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A comparison of relation-breaking behaviors, relation-maintaining behaviors, and maternal sensitivity in population of handicapped and non-handicapped infants

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A COMPARISON OF RELATION-BREAKING BEHAVIORS, RELATION-MAINTAINING BEHAVIORS, AND MATERNAL SENSITIVITY IN POPULATION OF HANDICAPPED AND NON-HANDICAPPED INFANTS

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INTRODUCTION

The infant enters the world with certain abilities that allow him or her to interact with the environment. Early on infants demonstrate a preference in viewing the human face (Fantz, 1968) and selectively responding to the sounds of human speech (Eimas, Sigueland, Jusczyk, & Vigorito, 1971). The early development of perceptual sensitivities enable the infant to become a partner in the social environment. It has been suggested that the ability to engage in social interactions provides the infant with the structure to organize cognitive and affective experiences (Stern, Beebe, Jaffe, & Bennett, 1977). Through the interaction process the infant first learns such aspects of functioning as the rules governing conversational turn taking (Bateson, 1975; Schaffer, Collis & Parsons, 1977), attachment to the caregiver (Ainsworth, Bell, & Slayton, 1974; Blehar, Lieberman, & Ainsworth, 1977), problem solving and sociability (Matas, Arend, & Sroufe, 1978; Pastor, 1981), and curiosity and ego control (Arend, Gove, & Sroufe, 1979).

The development of social competency during infancy may be at least partially based on early patterns of maternal-infant communication. The mother-child relationship is of particular interest as it provides insight into the process

of social and intellectual development, the significance of the child's early years, and the individual differences in maternal behavior and child outcome. Early investigations of mother-infant social interaction believed the child's motives for social interaction could be understood simply by investigating the caregiver's perceptions of the child. Several studies indicated parental perception produced powerful effects on the child. Kearsley (1979) and Sharlin & Polansky (1972), for example found mothers who perceived their children to be less competent than their peers negatively affected the child's cognitive development as measured by standardized tests (Kearsley, 1979; Sharlin and Polansky, 1972). This unidirectional view of mother-infant interactions neglected the contribution made by the child in the learning process.

In 1968 Bell reviewed the parent-child literature and determined there was evidence to support the position that infant behavior greatly influences parental response to the child and ultimately the child's developmental progress. The recognition of multidimensional causality was an important step toward a more realistic investigation of the complexity of social interactions between parent and child. Investigators have recently begun exploring the qualitative and quantitative characteristics that distinguish parent-child relationships, and have focused increasingly on the

younger child. Possible child influences on maternal-infant interactions might include: the child's developmental age, which may affect the range of behaviors available to the child or the clarity of social cues that child presents to the parent; chronological age or the history the dyad has with one another; and the presence of a disability or handicapping condition which may effect the parent's perception of the child or the form and clarity of cues the child emits.

The present study was undertaken to investigate patterns of mother-infant interaction that develop across the period of infancy for mother-infant dyads in which some of the children were handicapped. The parent and child characteristics studied included chronological and developmental ages of the children, presence of a handicapping condition in the child, and the degree of responsivity or sensitivity of the parent. Literature regarding each of these factors will be reviewed.

The influences of chronological and developmental age on social interaction were investigated since handicapped children of equal developmental age are frequently chronologically older than their normally-developing peers. Brooks-Gunn & Lewis (1984) have argued that when studying the effects of a handicapping condition on maternal behavior, a mental age match should be used. They cited

evidence that mental age but not chronological age accounted for observed increases in maternal responsivity. Consequently, one issue that the present study wished to investigate was whether changes in cognitive abilities, as reflected by developmental age, had a greater influence on mother-child interactions than the length of time the dyad had been together (analysis by chronological age).

Many investigators have noted that the mother-infant relationship becomes strained when the child is handicapped (Leiderman & Seashore, 1975; Field, 1977b; Crnic, Rogazin, Greenberg, Robinson, & Basham, 1983). It is not clear whether this dyadic interactional pattern is a function of maternal perception of having a "damaged" infant, to a different response style on the part of the infant, or a combined influence of both of these factors. Lamb & Easterbrooks (1981) have suggested that parental responsivity toward the child may be the single most important determinant of individual differences in infant social cognition. The relationship between the child's behavior and parental response establishes a behavioral contingency which permits the infant to associate his/her behavior with the behavior of the interactive partner. To the extent that the adult's behavioral responses are consistent and predictable, the child develops specific expectations of other people as well as a sense of

him/herself as an effective social agent. The development of expectations regarding the behavior of others and the development of a sense of social competency are considered by Lamb & Easterbrooks (1981) to be the major components of infant social cognition that are affected by parental sensitivity. Lamb and Easterbrooks (1981) have defined maternal sensitivity as a characteristic of adult behavior in which "contingent, appropriate, and consistent responses to an infant's signals or needs" are provided. A goal of the present study was to determine what effect different levels of maternal sensitivity had on the child's performance of social behaviors. If Lamb & Easterbrook's conception of maternal sensitivity is correct, children of less sensitive mothers may utilize different social behaviors and be less effective as social partners than infants whose mothers are more sensitive to their child's needs.

Maternal-infant interactions were investigated by examining infant responses in two broad classes of social behavior, relation-breaking and relation-maintaining behavior. Relation-maintaining behaviors were defined as those behaviors emitted by the infant that serve to maintain or prolong social contact between the dyad. Eye contact, smiling, and vocalizing are examples of relation-maintaining behaviors. Relation-breaking behaviors were defined as

those behaviors emitted by the infant that act to shorten or end dyadic interactions. Averting eye contact (gaze aversion) and crying are examples of relation-breaking behaviors. Video tapes of parent-infant interaction were rated for the occurrence of these two categories of behaviors. Frequencies of both categories of behaviors were then analyzed in relationship to the factors of chronological and developmental age, presence of a handicapping condition, and maternal sensitivity.

REVIEW OF LITERATURE

This review of research addresses six issues related to mother-infant social interactions: the reciprocal nature of mother-infant interactions, biological foundation for social interactions, development of social interactions, stability of mother-infant interactions across time, and effect of child responsivity and maternal sensitivity on mother-infant social interactions. Each of these issues are important to consider in order to understand the complexity of infant social behavior.

The development of social interactions has most commonly been studied within the context of the mother-infant dyad. Because mothers continue to be the primary caretakers of their infants, the use of the term "mother-infant" dyad reflects both fact and convenience. The use of this term does not imply, however, that fathers and/or others may not be the primary caretakers of infants and are to be excluded from this discussion.

Reciprocal Nature of Mother-Infant Interactions

Bell (1977) views parent-child interaction as a feedback system in which the parent holds an expectation about appropriate child behavior. When the child fails to meet this expectation, the parent responds by imposing greater

structure upon the interaction by redirecting the child into more acceptable levels of behavior. Mother-infant interactions can be characterized as a developing, reciprocal communication system where the actions of one partner are directed by the goals relative to the other partner (Hopkins, 1983). This definition implies intentionality between the communicating partners. The concept of behavioral intentionality among infants has long presented a problem for developmental theorists. One solution has been to regard the infant as being "prewired" to act in a communicative manner. (Ainsworth & Bell, 1974; Hopkins, 1983). Prewiring asserts that the child is genetically equipped with a set of behaviors, such as crying, that allow him/her to engage in social interactions from the time of birth.

The infant and adult enter into an interaction with a constellation of characteristics which are unique to each individual personality. Each possesses a unique set of rhythms, behavioral repertoires, and response styles through which interactions may be either enhanced or negated by the modification of one or a combination of the set (Field, 1978b). The mother tends to react toward her infant's behavior as if it had communicative significance. Hopkins (1983) reported mothers of young infants (1-5 months) tended to interpret their child's nonverbal behaviors, especially

head and eye movements and general activity level, as "state" indicators. For example, when the infant's chin was slumped on its chest, it was always associated with state labels such as "passive" or "restful." The head turned and angled upwards was labelled "interested" or "excited." The communicative process is further enhanced by the selective maturation of certain perceptual characteristics in the infant. The mother holds a belief about the presence or absence of communicative intention which serves to guide the mother's interpretation of her child's behavior. It is through the mother's role of interpreter that the notion of a communication system originates. As the child develops cognitive strategies to influence the communication system, such as the ability to reproduce an action, intentionality is ascribed. Piaget (1952) believed that fully intentional communication did not appear until stage 4 of the sensorimotor period, or until the child is approximately 8 months of age. During sensorimotor stage 4, the infant consolidates previously acquired schemes to produce more coordinated schemes that are more adaptive and instrumental. This consolidation results in the child's increasing ability to evoke novel events as a means of obtaining other desired goals, not just for their curiosity value alone (Brainerd, 1978).

Lamb and Easterbrooks (1981) conceptualize the adult's

behavioral response to the infant to occur in a four stage process. The adult must first perceive the infant's signals or need, interpret it correctly, select an appropriate response and implement it effectively. Failure to complete any of these stages in signal reception and response may result in behavior that is perceived to be insensitive. The infant's reaction to insensitive behavior is thought to be unique to each infant. As the infant develops, he/she becomes more competent in making its wants and needs known to the mother. Ainsworth and Bell (1974) suggest that effective use of such behaviors in the child's repertoire fosters the development of a general task competence, and influences the development of skills needed to enlist the cooperation of others.

Effective mother-infant interactions are characterized as being "synchronous" or "harmonious" (Field, 1978b). Synchrony is a qualitative term that describes the mother's ability to modulate her behavior in response to the infant's attentive and nonattentive behavior. Synchrony in mother-infant relations is akin to Ainsworth and Bell's concept of competence. If a mother who is sensitive to her infant's needs is paired with an infant who is effective in signalling his/her wants (through fussing, crying, smiling, etc.), both partners can be viewed as competent and synchronous. However, it is possible for either partner to

be relatively ineffective in sending signals and/or interpreting the other's signals. In such a case, the pair would be characterized as being incompetent and the interaction asynchronous. Asynchronous interactions are thought to hinder the normal development of sensorimotor and social skills in the infant. Ainsworth and Bell suggest that if both partners are communicatively incompetent, the survival of the infant may be compromised.

In summary, maternal-infant social interactions can be characterized as being multidirectional in nature. The responses of each partner influence the quality of the relationship that develops between the members of the dyad. During interactions with the very young infant, the adult tends to impose intentionality on the child's behavior. As the infant becomes older and gains the ability to perceive cause and effect relationships between his/her actions, the child is able to share more equally in the interactive process.

Biological Foundation for Social Interactions

Several investigators have argued that patterns of attention and nonattention provide the foundation for the development of social interactions (Brazelton, Koslowski, & Main, 1974; Lester, Hoffman, & Brazelton, 1985). During maternal-infant interactions, the child establishes rhythms

of attention (thought to indicate social engagement) and nonattention (an indicator of disengagement). Stern, Beebe, Jaffe, & Bennett (1977) suggested rhythms of social interaction provide a structure that enable the infant to form expectancies about the environment that lead to the organization of cognitive and affective experiences.

Early social interaction rhythms may be biologically based and appear to resemble the temporal patterning characteristics of the sleep-wake cycle (Stratton, 1982). For the caregiver, the regularities in the occurrence of child behaviors make the infant more predictable and easier to understand, which may facilitate further social interaction. Wolff (1967) first proposed endogenous rhythms to exert control over the infant's adaptive behavior and interaction with caregivers. For infants as young as 3 weeks of age, it was noted that their use of the nonattention phase of interactions seemed to provide the child with time to assimilate information perceived during the attention phase. These cycles resembled the homeostatic mechanisms that control such functions as respiration and heartbeat (Brazelton, et al., 1974). From this point of view, the infant's ability to attend to social stimuli may be related to the self-regulation of internal processes. Alternatively, the mother is often able to capitalize on her infant's attention phase by waiting to initiate further

activity until the child has met her in face-to-face gaze. Mother-infant interactions provide a framework through which the mother is able to mediate the external environment and expand the infant's experience by the mutual exchange of behaviors (Beebe, Hertsman, Larson, Dolins, Zigman, Rosensweig, Faughey & Korman, 1982).

Development of Social Interaction

Infant gaze behavior, as measured by face-to-face interaction, has been utilized as an index of attention, arousal, and affect in the early interactional process. Face-to-face interactions represent the most efficient mode of interaction for the very young child. Around the ages of three to six months, face-to-face interactions appear at their highest level (Cohen & Beckwith, 1976; Stern, 1971; Trevarthen, 1974). Stern (1971) has observed mothers to continually alter their behavior in response to changes in their infant's visual attention. Fogel's (1977) study of an infant from 5 to 13 weeks of age indicated the mother was more successful at gaining the child's attention when she simply gazed at him with her face at rest. Once the infant met her gaze, the mother exaggerated her facial expression (smiled, raised eyebrows, nodded head) and was able to hold the child's attention for a longer period of time, elicited vocalizations and wide mouth opening. Other investigators

(Cohen & Tronick, 1987; Tronick, Als, Adamson, Wise, & Brazelton, 1978) have also found that mothers of infants 9 months of age and younger were more successful at eliciting social responses from their infant when the mother's facial expression lacked positive affect. Around the age of six months, the child's interest in face-to-face interactions wanes as he/she is more able to actively engage the environment and manipulate objects.

Although the method through which the child signals the mother changes as the infant becomes more sophisticated in the use of vocalization and motor movement, the importance of face-to-face behavior increases during the second six months of life. Clyman, Emde, Kempe, & Harmon (1986) suggest that for the older infant, face-to-face interaction provides a source of additional information about a situation when an unfamiliar object or person is encountered. This new use of gaze behavior has been called "social referencing" (Campos, & Sternberg, 1981; Klinnert, Campos, Sorce, Emde, & Svejda, 1983), and its purpose may be to gain emotional information from another about the safety of a situation in order to resolve uncertainty and to guide subsequent behavior (Clyman, et al., 1986). Several studies have shown that infants through the second year of life utilize visual gaze to reference the mother when a variety of unfamiliar or ambiguous situations are encountered

(Feinman & Lewis, 1983; Klinnert, 1981).

The quality and quantity of children's social interactions with the mother have been found to change as the infant completes the second year of life. Wasserman, Allen, & Soloman (1985) characterized two-year-olds as being increasingly able to sustain attention to objects and people, and be more likely to follow requests than were younger children. Despite spending a greater proportion of time in play situations, the older infant has been found to initiate more social interactions with the mother than developmentally younger children (Cunningham, Reuler, Blackwell, & Deck, 1981).

The child's ability to return the gaze of an adult in early face-to-face interactions would appear to serve as the precursor for the child's developing capacity to participate as an equal social partner in future social interactions. Through the context of gaze behavior, the infant learns that the facial expressions of another provides not only a source of amusement or entertainment and information about difficult situations, but also a source of approval and disapproval to help interpret the consequences of his/her behavior.

Stability of Mother-Infant Interactions Across Time

Stability in maternal-infant social interactions refers

to the basic continuity of individual characteristics between dyadic partners. The issue of stability is important if causal relationships are to be discovered between parent and child behavior. Unfortunately, the research in this area is equivocal. Several studies have shown infant social behaviors such as smiling, looking, and vocalizing to the mother, have little predictability over the first two years of life (Blehar, Lieberman, & Ainsworth, 1977; Clarke-Stewart, Umeh, Snow, & Pederson, 1980; Fish & Crockenberg, 1981). Although the purpose of Pettit and Bates (1984) study was to investigate the continuity of the mother-infant relationship across time, these authors also analyzed the consistency of specific infant and mother social behaviors at 6 and 13 months of age. Mother and infant social behaviors were correlated with the child's six month Bayley MDI scores and an index of maternal satisfaction. Infant social behaviors were found to be moderately correlated with an estimate of the child's cognitive ability (Bayley MDI, r=.36). The investigators reported that specific infant social behaviors such as smiling, vocalization, fussiness, and crying were not significantly correlated at 6 and 13 months of age although the exact correlations were not provided.

Other studies have found a high degree of stability for infant behavior across time. Clark-Stewart and Hevey (1981)

observed mothers and their children in the home setting from the age of 12 to 30 months. Subjects were observed 12 times over a 1 1/2 year period during normal activity. They found physical proximity (78%), visual contact (57%), and verbal interaction (32-57%) to be the most common types of interactions observed between dyads. Physical contact and affectionate play occurred rarely (5-10%). Mothers were almost two times more likely to initiate interaction than the child. Despite differences in setting, socioeconomic status of subjects and length of observation, the behavior of 2 1/2 year-olds was observed to be quite similar. Clarke-Stewart (1973) observed the same order of frequency for behavior categories (proximity > visual > verbal > physical > play) and demonstrated a high degree of concordance in percentages of each category among groups of 9-to 18-month-old infants.

Clarke-Stewart and Hevey observed a relatively high degree of stability across behavioral modalities. Individually, these modalities changed idiosyncratically across time. Physical proximity and contact decreased both linearly and to a significant degree from 12 to 30 months. Clarke-Stewart (1973) and others (Ragozin, 1978; Serafica, 1978) have also observed this decrease over time. A significant linear increase in child's verbalization and responsiveness was observed in this study by Clarke-Stewart

(1973), Maccoby and Feldman (1972), and others. Mother- and child-initiated visual attention and affectionate play exhibited an inverted-U-shaped function which peaked at 18 months and reached its lowest level at 30 months. Verbalization and responsiveness of mothers also displayed an inverted U-shaped curve which peaked at 24 months. No significant change in visual attention and positive affect to the mother was observed in this study and studies by Clarke-Stewart (1973) and Maccoby and Feldman (1972).

Rates of behavior elicited by mothers decreased over time so that by age 2 1/2 years, mothers and children were evolving into equal partners with respect to the initiation of social interactions. While no differences were found in level of physical contact between boys and girls, girls were observed to be more stable and unchanging in the amount of physical contact they initiated and this was independent of other aspects of mother-child interaction. For boys, initiating physical contact with the mother decreased over time and was related to the quality of the dyadic relationship. Although the individual behaviors infants demonstrate change across time, these studies suggest that the pattern of responding remains relatively stable over time.

For mothers, routine caregiving behaviors that require a minimum of maternal involvement have not been shown to be

stable over time and do not predict a child's competence on cognitive measures (Blehar, et al., 1977; Clark-Stewart & Hevey, 1981). Maternal behaviors that involve greater social involvement, such as vocalizations and demonstration of objects to the child have been found to be highly stable and to correlate with subsequent child competency outcomes such as the Bayley Scales and Stanford-Binet (Farran, & Ramey, 1980; Ruddy & Bornstein, 1982). Maternal warmth may present the highest stability among maternal characteristics measured in studies of this nature (Pettit & Bates, 1984).

Investigations into the consistency of maternal-infant social behaviors have suggested that many child behaviors are not demonstrated at stable rates across the infancy period. This is not surprising given the rapid changes in cognitive and physical growth that occur during infancy. There is reason to believe however, that although the specific behaviors infants emit during the infancy period may change, the parents' perception of the child remains consistent. This finding suggests that the child's essential make-up or temperament is perceived to be stable over time. Pettit and Bates (1984) for example, found a small correlation ($r = .19$) between infants who were observed to be more irritable at 6 months and who were perceived by their mothers to be difficult to care for at age 13 months. When considering the mother's response to infant behavior,

several studies have indicated mothers to be more likely to provide consistent levels of social stimulation than care-giving behaviors to their child. The reliable nature of maternal social responses suggests that parents are able to interpret their child's social responses despite large changes in how the child presents those behaviors. The less reliable nature of maternal care-giving behaviors would appear to be the natural outcome of the child's increasing independence and the decreasing reliance on others to provide support as the infant becomes older.

Effect of Child Responsivity on Mother-Infant Interactions

Before the literature in the area of child responsivity is reviewed, two important methodological issues must be discussed with regard to how differences in the behavior of handicapped and non-handicapped infants are measured. These issues were first raised by Rosenberg & Robinson (1988) in their review of the mother-infant interaction literature. First, the label "handicapped" is frequently used by researchers to describe a group of subjects in a study without describing the specific disabilities each individual possesses. It is often assumed by researchers and readers alike that children with handicaps share the same degree and type of impairment. This is of course untrue. The degree of handicapping conditions may range from a mild impairment

such as the muscle weakening produced by some forms of cerebral palsy to a severe/profound disability in which the child's cognitive development is many months or years below that expected for a given chronological age. There is evidence that infants with different types of handicapping conditions are dissimilar in the types of behavioral responses they demonstrate. In a study by Hanzlik & Stevenson (1986), the social behavior of non-handicapped, cerebral palsy, and retarded infants and their mothers was investigated. The investigators found infants with cerebral palsy sought more physical contact and were more positively responsive to their mothers than were infants who were retarded. Infants with retardation and cerebral palsy exhibited different behavioral patterns when compared to non-handicapped infants. Infants with cerebral palsy were less likely to engage in independent play and more likely to seek physical contact with the mother than were non-handicapped infants although infants who were retarded did not differ on these measures from non-handicapped infants. Many of the differences Hanzlik & Stevenson found between infants with retardation and cerebral palsy can be accounted for by differences in motor ability. Cerebral palsy primarily affects motor development making independent movement more difficult and increasing the likelihood that the child will need to rely on the help of others to

accomplish his/her goals.

A second issue involves the degree of difference investigators report to exist between handicapped and non-handicapped children. In many cases the differences found between these groups of children, although statistically significant, may have little or no utility in providing clinically valuable information (Rosenberg & Robinson, 1988). For example, Wasserman & Allen (1985) reported mothers of physically handicapped infants to be less responsive to their child at 24 months of age than were mothers of non-handicapped infants. This conclusion was arrived at because mothers of handicapped infants had a higher percentage of ignoring their child than mothers of non-handicapped infants. This difference was statistically significant, however the amount was so small (less than 10% difference) that it is probably of little use in being able to distinguish the parenting style of mothers of handicapped and non-handicapped children.

The assumption that all handicapped children possess the same degree and type of disability should be guarded against since it leads to the faulty conclusion that all handicapped children are similar in the social behaviors they exhibit. Investigators must take into consideration how different handicapping conditions may affect the child's ability to interpret and respond to stimulation in different ways.

For example, motor delays may not affect the cognitive development of the child, but instead affect the speed and accuracy of responding. On timed tests, slowness to respond may be confused with the inability to respond. Investigators must also be cautious in interpreting reports of differences that may exist between handicapped and non-handicapped children. One must consider how such differences ultimately affect the education, treatment, and socialization of the individual child. Statistically significant differences between two populations are important only if they provide some relevance for improving the outcome of the handicapped child.

A growing body of literature suggests that there are major differences in attention and responsivity during early interactions with sick, premature, or developmentally delayed infants as compared with normally developing infants. High-risk infants frequently appear less developed, less able to modulate their state, and different as individuals from their normal peers. Field and colleagues (Field, Goldberg, Stern & Sostek, 1980; Field, Sostek, Goldberg, & Shuman, 1979) cite a number of studies relating to the social interactions of high-risk infants including preterm, postterm, autistic, and infants with Down Syndrome. Field believes that high-risk infants can be placed along a continuum of responsiveness. Interactions of

preterm, autistic, and infants with Down Syndrome are characterized as hypo-aroused or hypo-responsive. Postterm, hyperactive, and some autistic infants are best characterized by hyper-aroused or hyper-responsive in their interactions (Field, 1981). Preterm and postterm infants represent examples of the two extremes of infant responsiveness. The young preterm infant has been described as being hypotonic (Brown & Bakeman, 1979; DiVitto & Goldberg, 1979). The postterm infant has been described as irritable, not easily consoled, hypertonic, and overresponsive to stimulation (Field, Hallock, Ting, Dempsey, Babini, & Shuman, 1978). Lester, Hoffman, and Brazelton (1985) argued that differences in social interaction between term and preterm infant-mother dyads result in part from inefficient temporal organization in the interaction itself. Lester, et al., observed the social interaction of term and preterm infants and their mothers at 3 and 5 months of age and found preterm infants to have more difficulty regulating their behavior, thereby reducing the possibility for smooth, synchronous interactions to develop with the mother. The researchers found that by 3 months of age, healthy term infants' were quite skilled at displaying a strong temporal patterning of behaviors in harmony with the mother during en face interactions which led to synchronous relations at 5 months of age. Pretern infant dyads, in

contrast, were less able to synchronize their behavior cycles of affect and attention during interactions. Mothers of preterm infants reported difficulty "reading" the state of the infant. Although interactions became more harmonious with time, the level of synchrony never reached the level observed in term infant dyads.

Handicapped infants and toddlers have often been found to initiate fewer social interactions with their mothers, emit fewer social behaviors, and be less responsive to the mother's bids for interactions than are non-handicapped children (Cunningham, Reuler, Blackwell, & Deck, 1981; Eheart, 1982; Hanzlik & Stevenson, 1986). Wasserman, Allen, & Soloman (1985) measured the frequency of mother and infant social behaviors during a free-play situation. Children were matched by chronological age. These investigators found that the affective content of the social interactions of normally developing infants became increasingly positive from the age of 9 to 24 months as measured by the number of smiles, laughter, and affectionate contact they initiated. Handicapped infants on the other hand were found to decrease the frequency of displays of positive affect over the same time period. Handicapped infants were characterized by higher levels of distractibility and greater passivity or inhibition with respect to exploration and separation from the mother. These differences were small in size. Using a

developmental age match, Brooks-Gunn & Lewis (1984) found handicapped infants to smile less frequently than do non-handicapped infants. Part of this difference may have been attributable to improvement in interpreting the child's social signals as the child became older. Brooks-Gunn & Lewis noted that mothers became more responsive to their handicapped child as the child's developmental age increased but not when the child's chronological age increased, suggesting that the mother's behavior is mediated by some change in the child's ability to produce social cues.

Not only do quantitative differences appear to exist between the social responsiveness of handicapped and normally-developing infants, but qualitative differences in the form of social responses have been noted as well. Infants with Down Syndrome are reported to smile and laugh less intensely than do non-retarded infants (Rothbart & Hanson, 1983; Sorce & Emde, 1982). Thompson, Cicchetti, Lamb & Malkin (1985) reported infants with Down Syndrome exhibited a more limited range of emotional reaction and less intense emotional response to a stressful situation than non-handicapped infants. Studies indicating differences exist in the strength of social responding between infants with Down Syndrome and normally developing infants provide an insight into why the responses of handicapped children may be perceived by the mother to be

less positive in nature. The results of these studies may not be generalizable beyond infants with Down Syndrome however, since the strength of affective responses has not been studied in other populations of handicapped children as yet.

Studies of infant responsivity indicate the presence of a handicapping condition may affect the parent's perception of the child, the ability to engage in synchronous interactions, as well as the form and quantity of social responses the child initiates. Handicapped infants appear to be less responsive in general than their non-handicapped peers, however the type and degree of handicapping conditions will in part, determine how the behavior of these two populations of children differ.

Effect of Maternal Sensitivity on Mother-Infant Interactions

The mother's ability to respond appropriately and consistently to the child's cues and moods is referred to as maternal sensitivity (Rosenberg & Robinson, 1981). Parental sensitivity is one factor that helps to shape the pattern of maternal-infant social interactions over time and may be related to child outcome. Mothers of handicapped infants have frequently been characterized as less sensitive to their children than mothers of non-handicapped children (Brown & Bakeman, 1978; Greenberg, 1971; Leiderman &

Seashore, 1975). More recent studies have indicated that mothers of handicapped infants are as sensitive (Buckhalt, Rutherford, & Goldberg, 1978; Hanzlik & Stevenson, 1986) or more sensitive to their child than mothers of non-handicapped children (Cunningham, et al., 1981; Eheart, 1982; Yoder, 1986).

Differences in maternal responsivity between mothers of handicapped and non-handicapped children arise from the manner in which sensitivity is measured and what criteria are used to determine sensitive behavior (Rosenberg & Robinson, 1988). When comparing the level of sensitivity between handicapped and non-handicapped populations, children are often matched either by developmental (DA) or chronological (CA) age. Rosenberg & Robinson (1988) have argued that DA and CA matches provide different kinds of information. Chronological age matches describe how handicapped children differ from non-handicapped children of the same CA, but can not distinguish the effects associated with a handicapping condition and how the presence of a handicapping condition influences the mother's behavior. Matching children by DA enables a comparison to be made of the similarities and differences that may exist in behavior of children functioning at similar developmental ages. Brooks-Gunn & Lewis (1984) argue that the use of a DA match should be used when studying the effects of handicapping

conditions on maternal behavior. They cite evidence that maternal sensitivity was positively affected by changes in developmental age but not chronological age.

Yoder (1986) has suggested that investigators have failed to find consistent results in studies of maternal sensitivity because of how sensitivity has been measured. Yoder argues for a measure of maternal sensitivity which takes into consideration the proportion of child behavior to mother behavior. When maternal sensitivity is not based on a proportion, Yoder suggests that any differences found in the level of sensitivity may be accounted for by differences in the opportunities available to mothers to be sensitive.

Maternal sensitivity seems to be related to at least two factors: the parent's perception of the child as easy or difficult to manage, and the infant's ability to signal the adult clearly and consistently. Sensitivity has frequently been looked at in the context of feeding situations. Field (1977b) noted much parental insensitivity occured during feeding. Field observed mothers of preterm infants with respiratory distress syndrome (RDS) spent most of the feeding time coaxing their disinterested children to feed rather than reserving their efforts for stimulation for breaks and pauses in sucking activity as is characteristic of the feeding ritual of normally developing infants and their mothers. Attempts to coax the infant to feed proved

ineffective as infants became even more distracted and fussy. Face-to-face interactions of preterm lower socioeconomic class infants (Brown & Bakeman, 1979) and preterm and postterm infants (Field, 1977a) have been characterized as overstimulating and controlling behavior on the part of their mothers. Field (1978b) speculates that in an attempt to engage their relatively unresponsive infants, mothers tend to overstimulate. Field found evidence that these differences continue across infancy, at least through 12 months of age. Preterm infants were found to smile and vocalize less often, and averted gaze away from the mother significantly more often than term infants (Crnic, Rogazin, Greenberg, Robinson, & Basham, 1983). Leiderman & Seashore (1975) and Crnic, et al., (1983) both observed mothers of preterm infants tended to smile less during interactions. This finding was interpreted as an indicator of dissatisfaction between communicating partners.

Many of these differences have also been observed to occur with developmentally delayed infants and their mothers. Studies of autistic infants show lesser responsivity of both infant and mother and greater incidence of avoidance by the child (Hutt & Ounsted, 1966; Stepneski, 1978). Mother's behavior was characterized as over-active and controlling in the latter study. Greenberg (1971) found similar disturbances persist through the age of 2 years

(Beckwith, 1977) and are related to later cognitive and language delays and behavior problems (Field, 1978a; Crnic, et al., 1983). Field (1978a) also noted that mothers who were more active and less sensitive to their infant's gaze signals at 4 months tended to be over-protective and used more imperatives at 2 years. Cunningham, et al., (1981) found mothers of mentally retarded infants initiated fewer interactions with their children than mothers of non-delayed infants when matched at two levels of developmental age. At younger developmental ages, mothers of retarded and non-retarded infants were found to be equally responsive to their child's social approaches. However, as the child's developmental age increased, mothers of retarded children became less responsive to their children's bids for interaction than mothers of normally developing infants. Mothers of delayed children had a greater likelihood of interrupting and controlling their children's play while mothers of normally developing infants spent more time observing their children during play. More commands were given by mothers of retarded children, however when the child complied, mothers were less likely to respond in a positive manner to the child's cooperative behavior than mothers of non-delayed children.

Wasserman and colleagues (1985) observed mothers and their children four times from the ages of 9 to 24 months.

They found mothers of at-risk and physically handicapped infants to be less responsive to their child at younger chronological ages but became just as responsive to the child as mothers of normally developing infants by the age of 24 months. Mothers of handicapped children demonstrated more physical and verbal teaching and initiated more interactions than mothers of non-handicapped infants. Although mothers of handicapped children tended to ignore their child more at the age of 24 months, these mothers also provided more praise and encouragement to their children than mothers of normally developing infants. The results of this study are contradictory and reflect the methodological error of matching subjects by chronological age rather than developmental age.

Other studies have reported no differences in level of sensitivity between mothers of handicapped and non-handicapped infants. Buckhalt, Rutherford, & Goldberg (1978) found no difference in the amount of time mothers spent looking, touching, and vocalizing to either normally developing or Down's Syndrome infants. Hanzlik & Stevenson (1986) compared the proportion of child behaviors followed by positive maternal behaviors and found no differences between mothers of infants who had retardation cerebral palsy or were non-handicapped when the children were matched on either DA or CA. A third set of studies has found

mothers of handicapped infants to be more sensitive to their children than mothers of non-handicapped children (Cunningham, et al., 1981; Vietze, Abernathy, Ashe, & Faulstich, 1978; Yoder, 1986).

Several studies have investigated the relationship between child abilities and maternal sensitivity. Brooks-Gunn & Lewis (1984) found mothers became more sensitive with increases in the child's developmental age, but not with increases in chronological age. Yoder (1986) presented evidence that mothers of severely handicapped infants were more sensitive to their children than mothers of less handicapped infants. In this study, mothers were asked to respond to child behavior that the mother considered to be a communicative cue. Mothers of more severely handicapped children responded to relatively subtle cues that could easily have been missed by an investigator who was not familiar with the child. The less intense or subtle nature of their behaviors may be one reason why handicapped children have been characterized as being less responsive than non-handicapped children. The results of Yoder's study would suggest that when comparing the level of sensitivity between mothers of non-handicapped and handicapped children, an effort should be made by the investigator to become acquainted with the child's idiosyncratic communication cues to ensure that an accurate measure of behavior is obtained.

measure of behavior is obtained.

In summary, studies of maternal sensitivity have produced equivocal results. Older studies especially, which have not taken into consideration the opportunity mothers may have to engage their children in interactions, have concluded that mothers of handicapped children are less responsive than mothers of non-handicapped children. More recent studies have indicated less difference exists in the level of sensitivity between mothers of handicapped and non-handicapped infants. In some cases, mothers of handicapped children have demonstrated more sensitive behavior than mother of non-handicapped children in terms of interpreting subtle child behaviors as social acts. Future studies will no doubt help to clear up the ambiguous nature of the sensitivity literature. It is reasonable to expect that mothers of handicapped and non-handicapped children will ultimately be found to be equally sensitive to their children since mothers of handicapped children are also mothers of non-handicapped children.

Summary

The issues that have been considered for an investigation of infant social behavior and their relation to maternal sensitivity has included the nature of infant social behavior and how it is believed to develop over time,

the reliability of discrete social behaviors across infancy, and the effects of chronological age, developmental age, handicapping conditions, and child responsivity. The conclusions of this review of literature are that infants are able to and do engage in social interactions quite early in life and that this behavior appears to have a biological base. Both child and adult influence the other in establishing harmonious or synchronous social interactions over time. The child's repertoire of discrete social behaviors changes as a function of increasing cognitive and motoric complexity, however there is evidence that these changes do not influence the perception of the child as either a positive or negative social partner.

In terms of maternal sensitivity, there is contradictory evidence that mothers of handicapped children are less sensitive, equally sensitive, or more sensitive than mothers of non-handicapped children. Consistent findings that handicapped children are less responsive to their social partners has led to one conclusion that the adult is eventually "turned off" by the unresponsive child and this leads to adult behavior that is less responsive. Studies have also indicated that maternal sensitivity is influenced by increases in developmental age but not chronological age. Early studies investigating the social behavior of young children have been criticized for containing significant

methodological flaws, including how subjects are matched, how infant and mother behaviors are defined and measured, and the degree of difference found in many studies. More recent investigations have suggested less difference exists between mothers of handicapped and non-handicapped children.

Hypotheses

The present study was conducted to examine the role of relation-breaking behaviors across the infancy age period. It is important to understand what factors serve to decrease the potential for positive synchronous social interactions between the infant and caregiver as the social and educational future for the infant rests on the ability of both partners to communicate his/her wants and needs. An investigation of the behaviors which might serve to disrupt interactions would help educators and mental health professionals recognize the cues that are maladaptive to positive social interactions and provide a data base on which teaching strategies could be developed to enhance the success of interactions.

Based on the literature reviewed, it is hypothesized that there will be a difference in the frequency with which relation-breaking behaviors are observed between developmentally delayed (DD) infants and mothers and normally developing (ND) infants and mothers. It is

expected that members of ND dyads will display fewer relation-breaking behaviors. The behavior observed among members of the DD dyads is expected to be more like that observed among preterm infant dyads, in that infants will be more fussy, provide less eye-to-eye contact, and turn away more often from the mother which will contribute to less harmonious interactions overall.

A second hypothesis predicts that while the discrete behaviors observed will change as a function of sensorimotor stage, the pattern or direction of responding for each child will remain relatively constant across age. For example, behaviors such as gaze aversion and crying are expected to decrease as the primary methods of seeking or avoiding maternal attention for very young infants and be replaced by more sophisticated behaviors that serve the same function as the child becomes older. Crying might be replaced by verbal protesting and gaze aversion might be replaced by the infant physically moving away from the mother.

The third hypothesis states that there will be little or no difference between sexes in the selective performance of individual social behaviors. Male and female infants are not expected to rely on functionally different behavioral approaches in breaking or maintaining social contact with the mother. This tendency is not expected to change as a function of age.

The fourth hypothesis investigates the effect of maternal sensitivity toward the infant as it relates to the frequency of relation-breaking behaviors observed. It is expected that mothers rated lower in sensitivity to their child will engage in social interactions characterized as being more negative and the frequency of observed relation-breaking behaviors will be higher than in interactions in which mothers are rated higher in sensitivity to the child.

An investigation of how differences in chronological and developmental age might differentially influence developmentally delayed and normally developing infants will also be conducted. It may be found that differences in mother-child relations are not due solely to the increasing complexity of behavior with increased age, but to the relative time period the mother and infant has been together as a social unit. As developmentally delayed infants tend to be chronologically older in relation to their developmental age than normally developing infants, one may find an effect on relation-breaking and relation-maintaining behaviors that is not attributable to developmental age but to chronological age, with the factor being the relative degree of exposure partners have had to one another.

METHODOLOGY

Subjects

Subjects were selected on the basis of existing video tapes of mother-infant dyads engaged in free-play activity collected at the Meyer Children's Rehabilitation Institute, Omaha, Nebraska by Dr. Steven Rosenberg and Dr. Cordelia Robinson. The following guidelines were employed in selection of videotapes: (a) there was a signed consent form for the parent and child on file at the Institute; (b) each infant subject must have had a sensorimotor evaluation (Uzgiris & Hunt, 1975) within 4 months of the video taping; and (c) based on the outcome of the sensorimotor evaluation, infants were either making age-appropriate cognitive growth (infants said to be developing without developmental problems) or exhibited some form of developmental delay in which cognitive development was hindered. Criteria for including infants into the delayed category was a delay in developmental maturation of two or more months or the existance of a prexisting condition such as cerebral palsy or Down Syndrome which might affect the child's rate of developmental progress. Developmental delays may have been caused by physical, mental, or a combination of physical and mental factors. The degree of cognitive lag ranged from mild to severe. The final set of subjects consisted of 34 infant and mother dyads. Fifteen subjects were determined

to be normally developing (ND) and nineteen were developmentally delayed (DD). In Table 1 the nature of the disabilities of infants in the DD group are presented.

Subjects ranged in age from 3 to 40 months. Mean age of the ND infants was 19.1 months, with a range of 3 to 40 months. Infants in the DD group were an average of 9 months older than ND infants, however, sensorimotor level for both groups was roughly equivalent. Sensorimotor level 4 was the median developmental age for DD infants and sensorimotor level 3 was the median developmental age for ND infants. The number of subjects at each of the six sensorimotor levels, as well as mean age of subjects are presented in Table 2. There were 12 males and 7 females in the DD group and 9 males and 6 females in the ND group. All socioeconomic backgrounds were represented but the majority of subjects were from middle class homes.

Parents and infants were recruited for the original studies in which the video tapes were made from volunteers of local "Lamaze" birthing classes and from among clients of the Meyer Children's Rehabilitation Institute and the Omaha Public Schools (OPS) Preschool Handicapped Program. Parents were asked to participate in one of two studies. In the first study the relationship between maternal sensitivity and the type of activity parents engaged in with their children was investigated. Subjects were volunteers from

Table 1

Description of Developmentally Delayed (DD) Subjects

Condition	Number of Subjects
Down Syndrome	6
Cerebral palsy/motor delays	6
Minor developmental delays	5
Nonspecific mental retardation	2
	19

Table 2

Sensorimotor Level and Mean Chronological Age of Subjects

	Subjects		Subjects	
Sensorimotor Level	Number Developmentally Delayed	$\bar{X}$ age (months)	Number Normally Developing	$\bar{X}$ age (months)
1	1	4.0	0	--
2	4	6.2	2	4.0
3	2	19.5	6	5.5
4	3	26.3	2	8.5
5	6	20.8	3	16.0
6	3	30.3	2	21.0
	19		15	

"Lamaze" birthing classes and Meyer Institute clients. Video tapes were collected from October, 1980 to March, 1981 under the direction of Dr. Rosenberg. All 15 ND subjects and 4 DD subjects came from this study.

The second study investigated the efficacy of a competency-based parent training program on improving interaction between parents and their handicapped children as part of masters thesis project (Lengemann, 1984). Subjects were volunteers from the OPS Preschool Handicapped Program. These video tapes were collected from January to February, 1984. Five DD subjects were obtained from this study. The remaining 10 DD subjects were obtained from video tapes made by Meyer Institute staff documenting developmental progress of infant clients. Video tapes were collected from February, 1980 to July 1981 under the direction of Dr. Robinson. All video tapes were collected using the same procedure and represent the first videotaping of each particular mother and child prior to any intervention if intervention was involved in the study for which subjects were intially recruited. Video taping was conducted in a quiet "family room" setting at Meyer's Institute. The taping room was decorated to simulate a living room with couch and chairs provided on a carpeted floor. The room was supplied with a standard set of toys available to choose from which included: rattles, balls,

blocks, dolls, musical toys, wind-up toys, books. Video taping was conducted by one of the original researchers or a media specialist and was accomplished by the use of a video camera. Tape length varied from 5 to 10 minutes, depending on the purpose of video taping. Instructions to all mothers were to engage their infant in activities that would be typical in the natural home setting.

Instruments: Archival Data

Sensorimotor Assessment

Prior to the selection of subjects for this study, all infants had been assessed for developmental level with the Uzgiris and Hunt Sensorimotor Assessment (1975). The developmental assessments were completed within four months of the video-taping by Meyer Institute staff and represented part of the routine data collected for the experiments previously cited or as a measure of developmental progress for the Meyer Institute clients. The majority of infants were evaluated for level of developmental maturity within one month of the videotaping, however five DD infants, who represented some of the more severely delayed children, were evaluated within 2 to 4 months of the videotaping.

The Sensorimotor Assessment, developed by Uzgiris and Hunt (1975), was used to evaluate the developmental functioning of children operating in the infancy period.

The sensorimotor evaluation consists of a number of behavioral landmarks with which to assess the child's level of performance. Based on performance, the child is placed in one of six hierarchical substages along different categories of cognitive content which include object permanence, spatial relations, means-end relations, schemes in relation to objects, verbal and gestural imitation, and causality. Uzgiris and Hunt used items for assessment gathered from Piaget's original books on sensorimotor intelligence to ensure the items measured the same concepts as Piaget described. Reliability of the instrument was obtained using interrater and test-retest agreement. Interrater reliability ranged from 93% to 100%. The average agreement between two administrations was 80%. The sensorimotor evaluation provides a valid and reliable test of the sensorimotor concepts outlined by Piaget (Brainerd, 1978). A copy of the sensorimotor evaluation can be found in Appendix A. A schematic version of the Sensorimotor Assessment titled the Sensorimotor Profile (Robinson, Bataillion, Fieber, Jackson, Rassmussen, and Rose, 1985), is included as Table 3. The Sensorimotor Profile was devised by the staff at Meyer Children's Rehabilitation Institute to provide a quick visual reference of the types of behaviors that may be elicited at each of the six Piagetian sensorimotor stages. The content of the Sensorimotor

Table 3

SENSORIMOTOR PROFILE

Adapted from Uzgiris-Hunt Ordinal Scales of Psychological Development

SUBSTAGES	AGE IN MONTHS	VISUAL PURSUIT AND OBJECT PERMANENCE	MEANS-END	CAUSALITY	SCHEMES FOR RELATING OBJECTS	SPATIAL RELATIONS	GESTURAL IMITATION	VERBAL IMITATION	COMMUNICATION
I **REFLEXIVE**: Modification of reflexes **COMMUNICATION**: Shift from internal to external affectors of affective responses: intrinsic eliciters and regulators of infant and maternal behavior	Birth 2 months	(Momentary fixation) (Eye tracking partial arcs) Visual fixation/tracking	(Grasp reflex) (Activity change to presented obj.) (Approach to contact—patterned stimulus) (Mouths hand)	(Grasp reflex) (Activity change to presented obj.) (Approach to contact—patterned stimulus) (Mouths hand)	(Sucks nutritive/non-nutritive) (Brings hand to obj. in mouth)	(Coordinates face/voice in view) (Visual preference/paired stimuli)	(Synchronous movements in response to adult) (Pseudo-imitation)	(Alerts to auditory stimuli) Vocalizes without distress Positive response to own sounds made by adult	(Displays regulators of interaction) (Smiles to external social stimuli) (Reponsive vocalizations) (Preferential responsiveness to care giver)
II **PRIMARY CIRCULAR REACTIONS**: Initial adaptation and beginning coordination of schemes **COMMUNICATION**: Pre intentional/idiosyncratic/Perlocutionary	2-5 months	Brief gaze at point of disappearance	Hand watching (Sustained obj. grasp) Repetition of movement producing spectacle Reach/grasp obj., obj./hand in view Reach/grasp obj. in view	Hand watching Repeats movement producing spectacle Use of procedure to request repetition of event caused by adult	Incidental use/mouthing Attention to obj. hold/look Simple schemes e.g. shake, bang	Slow alternating (all) glance—2 objs Rapid all glance—2 objs Visually localizes lateral sound Accurate grasp—stable obj.	(Adult imitates child a movement, child attends) Adult imitates child's movement, child makes motor response	Adult imitates child, child repeats single sounds (Adult imitates child's sound, child repeats, e.g. cooing)	(Turn-taking (looks, vocal, motor)) (Child initiates/terminates interaction) (Differentiated cry) (Anticipates familiar events) (Affect is content mediated, e.g. smiles with assimilation)
III **SECONDARY CIRCULAR REACTIONS**: Schemes-systematic practice of schemes **COMMUNICATION**: Pre intentional/idiosyncratic/Perlocutionary	5-8 months	(Searching at point of disappearance) Look/reach—partially covered obj. Anticipation—disappearing obj. (Remembers contacted obj. when covered with cloth)	Purposeful release—grasp new obj. Attached tool—pulls support	Idiosyncratic actions to request repetition of events e.g. hand on object	Examine: visual, manual, oral Investigate object properties Differentiate simple schemes by object property (e.g. shake bell)	Looks where obj. falls in view Searches for obj. fallen from view Reorients reversed obj.	Following adult imitating child, adult initiates another familiar movement, child repeats Adult initiates child's movements, child repeats Imitation—expansion of familiar schemes	(Adult imitates child, child repeats, e.g. babbling) (Adult initiates child's sounds, child repeats a sound, e.g. babbling) (Adult imitates child's sounds, child repeats same, e.g. babbling)	(Recognizes, participates in games) (Consonant—vowel syllables, beginning repetition) (Emotions: negation, joy, anger, surprise) (Generalization of neg./pos. categories in social responses)
IV **COORDINATION OF SECONDARY CIRCULAR REACTIONS**: Intentional combination of schemes **COMMUNICATION**: Pre intentional/Conventional/Illocutionary	8-12 months	Visible displacement (V Dpl.—1 screen) V. Dpl.—2 or more screens	Locomotes to get obj. Differentiate spatial relationship of tool Attached tool—long string	(Signals expanded and have greater clarity) (Replication of toy's action to reproduce spectacle)	Complex schemes derived from obj. properties New complex schemes, e.g. slide, stretch, drop Brief recognitory use of functional objects (Combines functionally related objects, e.g. stir/cup)	(Takes objs. out of container) Places single obj. in/out	(Partial imitation—visible novel movement [VNM]) Imitates—VNM, gradual approx. Imitates—VNM, directly	Adult imitates novel sound, child repeats a sound, e.g. babble Adult imitates novel sound, child repeats same sound, e.g. babble	(Recognizes words—ritual, context) (Initiates familiar games—familiar others, strangers) (Gives obj.—turn-taking rituals) (Emotions: laughter/sar—violation expectancy) (Variety babbling, proto words, intonation)
V **TERTIARY CIRCULAR REACTIONS**: Trial and error problem solving **COMMUNICATION**: Intentional/Conventional/Illocutionary	12-18 months	Sequential V. Dpl.—two or more screens V. Dpl.—superimposed screens Invisible displacement (Inv. Dpl.)—1 screen Inv. Dpl.—2 or more screens Sequential Inv. Dpl.—two or more screens	Attached tool use—obj. out of view Unattached tool use (Trial and error strategies)	Combines obj. and person schemes to cause event Imitative attempt to activate toy	Functional use play—self (Functional use play—other/doll) Refers to obj. in shared interaction	Sequences objs. in/out Dumps objs. out Stacks objs. Experiments with gravity Moves to get obj. visible behind barrier Moves to get obj. invisible behind barrier	Imitates invisible movement e.g. pat head Partial imitation—invisible facial gesture Imitates—familiar invisible facial gesture	Imitates novel sounds, gradual approx. (Imitates some familiar words) Imitates novel sounds directly Imitates most simple new words	(Proto/imperative—reach/request, give) (Proto/declarative—give/point to share) (Recep. vocab. 10-50 words) (Jargon, proto words, single words, gestures) (Expands intents—comments, greetings) (Emotions: shame, defiance)
VI **INVENTION OF NEW MEANS THROUGH MENTAL COMBINATIONS**: Representational/foresightful problem solving **COMMUNICATION**: Intentional/Conventional/Locutionary	18-24 months	Systematic search—sequential Inv. Dpl.—3 screens	Foresightful problem solving	Explores to activate toy (Combines steps to activate toy)	Representational play combined schemes (Planned schemes in play, e.g. doll to bed and looks for blanket)	Remembers whereabouts/recognizes absence of familiar people/objs. (Nests 3 cups—trial/error)	Imitates—novel invisible facial gestures	(Imitates more complex new words/short phrases)	(Recep. vocab. several hundred words) (Expresses variety of communicative intents) (Same words—varied intonations—diff. meanings) (Begin conventional yes/no forms for wants) (Begin 2 word phrases)

Scoring Codes: F = Failed, E = Emerging, A = Achieved, G = Generalized, M = Motor Impairment Interferes; N/A = Not Applicable

Profile and Sensorimotor Assessment is the same. The Sensorimotor Profile does not replace the longer Sensorimotor Assessment but is often used by the evaluator for administrative convenience. Once the evaluation is completed, relevant information about the child is transferred to the Sensorimotor Assessment form and an estimate of the child's sensorimotor level is calculated.

The sensorimotor evaluation was administered by individuals familiar with the Piagetian concepts of sensorimotor intelligence. Infants were assessed in a quiet room with the parents present. Testing materials were used which included those materials previously discussed in reference to the video taping and other materials suggested by Uzgiris & Hunt including strings of beads, cylinders, and cloths for hiding objects under. Uzgiris & Hunt did not develop a standard set of testing materials, however the materials selected facilitated elicitation of the Piagetian concepts in each of the six substages. Ideally, mastery of a particular level is demonstrated by performance of the required behavioral response at least 3 times using different materials. This procedure is thought to ensure the child does indeed possess the required ability and performance is not bound by context. Frequently, eliciting several responses for one test item is impractical because of the infant's limited attention span. The infant was said

to be functioning at a particular level of sensimotor intelligence when the majority of responses fall into one of the 6 sensorimotor levels.

Teaching Skills Inventory

The Teaching Skills Inventory (TSI), Version III (Rosenberg & Robinson, 1981) was used as the measure of maternal sensitivity to the child. The TSI was developed as a dependent measure to evaluate the effectiveness of instruction provided to parents regarding developmentally appropriate activities to be carried out with their children. Items on the TSI are rated on a scale of 1 to 7 by trained observers. Each point of the scale has a descriptive sentence accompanying it for the purpose of rating. All 9 items of the TSI were rated for each child, however item two, a measure of how sensitive the adult is perceived to be towards the child, was used as the index of maternal sensitivity in this study. Sensitivity was defined by Robinson and Rosenberg (1981) as the ability of the parent to respond appropriately and sensitively to the child's cues and moods regardless of whether these are construed by the adult to be positive or negative. Sensitivity requires the parent to continually monitor the child's interest level and mood throughout each activity, and react to maintain or enhance the child's interest level

as needed. To rate this item, not only must the evaluator consider overt behaviors demonstrated by the adult, such as switching one toy for another, but the opportunities the adult misses in gauging the child's interest level. Mothers who were determined to be highly sensitive to their child received ratings of 5 to 7 on TSI item two, indicating appropriate sensitivity to the child's particular needs and interests was demonstrated more than half the time. Mothers rated less sensitive to their children earned scores on TSI item two of 1 to 4, indicating appropriate sensitivity was directed toward the child fifty percent or less of the time. A summary of the items found on the TSI and their meaning are provided in Table 4. A copy of the TSI form and instructions for rating the TSI item two can be found in Appendix B.

Reliability and validity of the TSI III as a measure that could detect change is parents' teaching skills was based on a study of 11 parent-child dyads who participated in the Infant Development Program at Meyer Children's Rehabilitation Institute. Interrater reliability was calculated by computing the percent agreement between the raters' scoring of each item on all the tapes. Average reliability between a standard rater and reliability raters was 87%.

The TSI data for the present study was collected from

Table 4

Items of Teaching Skill Inventory

Item Number	Item	What Item Measures
1	Structure	number of adult initiated vs. child initiated activities
2	Tracking	how sensitive the adult was to child
3	Clarity of Objectives	how clear the objective was to the rater
4	Developmental Appropriateness of Activities	match between requirements of activities and child's developmental level and physical capabilities
5	Appropriateness of Nonverbal Instruction	parent's ability to use physical guidance, prompts, modeling, pointing, and gesturing
6	Adjustment of Activity Complexity	parent's use of appropriate modification and conversion strategies during interaction
8	Appropriateness of Feedback	proportion of instances of feedback to child responses and quality of feedback
9	Child Participation	the degree of child participation in the interaction

video tapes between February and September, 1984 by the author and other Meyer Institute staff as part of an unrelated research project. TSI ratings were gathered from the same video tape segments as those used to provide data for the sensorimotor evaluation and measures of infant social behavior. Interrater reliability for the TSI for the tapes used in the parent study was calculated by percent agreement between raters to be 93%. In Table 5 the level of maternal sensitivity found within the delayed and non-delayed samples is presented. Seventy-nine percent (15 of 19 subjects) of the delayed infants had mothers who were assessed to be highly sensitive to their children (TSI rating of 5 to 7). Eighty percent (12 of 15) of non-delayed infants had mothers rated as highly sensitive to their needs. No child in either group had mothers rated in either the lowest or highest possible category of maternal sensitivity suggesting some restriction of range existed in the sample.

Instruments: Present Study

Behavioral Checklist

A checklist was devised by the author to assess the frequency with which relation-breaking and relation-maintaining behaviors occurred in individual dyads. The checklist was developed based upon a review of the

Table 5

Level of Maternal Sensitivity Found Within Delayed and Non-Delayed Sample

		Non-Delayed		Developmentally Delayed	
	Level of Maternal	Frequency	Percent	Frequency	Percent
Low	1	0	--	0	--
	2	0	--	1	5%
	3	1	7%	1	5%
	4	2	13%	2	10%
Total		3	20%	4	20%
High	5	8	53%	7	37%
	6	4	27%	8	42%
	7	0	--	0	--
Total		12	80%	15	79%
Grand Total		15	100%	19	99%

literature and observations of the range of social behaviors exhibited by children during the infancy period. These behaviors were assumed by the author to relate directly to the infants' attempts to enhance or decrease social interaction with the mother. The checklist was thought to include most of the social responses available in the infant's behavioral repertoire. Two categories of child social behaviors were defined, relation-breaking and relation-maintaining behaviors. Within these behavioral classes, individual response forms were described. Many authors had previously investigated one or more of the behaviors contained on the checklist, however the compilation of behaviors used for the present study represented the largest array of behaviors targeted for one study. Stepneski (1978), for example investigated the gaze behavior of autistic infants; Crnic, Rogazin, Greenberg, Robinson & Basham (1983) studied the smiling and vocalization of young children; and Thompson, Cicchetti, Lamb & Malkin (1985) investigated the facial expression and vocalization of infants with Down Syndrome. Relation-breaking and relation-maintaining behaviors were considered to be mutually exclusive of one another. Categories and descriptions of the behaviors on the checklist are presented in Table 6. The author expected the demonstration of behaviors on the checklist would be dependent on the age and

Table 6

Description of Behaviors on Checklist

Relation-breaking Behaviors

Less Sophisticated Response Forms

crying - prolonged, loud crying.

gaze aversion - gaze averted away from the mother.

protesting - includes silent-cry face, brief vocal protest and fussing. Does not include loud, prolonged crying.

negative facial expression - displaying a frown or "angry" face.

More Sophisticated Response Forms:

ignoring - attempts by the child to ignore, or not attend to 2 or more invitations to an interaction or issuance of a direction by the mother.

proximity avoiding - includes crawling, walking, or maneuvering away from the mother in an attempt to avoid close physical proximity. Child is not currently in close physical proximity to the mother.

proximity resisting - resisting physical contact or touch by the mother by moving the body or protesting while the child is already in close physical proximity to the mother.

con't Table 6

Description of Behaviors on Checklist

Relation-maintaining Behaviors

Less Sophisticated Response Forms:

eye contact - gaze direction toward the mother where eye contact is established.

positive facial expression - displaying a smile or "happy" face.

More Sophisticated Response Forms:

proximity seeking - establishing close physical proximity to the mother. Does not include touching.

contact seeking - physically touching the mother in a non-aggressive manner (i.e. no hitting, slapping, or pushing the mother).

positive communication - vocal and gestural attempts to engage the mother in interaction. To include verbal utterances, preverbal referential pointing, gesturing.

level of sophistication of responding of each infant as well as on the mother's sensitivity to her child's needs and cues.

Relation-breaking behaviors refer to those behaviors which serve to "cut-off" or decrease the frequency of social interaction between partners. Such behaviors include crying, gaze aversion, protesting, resisting or avoiding close proximity to the mother, ignoring, and negative facial expressions. Relation-maintaining behaviors refer to behaviors which serve to facilitate or enhance social interactions. These behaviors include establishing eye contact, seeking close physical proximity and contact with the mother, positive facial expressions and communications. The relation-breaking behaviors of crying, gaze aversion, protesting, negative facial expression, and the relation-maintaining behaviors of eye contact, and positive facial expression are considered to be more likely to be exhibited by infants at younger chronological ages and sensorimotor levels as they may be more related to early reflex patterns or represent less sophisticated or differentiated response styles. Proximity resisting and avoiding, ignoring (relation-breaking behaviors), proximity and contact seeking, and positive communication (relation-maintaining behaviors) are believed to represent more sophisticated response styles that require greater motoric, linguistic,

and/or cognitive ability in order to be utilized. It is thought that infants at older chronological and sensorimotor ages would be more likely to exhibit these behaviors.

Procedure

Five minute segments of the video-taping dyadic interactions were utilized to obtain data for the present investigation. The frequency with which the developmentally delayed and normally developing infant samples engaged in relation-breaking and relation-maintaining behaviors was counted directly from the video-taped free play sequences between each mother and her child. In the case of a 10-minute video-taping, only the first 5 minutes of the taped interaction was used. The five minute taped sequence was divided into twenty 15-second intervals for purposes of establishing reliability. The interval length was measured by use of a professionally made audio tape which marked the end of each interval by announcing its number. Raters recorded the frequency with which each of the twelve checklist behaviors occurred within each 15-second interval.

The behavioral ratings of the taped segments of interactions were obtained by the author and one additional rater. The author recognized that her knowledge of group assignments and experimental hypotheses could potentially bias her video tape ratings. Consequently a second rater

who was blind to group membership and expected outcomes rated all the taped segments. The co-rater's observations were used as the source of data for the experimental analyses. The rater was trained to identify and use the behavior checklist using video-taping segments of mother-infant dyads engaged in free play who were not included in this study. Training continued until interrater agreement of .80 or better was obtained. Both the author and the rater coded all video tape segments to ensure adequate interrater reliability on the checklist behaviors.

RESULTS

Interrater Reliability

Interrater reliability between the author and co-rater on eight training tapes was calculated by exact percentage agreement of the twenty 15-second intervals to be 83% (range 60% - 100%). The frequency of relation-breaking and relation-maintaining behaviors occurred at extremely low rates on the experimental tapes. Interrater reliability based on the number of 15-second intervals in which the two raters agreed would produce a greatly inflated estimate that approached the 1.0 level due to the over-representation of intervals in which no behaviors were observed. It was decided that because of the low rate of responding, interrater reliability would be better determined if the percent agreement between the two raters was based on the frequency with which each behavior on the checklist was observed. This produced an agreement level that was acceptable. Percent agreement between the two raters across subjects for each relation-breaking behavior was calculated to be 99% (range 62% to 100%). An agreement level of 98% (range 50% to 100%) was calculated across subjects for each relation-maintaining behavior. The overall percent agreement between the two raters was 99%. Eight of the twelve observed behaviors had interrater reliability calculated across subjects at 99% or above. One behavior,

crying, was not observed at all among the subjects and was dropped from further analyses. In Table 7 the percent agreement between the two raters for the experimental behaviors is presented.

Description of Social Behaviors

Both relation-breaking and relation-maintaining behaviors occurred at very low rates for both the delayed (DD) and normally developing (ND) groups. This was especially true for the seven different relation-breaking behaviors. On the average 2.42 relation-breaking behaviors (RBB) were observed for each DD child and 1.07 RBB for each ND child. Protesting was the most commonly observed form of relation-breaking behavior for both groups of infants. All forms of RBB were observed in the delayed sample, however proximity resisting and proximity avoiding were not observed among the non-delayed group. Eight of the ND infants (53%) and 5 of the DD infants (26%) exhibited no relation-breaking behaviors at all during the free play situation. Of the children who demonstrated RBB's, all infants tended to utilize two or fewer forms of relation-breaking behaviors. In Table 8 the frequency with which relation-breaking behaviors were observed among the DD and ND groups is presented.

In Table 9 the frequency with which relation-maintaining

Table 7

Interrater Agreement of the Observed Frequency of Relation-breaking and Relation-maintaining Behaviors

Relation-breaking Behaviors	percent agreement
cry	no instances
gaze aversion	62%
protest	99%
proximity avoiding	100%
ignore	100%
negative facial expression	75%
proximity resisting	100%
% agreement using observer's numbers as a base and summed across all RBB without respect to category	94%
Relation-maintaining behaviors	
eye contact	99%
proximity seeking	100%
contact seeking	50%
positive facial expressions	94%
positive communication	97%
% agreement using observer's numbers as a base and summed across all RMB without respect to category	98%

Table 8

Observed Frequency of Relation-breaking Behaviors (Sum=62)

	N = 19 Developmentally Delayed			N = 15 Normally Developing		
Behavior	Frequency	Number of Subjects	Percent Subjects	Frequency	Number of Subjects	Percent Subjects
Cry	0	0	0%	0	0	0%
Gaze Aversion	7	4	21%	1	1	7%
Protest	23	8	42%	10	4	27%
Proximity Avoiding	6	2	10%	0	0	0%
Ignore	7	4	21%	3	2	13%
Negative Facial Expression	1	1	5%	2	2	13%
Proximity Resisting	2	2	10%	0	0	0%
Total	46			16		

Table 9

Observed Frequency of Relation-maintaining Behaviors (Sum=376)

	N = 19 Developmentally Delayed			N = 15 Normally Developing		
Behavior	Frequency	Number of Subjects	Percent Subjects	Frequency	Number of Subjects	Percent Subjects
Eye Contact	124	16	84%	67	14	93%
Proximity Seeking	0	0	0%	1	1	7%
Contact Seeking	1	1	5%	1	1	7%
Positive Facial Expression	45	9	47%	36	8	53%
Positive Communi-cation	54	9	47%	36	8	53%
Total	224			152		

behaviors (RMB) were observed among the delayed and non-delayed samples is presented. Relation-maintaining behaviors were observed much more frequently for both the delayed and non-delayed samples. The average number of RMB's demonstrated by the delayed group was 11.79. Non-delayed infants produced an average of 10.13 RMB's. No infant failed to exhibit any relation-maintaining behavior. Normally developing infants as a group displayed all five forms of RMB, however no DD infant exhibited the behavior of proximity seeking. The response form of eye contact was the most frequently observed RMB, with 30 of 34 subjects (88%) displaying this behavior. Eye contact was also found to be the most commonly demonstrated form of all social behavior (RBB or RMB) displayed by infants in this study. For delayed infants, 84% of all RMB responses were accounted for by instances of eye contact with the mother. For non-delayed children, this percentage rose to 93% of all relation-maintaining behaviors.

In summary, all forms of relation-breaking behaviors occurred at extremely low rates. Developmentally delayed infants were almost 2 1/2 times more likely to exhibit RBB's than non-delayed infants. Delayed infants were found to produce more forms of RBB than did their normally developing counterparts. Thirteen of all 34 infants (38%) displayed no RBB at all. Relation-maintaining behaviors were observed to

occur approximately 10 times more often than relation-breaking behaviors and no child failed to use at least one form of RMB.

Analyses: Multiple Regression Analyses

A stepwise multiple regression analysis was performed to determine what effect the variables of chronological age, developmental age, sex, group membership (ND or DD), and maternal sensitivity had on predicting the occurrence of each category of relation-maintaining and relation-breaking behavior. The independent variables were entered into the regression equations as follows: TSI item two, sensorimotor level, chronological age, group affiliation, and sex. The order in which variables were entered into the multiple regression equation was based on the author's review of literature and her understanding of the importance of each variable in influencing infant social behavior. Using frequency data, only two significant effects were produced. Sensorimotor level was found to have a significant effect on predicting the relation-breaking behavior of gaze aversion $r(32) = .05$, $p = .003$. Children at younger developmental ages (sensorimotor levels 1-3) were more likely to utilize gaze aversion as a response form than developmentally older children, however the number of subjects who utilized this behavior (3) was so low that it provides little useful

information. Sensorimotor level was also found to predict the relation-maintaining behaviors of positive communication $r(32) = .40$, $p = .02$. Seventeen children or one-half of the experimental sample, utilized this form of responding. Thirteen of these children were from high sensorimotor levels (levels 4-6). This effect was in the expected direction since the ability to communicate a message using gestures or vocalization is highly related to increases in chronological and mental age.

When the experimental behaviors were anayzed as the sum of relation-breaking or relation-maintaining behaviors, stepwise multiple regression analyses found no significant effects for chronological age, sensorimotor age, sex, group, membership, or maternal sensitivity level. Because social behaviors were demonstrated by infants at such low rates, the data was more readily analyzed by nonparametric methods, therefore further analyses reflect the utilization of these methods.

Chi-Square Analyses

A Chi-square analysis of the total number of relation-making and relation-breaking behaviors produced by subjects was calculated with the expectation that the total frequency of behavior would be the same for delayed and non-delayed infants. This analysis indicated developmentally delayed

infants produced significantly more relation-breaking behaviors ($\chi^2(1,N=34)=8.32$, $p<.01$), but not more relation-making behaviors ($\chi^2(1,N=34)=1.95$,ns) than non-delayed infants. In Table 10 the frequency and proportions of total social behavior emitted by the two groups of infants are presented. The proportions of relation-breaking and relation-maintaining behavior are quite comparable for delayed and non-delayed infants, with non-delayed infants displaying 7% more relation-maintaining behaviors than their delayed peers.

Post Hoc Analyses

When considering the types of social behaviors produced by the two groups of infants, two issues became apparent. First, the difference in the amount of social behavior produced by delayed and non-delayed infants may have been accounted for by the presence of physical disability in the delayed sample and second, the greater frequency with which relation-maintaining behaviors occurred in the two groups was largely an artifact of a single form of RMB, eye contact, which accounted for 44% of all social behavior observed in the present study. The relation-breaking behaviors of proximity avoiding and resisting and the relation-maintaining behaviors of proximity and contact seeking where identified as those forms of response that

Table 10

Frequency and Proportions of Social Behavior Observed by Group Affiliation

	Non-delayed (N=15)		Delayed (N=19)	
	Frequency	Proportion of Total Behavior	Frequency	Proportion of Total Behavior
Relation-breaking Behavior	16	10%	46	17%
Relation-maintaining Behavior	152	90%	224	83%
Total	168	100%	270	100%

Proportions calculated as $\frac{\text{Sum RBB (or RMB)}}{\text{Sum (RBB + RMB)}}$ for each group of infants.

were largely dependent upon physical mobility. All four of these social behaviors occurred at extremely low levels as only two ND (13%) and five DD (26%) infants utilized these forms of responding. Of the children who did demonstrate these behaviors, all were found to be functioning at a high sensorimotor level (sensorimotor level 5 and 6) and had a chronological age of thirteen months or older (range 13-31 months of age). Two of the delayed infants who utilized these behaviors were characterized as having minor developmental delays and the remaining three infants had Down Syndrome. Although no child described as having major physical or motor delays was found to have produced these forms of behavior, no child regardless of handicapping condition utilized these responses with any great frequency. It seems appropriate to conclude that the greater proportion of RBB exhibited by the delayed sample was not accounted for by the presence of children who were physically incapable of performing these behaviors, but that developmental and chronological age appear to be the important factors as to whether these behaviors will occur.

The social behavior eye contact accounted for 84% of all RMB and 46% of all forms of social behavior for the delayed sample. For the non-delayed infants, eye contact accounted for 93% of all RMB and 40% of all social behavior demonstrated. To determine whether eye contact was related

to developmental or chronological age, Chi-squares were calculated using marginals to determine the expected frequencies. Although delayed children at younger developmental and chronological ages emitted a higher average number of eye contact behaviors than all other children, Chi-square analyses indicated that these differences were not significant, X (1,N=34)=.006,ns; X (1,N=34)=.0002,ns. In Table 11 the average frequency with which eye contact was demonstrated by delayed and non-delayed infants at different developmental and chronological ages are presented. These results indicate eye contact is an especially important social signalling device for delayed infants at very young developmental or chronological ages.

Hypothesis two stated that although infants at developmentally younger and older levels may have a tendency to utilize different forms of relation-maintaining and relation-breaking behaviors, there would be no significant difference in the relative proportion of relation-breaking and relation-maintaining behaviors that could be accounted for by either developmental or chronological age. Less sophisticated social behaviors were defined as those behaviors most likely to be emitted by infants at younger developmental (SM1-3) and chronological ($\leq$13 mo.) ages and to be more closely related to early reflex patterns or represent a less differentiated response style. Examples of

Table 11

Average Frequency of Eye Contact Behaviors for Delayed and Non-delayed Infants at Different Developmental and Chronological Ages

	Average Frequency			
	Developmental Age		Chronological Age	
	Low (SM 1-3)	High (SM 4-6)	Low (13 mo.)	High (13 mo.)
Developmentally Delayed	10.14	4.42	10.82	4.00
Non-delayed	4.75	4.14	4.10	5.20

these behaviors are crying, eye contact, positive and negative facial expressions. More sophisticated social behaviors were considered to require a greater degree of motoric, linguistic or cognitive ability and most likely be produced by infants at higher developmental (SM 4-6) and chronological (>13 mo.) ages. Proximity resisting and avoiding, proximity and contact seeking, and positive communication are examples of more sophisticated social behaviors. Social behaviors were totaled across the categories of more and less sophisticated RBB and RMB, and group affiliation. T-tests were performed to determine whether the proportion of delayed and non-delayed infants at low or high sensorimotor and chronological ages affected their use of social behaviors. In Table 12 the results of the t-test analyses are presented.

T-test results indicated that infants at younger developmental ages performed less sophisticated forms of RBB more often than infants at older developmental ages. Infants at older and younger developmental levels did not utilize significantly different proportions of RMB. Children at older developmental levels tended to utilize a significantly greater proportion of more sophisticated forms of RMB and RBB than their younger counterparts. T-test analyses of the effect of chronological age on the use of more and less sophisticated forms of social behavior

Table 12

Row-wise t-tests Comparing the Average Number of Social Behaviors Emitted by Level of Developmental and Chronological Age

	t-test Values			
	Developmental Age		Chronological Age	
	Low (SM 1-3)	High (SM 4-6)	Low (CA 13 mo.)	High (CA 13 mo.)
Less Sophisticated RBB	* * 2.20	.58	* * 2.00	.59
More Sophisticated RBB	* * .07	.89	* * .12	.94
Less Sophisticated RMB	* 7.53	9.33	* 9.06	7.57
More Sophisticated RMB	* * 1.05	4.87	* * 1.26	4.18

* * t's (33) $\geq$ /3.42/, p's < .005

* t's (33) $\leq$ 1.36,ns

revealed a similar pattern, infants who were chronologically older utilized significantly more sophisticated forms of RBB and RMB than did chronologically younger infants. Infants at younger chronological ages utilized less sophisticated forms of RBB more frequently than older infants, however both older and younger children utilized less sophisticated forms of RMB in similar proportions. These results indicate hypothesis two was generally confirmed, chronological and developmental age did not substantially affect the direction of social responding for this group of infants.

Multiple regression analyses supported hypothesis three which stated sex differences were not related to the performance of relation-making and relation-breaking behaviors. No additional statistical procedures were performed to analyze this hypothesis since the literature indicated few sex differences in mother-infant social interaction.

Using marginals to calculate expected frequencies, Chi-square analysis indicated that when the total number of behaviors was considered, infants of more and less sensitive mothers did not produce significantly different levels of social behaviors, $\chi^2(1,N=34)=1.50,ns$. However, when the average number of behaviors per child was considered, children of more sensitive mothers (TSI levels 5-7) were found to produce significantly more RMB's than infants of

less sensitive (TSI levels 1-4) mothers, $\chi^2(1,N=34)=8.13$, $P<.01$. Expected frequencies were calculated with the expectation that the proportion of RMB would be the same as the proportion of children with mothers of more and low sensitivity. An average of 11.48 RMB's were produced by children of more sensitive mothers compared to an average of 9.43 RMB's exhibited by infants of less sensitive mothers. No difference was found for infants of more sensitive or less sensitive mothers as the average number of RBB's per child produced, $\chi^2(1,N=34=.31,ns$. Expected frequencies were calculated in the same manner as in the previous Chi-square. Children of less sensitive mothers exhibited an average of 1.0 RBB whereas infants of more sensitive mothers emitted an average of 2.04 RBB's. In Tables 13 and 14 the frequencies and proportions of RMB and RBB observed by level of maternal sensitivity and group affiliation are presented.

T-tests indicated chronological age was not related to level of maternal sensitivity $t_{DD}(17)=1.68,ns$; $t_{ND}(13)=/1.21/,ns$, nor was developmental level $t_{DD}(17)=.41,ns$; $t_{ND}(13)=/1.75/,ns$.

These results only partially support hypothesis four. Although infants of less sensitive mothers were found to engage in approximately equal proportions of relation-breaking behavior as infants of more sensitive mothers, infants of less sensitive nothers engaged in significantly

Table 13

Frequency and Proportions of Relation-breaking Behavior Observed by Level of Maternal Sensitivity and Group

Maternal Sensitivity Level	Non-Delayed (N=15)		Delayed (N=19)		
	Frequency	Proportion	Frequency	Proportion	Total
Low	3	2%	4	1%	7
High	13	8%	42	16%	55
Total	16	10%	46	17%	62

Proportions calculated as $\frac{\text{sum RBB}}{\text{sum (RBB + RMB)}}$ for each group of infants.

Table 14

Frequency and Proportions of Relation-making Behavior Observed by Level of Maternal Sensitivity and Group

Maternal Sensitivity Level	Non-Delayed (N=15)		Delayed (N=19)		
	Frequency	Proportion	Frequency	Proportion	Total
Low	28	17%	38	14%	66
High	124	74%	186	69%	310
Total	152	90%	224	83%	376

Proportions calculated as $\frac{\text{sum RMB}}{\text{sum (RBB + RMB)}}$ for each group of infants

fewer relation-maintaining behaviors in comparison to infants of more sensitive mothers.

DISCUSSION

Summary

The main purpose of this study was to determine what impact developmental disability and maternal sensitivity had on the type of social interactions infants engaged in. A time sampling paradigm was used to measure the frequency with which infants engaged in two classes of mutually exclusive social behaviors during a free-play situation with mothers. Delayed infants were an average of nine months older than their normally developing peers but were roughly equivalent on developmental age as measured by a Piagetian-based sensorimotor assessment device. Severity of handicapping conditions within the delayed group varied from minor to severe and resulted from physical and/or cognitive deficiencies. The mother's ability to identify and respond sensitively and appropriately to her child's behavioral cues and moods was measured by the Teaching Skills Inventory, TSI, (Rosenberg & Robinson, 1981). Twenty percent of mothers (7 of 34) in each of the two infant groups were determined to behave in a less sensitive manner toward their children. The great majority of mothers (27 of 34 or 80%) were rated as behaving in a more sensitive manner toward their infant. The assessment of maternal sensitivity was found to contain some restriction in the range of observed

ratings. No mother was rated at either the lowest or highest level of sensitivity toward the child, however some variability among the scores was obtained.

The two classes of child social responses measured in this study were relation-breaking and relation-maintaining behaviors. Relation-breaking behaviors (RBB) were those behaviors emitted by the infant that were believed by the author to terminate or decrease the amount of social engagement between dyad members. Seven forms of RBB were identified as being within the motoric, linguistic, or cognitive capability of children aged 0-24 months. Five types of relation-maintaining behaviors (RMB) were identified as infant response forms believed to increase or prolong social engagement.

All forms of RMB and RBB were found to occur at low levels during the free-play situation. This low level of occurrence may have been due to several factors: the attractiveness of the toys available to the children, the presence of the video camera equipment and media technician during the free-play situation, the pressure for mother and infant to "perform," the short period of time sampled, or the misidentification of social behaviors produced by infants. Although not measured directly, mothers and children were not noted to look in the direction of the video equipment at rates that appeared abnormal, suggesting

that the video taping may not have significantly altered dyadic behavior. No instances occurred during the coding of the taped segments where either rater was unable to categorize infant social responses into one of the twelve behavioral categories. The author's review of the mother-infant research indicated a time-sampling period of five minutes was not uncommon. It seems likely therefore, that during an unstructured, non-stressful situation with toys, mothers and infants engage each other in relatively few social exchanges.

Delayed infants produced an average of 11.79 RMB's and only 2.42 RBB's during the free-play situation. Normally developing infants emitted an average of 10.13 RMB's and 1.07 RBB's. Significantly more relation-breaking but not relation-maintaining behaviors were produced by delayed infants than non-delayed infants, however the proportion of social behaviors emitted by individual DD and ND children was not found to differ significantly. The social interactions of this sample of infants were observed to be more greatly positive than negative in nature. Both delayed and non-delayed infants utilized more forms of relation-maintaining behavior than relation-breaking behavior and many children (8 ND and 5 DD) did not demonstrate any form of RBB during the play situation. In general, the interactions of this group of normally-developing infants

can be characterized as more conducive to maintaining positive social relations with the mother than those of delayed infants, given the greater range of RMB's these infants demonstrated and their tendency to emit very few RBB's. The social interactions of delayed children are also more positive than negative, however these children tended to rely on fewer forms of RMB's and produce more RBB's on the average than non-delayed children. One conclusion may be that these small qualitative and quantitative differences in the nature of the social interactions of handicapped children helps to create a perception that these children are less reinforcing social partners. Based upon the finding that infants in the delayed group had a greater likelihood of having concomitant physical disabilities, no evidence was found that suggested developmentally delayed infants performed any social behavior less frequently than their normally developing peers. Developmental and chronological level, however, were found to be highly related to whether or not social behaviors requiring motoric locomotion were performed. Infants who were physically and cognitively older were more likely to display these forms of social behaviors than were younger infants.

The relation-maintaining behavior of eye contact was found to be the most commonly occurring social behavior demonstrated by infants in this study. Forty-four percent

of all social behavior observed was the result of the child establishing eye contact with the mother. This phenomenon suggests that securing eye contact with one's social partner is a powerful component of the interactional process even at very early ages. This finding appears to be especially true for developmentally delayed children at young chronological and cognitive ages. Young handicapped children were found to seek eye contact with their mothers on the average more frequently than all other infants, however this difference was not found to be statistically significant. One conclusion may be that handicapped children as a group are just as socially oriented as their normally developing peers but that by depending more heavily on a very subtle form of social behavior (eye contact), mothers may have a tendency to miss their child's bids for interaction. Consequently as the child becomes older, he/she may learn to approach their social partners less often and this lack of approach leads these children to the characterized as less socially motivated than their normally developing peers. In addition, lacking opportunity or ability to elaborate upon the types of social behaviors displayed, the handicapped child may indeed become less adept at interacting in social situations. This conclusion is consistent with studies that have shown handicapped infants to be less active, initiate fewer interactions, and smile

and vocalize less often than non-delayed children (Cunningham, et. al., 1981; Hanzlik & Stevenson, 1986; Thompson, et. al., 1985).

Relation-maintaining and relation-breaking social responses were divided intuitively into behaviors requiring more and less cognitive, motoric, or linguistic abilities in order to be performed. It was hypothesized that as the infant became older and more cognitively mature, he or she would rely less on simple forms of responding (i.e., eye contact, crying) and develop a more sophisticated social response repertoire. The experimental results indicated that infants responded in much the same direction regardless of developmental or chronological age. In other words, a young (developmentally or chronologically) infant interacts socially in a manner which is just as positive and negative as older infants, however the discrete behaviors utilized in social interactions by younger and older infants changes as a function of developmental maturation. The impetus for the switch from less sophisticated to more sophisticated forms of social responding may be the result of physical or cognitive maturation, or a combination of both of these factors. The exception to this finding occurs in the utilization of relation-maintaining behaviors. For both younger and older infants, less sophisticated forms of RMB were utilized at similar rates. This finding may be due to

the frequent demonstration of eye contact behaviors which appears to be an important component of any social interaction.

Level of maternal sensitivity appeared to be the most critical factor associated with the infant's performance of social behavior in this study. Delayed infants in this sample were not found to have mothers who significantly differed in sensitivity toward his/her needs than mothers of non-delayed infants, nor was developmental or chronological age related to mother's sensitivity level. These findings do not support previous studies that have found mothers of delayed infants to behave in an over-stimulating and controlling manner (Brown and Bakeman, 1978; Hanzlik & Stevenson, 1986; Wasserman et. al., 1985) but indicate mothers of handicapped and non-handicapped children share more similarities than differences. Rosenberg & Robinson (1988) have argued that in some studies that have shown differences in the parenting style of mothers of handicapped and non-handicapped children have been so small as to be of dubious clinical significance. The present study indicates level of maternal sensitivity affects the types of social behavior infants engage in. Infants of more and less sensitive mothers were not found to differ on the average number of RBB's produced per child, however infants of less sensitive mothers demonstrated fewer RMB's on the average

than infants of more sensitive mothers. These results suggest children of highly sensitive mothers may be more expressive than children of less sensitive mothers.

Conclusions

The experimental hypotheses of this study were all at least partially confirmed. The finding that delayed infants produced significantly more relation-breaking behaviors in than non-delayed infants is consistent with other research findings that have reported handicapped infants to exhibit fewer positive social signalling behaviors such as smiling and eye contact (Crnic, et al, 1983; Stepneski, 1978) and may be the source of the perception that the interactions with delayed children are reported by adults to be less satisfying (Crnic, et al., 1983). The greater likelihood of normally-developing infants who did not utilize any form of relation-breaking behavior during a play situation provides additional support to the findings that as a group DD children are less rewarding to their social partners. Chronologically and developmentally younger infants did not produce significantly more positive behaviors than older infants although normally developing infants at older developmental ages produced significantly more sophisticated forms of RBB than did their delayed peers. This outcome may be an indication that ND infants are better able to

communicate a social message to their partners despite the intent of the message being a desire to terminate further contact, and be related to the breadth of social experience non-delayed infants possess.

Mothers of handicapped children are often described as more directive and controlling than mothers of normally-developing children. Such behavior if actual, may result in delayed children not receiving adequate opportunities to develop as many alternative forms of communicative behavior as their non-delayed peers and a tendency to respond in a more stereotypic fashion. The central issue as to whether the mother's behavior is characterized as more "controlling" or "facilitating" is that of sensitivity to the child's needs, cues, moods, and interest level. The present study demonstrated that infants of more sensitive mothers utilized a broader range of social behaviors which served to terminate or facilitate the interactional process. It may be that children of more sensitive mothers are more successful in signalling their desire to continue and end interactions. Infants of more sensitive mothers may be social "risk takers" in that they are more likely to express to their interactional partner their personal need for attention and non-attention. Alternatively, more sensitive mothers may be more skillful at reaching out to their children and eliciting more social interactions from them,

regardless of whether these interactions have positive or negative components. This interpretation has yet to be investigated.

Infants of less sensitive mothers appear to approach their mothers less, an indication of a more "conservative" interactional style. Once engaged in an interaction these infants may be less willing to end it, but also less adept at maintaining positive approaches with their partner. Children of less sensitive mothers may be similar to the less securel attached children identified by Ainsworth's Strange Situation paradigm who appear to have a desire to establish contact with the mother but do not demonstrate the social skills necessary to sustain satisfying interactions. Less sensitive mothers themselves may lack the skills necessary to maintain social contact with their children. These mothers may actually break contact with their infants more often than mothers who are more sensitive to their infants. Since only the infant's social behavior was analyzed in this study, this question can not be addressed here. Further research is indicated to establish whether the interactional differences are due primarily to the mother's interactive style or to the child's.

An important implication arising from this study is in how to improve the efficacy of early intervention programs for delayed and at-risk infants. The importance maternal

sensitivity appears to play on the social responding of infants is an indication to child developmentalists that greater emphasis needs to be placed on techniques which will improve the quality of interactions between parent and child and that less focus should be placed on changing the form of the child's response. Parents who are more sensitive to their child's needs may indirectly expand the opportunities they present to their children to explore the environment. Such expansions may result in broadening the child's ability to respond in socially appropriate ways and ultimately effect positive changes in the child's cognitive abilities.

Parents often learn soon after initiation into an early intervention program that opportunities to interact with the child also present occasions in which incidental teaching may be provided. As the result, parents of handicapped children may learn not to nurture and appreciate the child's attempts to engage the adult, but that he/she must use these opportunities to actively teach some predetermined educational curriculum. Many studies have characterized the interactions of mothers of handicapped children to be more directive and commanding than the interactions of mothers of non-handicapped children (Cunningham, et al., 1981; Stepneski, 1978). Both parents and children may learn to view the interactional process as less satisfying and eventually perceive social relations as punishing. There is

some evidence to suggest that parents of handicapped children do indeed perceive interactions with their children to be less satisfying than do parents of normally-developing children (Crnic, et al., 1983).

Although a high level of parental directiveness may occasionally be a helpful parenting technique, there is evidence that mothers who are both insensitive and directive may lead to detrimental effects as the child's development (Mahoney, Finger & Powell, 1985). When mothers are highly sensitive to the child, directiveness may help guide the child into more cognitively complex activities and enhance development (Crawley & Spiker, 1983). Future research should focus on techniques that not only enhance the interactional progress, but also reduce the tendency for parents of handicapped children to treat all social contact as an occasion for directive teaching.

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APPENDIX A

SENSORIMOTOR ASSESSMENT

Child's Name:_____ Examiner:_____

Birthdate: _____ Date Examination Began:_____

Age in Months: _____ Date Examination Ended:_____

	Items Correct
1. Advanced Visual Pursuit and Object Permanence	
2. Development of Means for Achieving Environmental Events	
3. Development of Causality	
4. Development of Spatial Relationships	
5. Development of Verbal Imitation	
6. Development of Motor Imitation	

	Total
Scheme Assessment	

Scoring: Three passes on each item are necessary to reach achievement criteria.

Definitions:
- (+) - pass regular
- +/a - pass with adaptation(s)
- (-) - fail regular
- -/a - fail with adaptation(s)
- CR - credited from previous assessments
- NA - not assessed due to inappropriateness of item for any given child

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Visual Pursuit and Object Permanence

Trial Number					Notes	Description of Responses
1	2	3	4	5		1. Smoothly and completely tracks movement of an object through a slow horizontal 180° circular trajectory. (Note: whether child merits pass at level of #4.)
						2. Child maintains gaze at point where object he was tracking disappeared. (Note: in administering always move object to same side and have it reappear on each trial.)
						3. Child reaches for and picks up (may or may not touch cover) an object which was partially covered as he observed. (Note: make sure child is interested in the object by putting it before him and noting whether he reaches for it.)
						4. Child follows an object suspended from a string through a complete arc and turns head to opposite side and finds object. (Child may receive credit if this response is only noted to one side, at least twice.)
						5. Single Visible Displacement with One Screen. Removes screen and takes object. Do not credit if child merely removes screen and plays with it.
						6. Child searches with his hand and/or in the direction of the trajectory of a toy which was shown to him and then moved behind him. He should retrieve it on both sides to receive credit.
						7. Single Visible Displacement; Random Alteration between two Screens. Removes correct screen and obtains object.
						8. Sequential Visible Displacement with Two Screens. Searches directly under the last screen.
						9. Invisible Displacement with One Screen. Child searches under screen. (May check adult's hand first.)

1	2	3	4	5		
						10. Invisible Displacement with Two Screens. Searche directly under the correct screen.
						11. Sequential Invisible Displacement with Two Screens. E leaves object under second screen. Child searches under screens, in order first to last or directly under last screen.
						12. Sequential Invisible Displacement with Three Screens. E leaves object under third screen. Child searches under screens, in order first to last or directly under last screen.
						13. Representation of Sequential Invisible Displacements: Child searches systematically from the last screen to the first in reverse order. (Administer this item using the same path as in 12 but leaving the object under the first screen and continuing hand movements if the child searched consistently under the last screen in number 12.)

A. Visible displacement - object is visible in adult's hand as it is placed completely under screen.

B. Sequential visible displacement - object is visible in adult's hand as it is placed under first one screen and then the other(s). The object is left under the last screen.

C. Invisible displacement - object is hidden in adult's hand and then placed under the screen without letting the child see the object again until child uncovers it.

D. Sequential invisible displacement - object is hidden in hand and adult moves hand with object under a first screen & then other(s). Child is not permitted to see the object from the time it is covered in examiner's hand until the child uncovers the object.

Development of Means for Achieving Environmental Events (from Uzgiris & Hunt Series II)

Trial Number					Notes	Description of Response
1	2	3	4	5		1. Observe the child to see whether he exhibits any hand watching behavior, while in a supine position away from attractive visual stimuli.
						2. Child repeats an early motor movement (hitting, shaking, etc.) systematically keeping an object active.
						3. Child demonstrates visually directed grasp. Child receives credit if he moves his hand to and grasps an object held within his visual field.
						4. Child pulls a pillow in order to obtain an object setting upon the pillow. (If child does not respond, examiner may demonstrate, then score as prompted response.)
						5. Child moves to regain an object moved out of his reach.
						6. Object is held about 4 inches above pillow. Child points, reaches for, or requests object. (Score as - if child pulls the pillow.)
						7. Child pulls string across horizontal surface in order to obtain object which is attached to the string, but out of the child's reach. (Score as prompted correct response if child pulls string only after demonstration.)
						8. Child pulls string vertically in order to obtain object attached to the end of the string. (Score as prompted correct response if child pulls string only after demonstration.)
						9. Child uses an object within reach (rake, etc.) in order to obtain an object which is out of his reach. (Score as prompted correct response if child uses the object only after its use is demonstrated.)
					*NOTE: idea of planning ahead.	10. *Present a long narrow container containing a string of beads to the child, then remove the beads and place both objects in front of the child. (Score as a positive response if the child develops a successful means for getting the beads in the container--dangling it, rolling it and stuffing it in--other than piece by piece.)

Development of Causality (from Uzgiris & Hunt Series IV)

In this scale you observe the child's response to a toy which produces a spectacle (visual and/or auditory). The type of response observed is presumed to be indicative of the level of the child's concept of causality.

Trial Number					Notes	Description of Response
1	2	3	4	5		1. Observe for hand watching behavior.
						2. Repetition of motor schemes keeping a visual spectacle active.
						3. Adult performs a spectacle such as swinging a toy, making a toy rock back and forth, etc. Observe whether child repeats a gesture when the spectacle stops, i.e., hitting hand on surface, vocalizing, kicking legs, etc.

The next items involve presenting a mechanical toy (wind up toy) to the child without him seeing the means by which it was activated and observing the child's reaction. His response should be scored at the level where it is best described. Child receives credit for all preceding items. Use several different mechanical or friction toys. Make note of toys used on each trial.

Trial Number					Notes	Description of Response
1	2	3	4	5		4. Child touches the object or adult's hand when adult demonstrates an activity and then stops leaving both object and hand within the child's reach.
						5. Child makes the mechanical toy perform it's activity manually.
						6. Child gives object back to adults and waits.
						7. If child explores for a means to activate the the object but is not successful, demonstrate for him. Note whether he attempts to imitate what adult has done.
						8. Child explores for a way to activate the toy. Allow the child opportunity to demonstrate activation spontaneously before you demonstrate the method. (He does not have to do so successfully.)

Scheme Assessment

Objects Used (Write in toys used)					Notes	
						Incidental Use 1. Holds object over 30 seconds.
						2. Brings object to mouth.
						3. Brings object before eyes or holds object and looks at it.
						Systematic Use of Simple Schemes. 4. Holds object and looks around room.
						5. Hits object with hands.
						6. Hits object on surface.
						7. Hits 2 objects together.
						8. Holds and bangs on other palm.
						9. Alternate transfer.
						Beginning Differentiation of Schemes. 10. Shakes or waves object.
						Investigating Properties. 11. Examines object visually/manually.
						12. Examines object manually or with mouth.
						Differentiated Scheme. 13. Scheme use dependent on properties of object.
						Complex Schemes. 14. Pushes object.
						15. Rolls object.
						16. Pats object gently.
						17. Bring to ear.
						18. Slides object.

Scheme Assessment - Continued

Objects Used					Notes	
						19. Crumples objects.
						20. Stretches object out.
						21. Attempts to tear.
						Letting go actions. 22. Dropping.
						23. Throwing.
						Functional Use. 24. Functional use of single object with demonstrati
						25. Bring two functionally related objects together producing physical contact with demonstration.
						26. Spontaneously demonstrates functional use of single object.
						27. Without demonstration bring two functionally related objects together producing physical contact.
						Shared Interaction. 28. Shows object to adult by showing, sharing or pointing.
						Symbolic Representation. 29. Names object or related word.
						30. Spontaneous representational play with doll.

Spatial Relationships

Number					Notes	Description of Response
1	2	3	4	5		1. Child switches glance from one visual stimulus to another (the two are about 12 inches apart) four to five times in 10 seconds.
						2. Child turns and focuses on an object held outside its visual field when the object rattle, ball, etc.) makes noise. (Make the child's visual field as devoid of stimuli as possible.)
						3. Child looks to other end of an opaque screen when a slowly moving object which he was tracking is passed behind the screen.
						4. Child follows the trajectory of a rapidly moving object and moves to look for it. (Drop the object in such a way that it makes very little noise when dropped.)
						5. Child moves in seat so as to look after an object which was dropped so that it falls out of the child's view. (Note: the object should be dropped so that it makes very little noise.)
						6. Child grasps at object (which has a definite front and back, or top and bottom, i.e., doll, baby bottle) and turns it to the "right side" or examines the object by turning it over several times.
						7-10. The following items may be scored as failure or pass at the following levels. Adult demonstrates placing several small objects into a cup and first removing them singly and then removing them "en masse."
						Level 1. Child takes objects out singly and does not put any in.(1 pt.)
						Level 2. Child places and releases at least two objects singly into the container and takes them out singly. (2 pts.)
						Level 3. Child places and releases at least two objects singly into the container, then removes contents by up-ending the cup. (3 pts.)
						Level 4. Child rotates and reverses cup so as to empty the container "en masse" (whether and how he places objects in cup does not alter score). (4 pts.)

Spatial Relationships - continued:

1	2	3	4	5			
						11-12.	Block building - may be scored as failure or pass at level 1 or level 2; if child passes at level 2 credit with passing two items. Level 1. Following demonstration of tower building (2-3 blocks) child combines blocks together in air or unsuccessfully attempts to stack.
							Level 2. Child builds tower of 2 blocks on two occasions or a tower of 3 blocks on one occasion.
						13.	Child places a toy on an inclined plane and permits it to roll down the incline following demonstration of this behavior.
						14.	Child moves his entire body (creeps or walks) around a barrier and retrieves a visible object. The object should be placed in a location so that the shortened route to retrieving it would be in the opposite direction to the object's trajectory. (Note whether the child moves in the same or opposite direction.)
						15.	Child moves around adult or an inanimate barrier in order to obtain an object removed from his visual field. (Note whether the child follows the object's trajectory or moves in the opposite direction.)
						16.	Child demonstrates awareness of usual whereabouts of familiar persons or objects and notices their current absence.

Development of Imitation

Note: Imitative responses may best be evaluated during administration of other scales. If you do not note the following during other scales try to elicit imitative responses through simple frolic play, and do so in short episodes. If no imitation is noted re-administer the scale on another occasion or by observing the child at play.

I. Verbal

Occurs	Does Not Occur	Reported	Notes	Description of Response
				1. Spontaneous vocalizations without distress (coos)
				2. Shows a positive response to familiar sounds (ones which infant has been heard to emit when in a "happy mood.") Smiles, laughs, etc.
				3. Vocalizes, adult imitates and child repeats the sound.
				4. Makes similar sounds in response to adult's vocalizing of sounds child can already make (coo, etc.)
				5. Vocalizes (babbling) in response to adult's but not same sounds.
				6. Vocalizes similar sounds in response to adults vocalizing of sounds child can already make but these are now more complex sounds.
				7. Vocalizes unfamiliar sounds (brr, bzz, ghrr, ones the child has not made). Child vocalizes similar sounds in response by gradual approximation.
				8. Directly.
				9. Child imitates familiar words (at least three). (May show him the object or a picture).
				10. Imitates new words after gradual approximation.
				11. Imitates new words directly.
				12. Imitates practically all words directly.

II. Motor (gestural)

Occurs	Does Not Occur	Reported	Notes	Description of Response
				1. Child makes some movement in response to adult performance of a familiar scheme but does not imitate the scheme.
				2. Child begins a familiar scheme, adult imitates and child repeats it.
				3. Imitates the familiar scheme demonstrated by adult.
				4-6. Expand a motor scheme that the child has used spontaneously, i.e., hitting two blocks together, shaking a new object, etc. Level 1. Unsuccessful attempt at imitation. (1 pt)
				Level 2. Imitates the action by gradual approximations. (2 points)
				Level 3. Imitates the action directly. (3 points).
				7-8. Demonstrate unfamiliar motor schemes or gestures to the child (verify unfamiliarity by asking parent, etc.), i.e., clapping hands, scratching surface, etc. They should be responses that the infant can see himself perform. Level 1. Imitates several gestures by gradual approximation. (1 point).
				Level 2. Imitates several gestures directly.
				9-10. Demonstrate unfamiliar motor schemes, which the child cannot see himself perform, i.e., opening and closing eyes, patting cheek, etc. Level 1. Imitates gesture by gradual approximation. (1 point).
				Level 2. Imitates gesture directly. (2 points).

APPENDIX B

VT Rating Form: Teaching Skills Inventory

Dyad _____ Primary Rater _____

Date of Tape _____ Reliability Rater _____

Date of Rating _____

Tape Quality	Poor		Average		Excel.
Audio	1	2	3	4	5
Video	1	2	3	4	5

	Primary Rating	Reliability Rating	Diff.
I. Structure			
1. Adult Initiated vs. Child Initiated Activities	____	____	____
II. Tracking			
1. Adult Sensitivity to Child	____	____	____
III. Instructional Skills			
1. Clarity of Activity Objectives	____	____	____
2. Developmental Appropriateness of the Instruction	____	____	____
3. Appropriateness of Verbal Instruction	____	____	____
4. Appropriateness of Nonverbal Instruction	____	____	____
5. Adjustment of Activity Complexity	____	____	____
IV. Feedback			

1. Type: Check one

Mostly Verbal ____

Mostly Nonverbal ____

Both ____

VT Rating Form: Teaching Skills Inventory
Page 2

	Primary Rating	Reliab. Rating	Diff.
2. Frequency of Positive Feedback	____	____	____
3. Frequency of Verbal Corrective Feedback	____	____	____
4. Appropriateness of Feedback	____	____	____
V. Child Responses			
1. Number of Activities	____	____	____
2. Number of Criterion Responses	____	____	____
3. Child Participation in the Interaction	____	____	____

Item 2. Sensitivity to Child. (This parent is appropriately responsive to the child's cues and moods, both positive and negative.)

This item requires a judgment about the adult's sensitivity to the child's interests and moods during each activity. Implicit within this rating is a judgment as to whether the adult is appropriately sensitive. A decision to switch from one activity to another in a teaching situation with an infant, toddler, or preschooler should be based upon the child's expression of interest in the activity at hand. If a child is involved in an activity in a reasonably complex manner it is not appropriate to introduce a different activity or abruptly change the direction of the current activity. This error of switching is most likely to occur when the adult is bored with the child's play, or has a preconceived notion of how the child should play. When the child's play has become excessively repetitive or he demonstrates a loss of interest, then it would be appropriate to change the activity. Inappropriate sensitivity would be typified by persisting with an uninteresting or aversive activity and perhaps even using restraint and physical guidance as a means of eliciting activity-related behavior. Innapropriate sensitivity would also include allowing the child to entirely dominate the interaction in a negative manner by making no new demands upon him because he refuses new materials.

Ratings should be based on the overall estimate of an adult's sensitivity to the child during the interaction. Important questions to consider are: Is the parent aware of the child's response to the activity? If the child appears bored, does the adult move to a new activity, allow the child to select a new activity, or persist with the present activity? All of these questions relate to an adult's ability to recognize when a child is finished with an activity and when the child is attempting to manipulate the adult in a manner that does not promote growth.

Rating Scale

7. The adult is appropriately sensitive almost all the time.

6. The adult is appropriately sensitive most of the time.

5. The adult is appropriately sensitive more than half the time.

4. The adult is appropraitely sensitive half the time.

3. The adult is appropriately sensitive less than half the time.

2. The adult is inappropriate in response most of the time.

1. The adult is inappropriate in response to the child's interests and moods in almost all interactions.