likes to be with people. (S) \_\_\_\_
4. Child is always on the go. (A) \_\_\_\_
5. Child prefers playing with others rather than  
alone. (S) \_\_\_\_
6. Child tends to be somewhat emotional. (E) \_\_\_\_
7. When the child moves about, he usually moves  
slowly. (Ar) \_\_\_\_
8. Child makes friend easily. (SHr) \_\_\_\_
9. Child is off and running as soon as he wakes up  
in the morning .(A) \_\_\_\_
10. Child finds people more stimulating than  
anything else. (S) \_\_\_\_
11. Child often fusses and cries. (E) \_\_\_\_
12. Child is very sociable. (SHr) \_\_\_\_
13. Child is very energetic. (A) \_\_\_\_
14. Child takes a long time to warm up to  
strangers. (SH) \_\_\_\_



15. Child gets upset easily. (E) \_\_\_\_
16. Child is something of a loner. (Sr) \_\_\_\_
17. Child prefers quiet, inactive games to more active ones. (Ar) \_\_\_\_
18. When alone, child feels isolated. (S) \_\_\_\_
19. Child reacts intensely when upset (E) \_\_\_\_
20. Child is very friendly with strangers.  
(SHr) \_\_\_\_
-

## Appendix C

Non-Significant Results for each Dependent Measure  
per Episode on Gender Groups by Birth Interval,  
Gender Groups by Home Play and Gender  
Groups by Sensitive Caregiving

Analyses of Birth Interval by Gender Groups for  
 Infant Play, Contact/Comfort and Distress

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
IPlay	5	.035	.85	.00	.315	.86	.04
IPlay	7	.568	.45	.01	1.61	.19	.18
IPlay	8	.127	.72	.00	1.31	.28	.15
IPlay	10	.963	.33	.03	1.06	.39	.16
IPlay	11	.537	.46	.02	.346	.84	.05

## INTERACTION

Dep.	Ep.	F	p	R2
IPlay	5	.570	.77	.12
IPlay	7	.950	.48	.20
IPlay	8	1.63	.17	.31
IPlay	10	.533	.79	.17
IPlay	11	.383	.90	.11

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
Cntct/ Comf	5	SIG.			2.44	.07	.24
Cntct/ Comf	7S	1.04	.31	.03	1.08	.38	.13
Cntct/ Comf	7M	.11	.73	.00	1.57	.20	.17
Cntct/ Comf	8	2.83	.10	.08	.759	.56	.09
Cntct/ Comf	10	.33	.56	.01	.63	.64	.10
Cntct/ Comf	11	.281	.60	.01	.273	.89	.04

## INTERACTION

Dep.	Ep.	F	p	R2
Cntct/ Comf	5	1.52	.20	.20
Cntct/ Comf	7S	.75	.62	.16
Cntct/ Comf	7M	.93	.49	.20
Cntct/ Comf	8	.59	.75	.1
Cntct/ Comf	10	.70	.66	.21
Cntct/ Comf	11	.45	.85	.13

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
InDis	5	.297	.58	.00	1.46	.23	.16
InDis	7	2.43	.12	.07	1.80	.15	.19
InDis	8	.04	.83	.00	.15	.95	.02
InDis	10	.02	.86	.00	.26	.89	.04

InDis 11	1.69	.20	.06	1.16	.35	.16
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## INTERACTION (A X B)

Dep.	Ep.	F	p	R2
InDis	5	1.46	.22	.27
InDis	7	1.49	.21	.28
InDis	8	1.17	.35	.24
InDis	10	.22	.97	.07
InDis	11	.71	.61	.21

Analysis of Home Play by Gender Goup on Infant Play,  
Contact/Comfort, and Distress

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
IPlay	5	.71	.40	.02	.58	.67	.07
IPlay	7	.13	.71	.00	1.14	.35	.13
IPlay	8	.00	.95	.00	1.32	.28	.15
IPlay	10	.00	.95	.00	.84	.51	.13
IPlay	11	.08	.77	.00	.20	.93	.03

## INTERACTION (A X B)

Dep.	EP.	F	p	R2
IPlay	5	.62	.72	.14
IPlay	7	1.15	.36	.23
IPlay	8	.77	.61	.17



IPlay	10	.60	.74	.18
IPlay	11	.21	.97	.06

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
Cont/Comf	5	.82	.37	.02	.40	.80	.05
Cont/Comf	7S	2.25	.12	.07	1.97	.12	.21
Cont/Comf	7M	.29	.59	.00	1.39	.25	.16
Cont/Comf	8	.28	.59	.00	.11	.97	.01
Cont/Comf	10	.06	.79	.00	.58	.67	.10
Cont/Comf	11	.04	.82	.00	.25	.90	.04

## INTERACTION

Dep.	Ep.	F	p	R2
Cont/Comf	5	1.12	.37	.22
Cont/Comf	7S	1.68	.15	.31
Cont/Comf	7M	.73	.64	.16
Cont/				

Comf	8	1.21	.33	.25
Cont/ Comf	10	1.48	.23	.36
Cont/ Comf	11	.69	.67	.19

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
InDis	5	.17	.67	.00	1.30	.27	.15
InDis	7	2.61	.11	.07	1.32	.28	.15
InDis	8	.70	.40	.02	.30	.87	.04
InDis	10	.18	.67	.00	.25	.90	.04
InDis	11	.06	.80	.00	1.04	.40	.15

## INTERACTION

Dep.	Ep.	F	p	R2
InDis	5	.97	.46	.20
InDis	7	1.20	.33	.24
InDis	8	.25	.96	.06
InDis	10	.68	.68	.20
InDis	11	.69	.67	.19

Analyses of Sensitive Caregiving by Gender Group on  
Infant Play, Contact/Comfort, and Distress

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
IPlay	5	1.06	.32	.02	.52	.72	.06
IPlay	7	1.19	.16	.05	2.03	.11	.21
IPlay	8	1.46	.23	.04	1.53	.21	.18
IPlay	10	.02	.88	.00	.87	.49	.14
IPlay	11	.05	.81	.00	.24	.91	.04

INTERACTION

Dep.	Ep.	F	p	R2
IPlay	5	.63	.72	.14
IPlay	7	1.60	.17	.30
IPlay	8	1.21	.33	.25
IPlay	10	1.95	.11	.43
IPlay	11	.36	.91	.12

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
Cont/ Comf	5	.74	.39	.02	.37	.82	.04
Cont/ Comf	7S	1.78	.19	.05	1.39	.26	.16
Cont/ Comf	7M	.34	.56	.01	1.53	.21	.17
Cont/ Comf	8	.06	.79	.00	.04	.99	.00
Cont/ Comf	10	.02	.87	.00	.57	.68	.09
Cont/ Comf	11	.11	.74	.00	.25	.90	.04

## INTERACTION

Dep.	Ep.	F	p	R2
Cont/ Comf	5	1.07	.40	.21
Cont/ Comf	7S	.93	.49	.20
Cont/ Comf	7M	(see text)		



Cont/ Comf	8	.26	.96	.06
Cont/ Comf	10	.71	.66	.21
Cont/ Comf	11	.31	.93	.10

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
InDis	5	1.41	.24	.04	1.14	.25	.15
InDis	7	.25	.61	.00	.81	.52	.10
InDis	8	.39	.53	.01	.20	.93	.02
InDis	10	.009	.92	.00	.23	.91	.04
InDis	11	.02	.86	.00	.93	.46	.13

## INTERACTION

Dep.	Ep.	F	p	R2
InDis	5	1.98	.09	.33
InDis	7	(see text)		
InDis	8	.25	.96	.06
InDis	10	1.34	.28	.33
InDis	11	.68	.67	.19

## Appendix D

Non-Significant Results for each Dependent Measure  
by Episode for the Analyses of Sensitive  
Caregiving by Mother Work Status, Home  
Play by Mother Work Status and  
Birth Interval by Mother  
Work Status

Analysis of Sensitive Caregiving by Mother Work  
 Status for Infant Play, Contact/Comfort, Distress

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
IPlay	5	1.00	.32	.02	.75	.52	.06
IPlay	7	1.99	.16	.05	1.41	.25	.12
IPlay	8	1.46	.23	.04	(see text)		
IPlay	10	.02	.88	.00	1.89	.16	.20
IPlay	11	.05	.81	.00	.11	.94	.01

## INTERACTION

Dep.	Ep.	F	p	R2
IPlay	5	.42	.82	.06
IPlay	7	.89	.49	.13
IPlay	8	(see text)		
IPlay	10	1.04	.41	.20
IPlay	11	.13	.98	.02

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
Cnct/ Comf	5	.74	.39	.02	.51	.67	.04
Cnct/ Comf	7S	1.78	.19	.05	.61	.61	.05
Cnct/ Comf	7M	.34	.56	.01	2.42	.08	.19
Cnct/ Comf	8	.06	.79	.00	1.04	.38	.09
Cnct/ Comf	10	.02	.87	.00	.73	.54	.09
Cnct/ Comf	11	.10	.74	.00	.25	.85	.03

## INTERACTION

Dep.	Ep.	F	p	R2
Cnct/ Comf	5	.30	.90	.04
Cnct/ Comf	7S	1.14	.36	.16
Cnct/ Comf	7M	1.74	.15	.23
Cnct/ Comf	8	.62	.67	.10
Cnct/ Comf	10	.64	.66	.13
Cnct/ Comf	11	.65	.66	.12

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
InDis	5	1.41	.24	.04	.49	.68	.04
InDis	7	.25	.61	.00	2.12	.11	.17
InDis	8	.39	.53	.01	2.25	.10	.18
InDis	10	.009	.92	.00	.35	.78	.04
InDis	11	.02	.86	.00	.19	.90	.02

## INTERACTION

Dep.	Ep.	F	p	R2
InDis	5	.38	.85	.06
InDis	7	2.26	.07	.28
InDis	8	1.58	.19	.22
InDis	10	.39	.84	.08
InDis	11	.57	.71	.11

Analysis of Home Play by Mother Work Status for  
 Infant Play, Contact/Comfort and Distress

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
IPlay	5	.71	.40	.02	.64	.59	.05
IPlay	7	.13	.71	.00	.81	.49	.07



IPlay	8	.003	.95	.00	2.61	.07	.21
IPlay	10	.002	.95	.00	1.92	.15	.20
IPlay	11	.08	.77	.00	.17	.91	.02

## INTERACTION

Dep.	Ep.	F	p	R2
IPlay	5	.52	.75	.08
IPlay	7	.68	.63	.10
IPlay	8	1.69	.16	.23
IPlay	10	1.61	.20	.28
IPlay	11	.28	.91	.06

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
Cnct/ Comf	5	.82	.37	.02	.45	.71	.04
Cnct/ Comf	7S	2.51	.12	.07	.82	.49	.07
Cnct/ Comf	7M	.29	.59	.00	2.38	.09	.19
Cnct/ Comf	8	.28	.59	.00	1.03	.39	.09
Cnct/ Comf	10	.06	.79	.00	.73	.53	.09
Cnct/ Comf	11	.04	.82	.00	.23	.87	.02

## INTERACTION

Dep.	Ep.	F	p	R2
Cnct/ Comf	5	.66	.65	.10
Cnct/ Comf	7S	.52	.75	.08
Cnct/ Comf	7M	1.36	.26	.19
Cnct/ Comf	8	.69	.63	.11
Cnct/ Comf	10	1.09	.39	.21
Cnct/ Comf	11	2.26	.07	.38

## Effect (A)

## Effect (B)

Dep.	Ep.	F	p	R2	F	p	R2
InDis	5	.17	.67	.00	.18	.90	.01
InDis	7	2.61	.11	.07	2.35	.09	.19
InDis	8	.70	.40	.02	2.13	.11	.18
InDis	10	.18	.67	.00	.37	.77	.04
InDis	11	.06	.80	.00	.26	.84	.03

## INTERACTION

Dep.	Ep.	F	p	R2
InDis	5	.10	.99	.01
InDis	7	1.32	.28	.19
InDis	8	1.54	.21	.22
InDis	10	1.28	.30	.23
Indis	11	.56	.72	.11

Analyses of Birth Interval by Mother Work Status  
on Infant Play, Contact/Comfort and Distress

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
IPlay	5	.03	.85	.00	.50	.68	.04
IPlay	7	.56	.45	.01	1.07	.37	.09
IPlay	8	.12	.72	.00	2.60	.07	.21
IPlay	10	.96	.33	.03	2.71	.07	.26
IPlay	11	.53	.46	.02	.29	.82	.03

## INTERACTION

Dep.	Ep.	F	p	R2
IPlay	5	1.60	.18	.21
IPlay	7	.93	.47	.14
IPlay	8	(see text)		
IPlay	10	1.80	.15	.31
IPlay	11	1.06	.40	.19

Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
Cnct/ Comf	5	(see text)			2.53	.09	.23
Cnct/ Comf	7S	1.04	.31	.03	.43	.72	.04
Cnct/ Comf	7M	.15	.73	.00	2.40	.08	.19
Cnct/ Comf	8	2.83	.10	.08	1.98	.13	.17
Cnct/ Comf	10	.33	.56	.01	.77	.52	.09
Cnct/ Comf	11	.28	.60	.01	.35	.78	.04

## INTERACTION

Dep.	Ep.	F	p	R2
Cnct/ comf	5	1.91	.12	.24
Cnct/ Comf	7S	1.16	.35	.17
Cnct/ Comf	7M	2.04	.10	.26
Cnct/ Comf	8	1.38	.26	.20
Cnct/ Comf	10	.48	.78	.10
Cnct/ Comf	11	.45	.80	.09



Dep.	Ep.	Effect (A)			Effect (B)		
		F	p	R2	F	p	R2
InDis	5	.29	.58	.00	.17	.91	.01
InDis	7	2.43	.12	.07	2.56	.09	.23
InDis	8	.04	.83	.00	1.99	.13	.17
InDis	10	.02	.86	.00	.34	.79	.04
InDis	11	1.69	.20	.06	.70	.56	.08

## INTERACTION

Dep.	Ep.	F	p	R2
InDis	5	1.03	.41	.15
InDis	7	1.86	.13	.24
InDis	8	(see text)		
InDis	10	.41	.83	.08
InDis	11	.38	.85	.08

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