

THE RELATIONSHIP OF SEX AND TEMPERAMENT TO
MUTUAL GAZE BEHAVIOR IN EARLY
PARENT-INFANT INTERACTIONS

By

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This study explored the relationship of sex and temperament to the mutual gaze behavior of parent-infant dyads. It was hypothesized that there are differences in the mutual gaze encounters among father-son, mother-son, father-daughter, and mother-daughter pairs. It was further hypothesized that there is a relationship between the parental perceptions of their infant's activity and mood level and the mutual gaze behavior of parent-infant interactions.

The study sample consisted of 42 professional and white collar couples and their firstborn infants, of which 26 were boys and 15 were girls. Data were collected when the infants were 13 weeks of age. Structured play interactions between the fathers and the infants and between the mothers and the infants were videotaped separately in a laboratory setting. Raters coded brief and prolonged mutual gazes by viewing the videotaped parent-infant interactions. Parental responses to the Perception of Baby Temperament Scale were used as estimates of infant activity and mood temperament levels.

In this study, Hypothesis I and II were analyzed separately. The first hypothesis dealt with the parent and infant sex effect on parent-

infant mutual gaze behavior. The research design for the analysis was a split-plot, repeated measures, two-way factorial. Brief and prolonged gaze were the dependent variables and parent sex and infant sex were the independent variables. A multivariate analysis of variance revealed no significant differences due to sex in the parent-infant mutual gaze behavior. Hypothesis II postulated a relationship between infant temperament and parent-infant mutual gaze behavior. Eight Pearson Product Moment correlations tested the relationship of fathers' and mothers' perception of their infants' activity and mood temperament with brief and prolonged mutual gaze. The correlation coefficients for all these relationships were nonsignificant. Conclusions for this study included: there was limited gaze behavior among the parent-infant sex dyads in the structured laboratory setting of this study, and the mutual gaze behavior that was observed was not systematically related to parent sex, infant sex, or the parents' perception of their infants' temperament.

These findings should be interpreted within the limitations of this research situation. The limitations that were identified were a single abbreviated period of data collection, a homogeneous, volunteer sample, the laboratory setting, and the increased probability of error due to the multiple tests of correlation. It was also possible that maturational level of the infant and reactivity of the laboratory setting may have functioned to decrease mutual gaze behavior between parents and their infants. In addition, a lack of sensitivity in the measurement of the temperament variables may have produced misleading non-significant findings.

Results from this study indicated that parents and their 13 week old infants in a structured situation exchanged very few mutual gazes. Follow-up studies are needed which describe the evolutionary development of the

important parent-infant gaze process. These studies should include multivariate approaches to the study of interactive gaze data in many contexts and with a wide variety of cultures over time. These studies could provide a more rational basis for selection of variables to be examined in the more contrived laboratory investigations of the detailed sequential effects of gaze behavior. Previous reputable studies have also reported no sex differences in gaze frequency. However, a few of the studies have documented that sex differences do appear in the long range effects of gaze behavior. Further study is necessary to document the long range transactional effects of sex and gaze behavior on infant development. Additional systematic study of methods to measure infant temperament is also indicated. Perhaps through more precise estimates of variation in infants' styles of responding, the role of infant in early parent-infant relationships can be better described.

CHAPTER 1
INTRODUCTION

Recent research has shown that infants from birth are actively involved in interactions with their parents or caregivers. In this early period, parents and infants are establishing formative interactive patterns that will have a lasting effect on their attachment to one another and the infant's subsequent development. Yet little research data are available concerning the factors which affect the give-and-take of early interactions, particularly those before the infant is six months of age. This study was designed to examine the relationship of parent-infant mutual (reciprocal) gazing to four variables--parent sex, infant sex, infant activity level, and infant mood quality.

The gaze encounter has been called the first system of communication available to both parents and infants, the basis for human sociability, and the cardinal attachment behavior (Rheingold, 1961; Robson, 1967; & Stern, 1974). Long before human infants can cling to their parents or follow after them, babies elicit their parents' attention by looking at them (Rheingold, 1961). In a recent study, Klaus, Kennell, Plumb, and Zuehlke (1970) documented that mothers immediately after birth express a marked interest in their babies' eyes. Stern (1974) found that 3 to 4 month old infants in a play situation with their mothers initiated and terminated 94% of all the mutual gaze episodes in the mother-infant play interactions. According to Robson (1967) and the studies he cited, mothers report strong positive feelings for their babies and caregiving

becomes less routine and more enjoyable when eye-to-eye contact develops. Numerous studies have confirmed that there is an important relationship between early parent-infant gaze behavior and subsequent parent-infant attachment (Blehar, Lieberman, & Ainsworth, 1977; Brazelton, Koslowski, & Main, 1974) and infant social, affective, and cognitive competency (Beckwith, Cohen, Kopp, Parmalee, & Marcy, 1976; Clarke-Stewart, 1973; Goldberg, 1977; Gordon, 1974; Yarrow, Rubenstein, & Pedersen, 1975). Conversely, a lack of parent-infant gaze behavior has been documented in the following conditions--childhood depression (Spitz, 1965), autism (Hutt & Ounsted, 1966), children who "fail to thrive" (Brazelton, 1974), and neglected and battered children (Gil, 1970).

Very little information is available concerning the specific effects of sex differences of parents and infants in reciprocal gaze interactions. For reasons that are not too clear, the father's role in early infancy has been remarkably neglected in the research study of parent-infant interactions (Kotelchuck, 1974; Lamb, 1974, 1975, 1977). However, there are a few contemporary studies that have examined the looking behavior of infants, fathers, and mothers. Lamb (1977) studied infants 6 through 15 months of age and their parents and found that the infants looked at their fathers more than their mothers, and Parke (1974) reported that mothers and fathers gazed at their newborn boys more than they gazed at their newborn girls. In none of these studies, however, was the reciprocation of the partner's gaze discussed, thus limiting interpretation in terms of the interactive gaze process. There is some evidence that looking behavior varies systematically in the first two years of parent-infant relationship due to both parent and infant sex (Gordon, 1974, 1976; Lewis & Weinraub, 1974). Further study of the sex effect on reciprocal

gaze of parents and infants is indicated and may help clarify the difference between mother and father roles during the early formative period of the infant's development. It may also help to confirm the presence or absence of early sex differences in infants.

Temperament characteristics, such as activity level and usual mood quality, may also affect the infant's looking behavior. It is uncertain how the infant's style of responding (temperament) may, in turn, affect the parent's interactive gaze behavior. For example, Escalona (1968) examined the relationship of infant activity level to a number of variables, one of which was the visual behavior of the infant. She found that inactive infants are more likely to use the visual modality than the active infants are, and that inactive infants recognize their mother at an earlier age. Stern's finding (1974)--that when mothers become aware of their infant's gaze, they respond quickly and in a consistent pattern by gazing back at their infant--suggests that perhaps the inactive babies' increased visual behavior may affect parental visual response. However, additional research of the reciprocal gaze process is necessary to validate this suggested relationship.

The influence of infant mood temperament on parent-infant mutual gazing is more difficult to predict due to the paucity of research findings related to infant mood temperament. Clarke-Stewart (1973) found that infants who are more positive in their responses (which specifically, but not exclusively, included looking behaviors) are more likely to participate in an increased number of social interchanges with their mothers. Brody and Axelrand (1970) documented that babies who are frequently crying, irritable, and uncomfortable are less likely to be available for socialization than babies who tend to be more

pleasurably aroused. Conversely, Robson, Pedersen, and Moss (1969) found that mothers of the more irritable boy babies in their study were more likely to participate in eye-to-eye contact with their sons than the mothers of the self-quieting or less labile girls. These data suggest that the reciprocal gaze process, like all other human interactions, may be affected by many complex interrelated variables. Research efforts designed to study this process must recognize this complexity. To date very few researchers have done so.

Statement of the Problem

Although there are considerable data which support the central role of the interactive gaze in early parent-infant attachment and subsequent infant competency, very little is known about the factors which affect this important formative process. There are data using static gaze criteria (such as parent or infant looks in direction of the other participant in the interaction) which suggest that sex of the parent and the infant and characteristics of the infant, such as activity and mood temperament, are factors which contribute to parent and infant gaze variation. Further research which specifically includes the study of reciprocal gaze effects would help to clarify the role of these factors in the give-and-take of the earliest parent-infant interactions.

Purpose of the Study

The purpose of this study was to examine the relationship of four variables to the mutual gaze behavior of parents and infants. The first two variables of the study were sex of the parent and sex of the infant. The four possible parent-infant dyads--father-son, mother-son, father-daughter, and mother-daughter--were compared to determine if there were differences in the number of brief and prolonged mutual gazes. The

second two variables examined in the study were temperament variables. The parents' perceptions of their infant's activity level and general mood quality were studied to determine their relationship to mutual gaze patterns.

The study examined the following two questions:

1. Are there differences in mutual gaze behavior patterns among father-son, mother-son, father-daughter, and mother-daughter dyads?
2. Are there relationships among the parents' perceptions of infant activity level and quality of mood and the mutual gaze behavior of parent-infant dyads?

Definition of Terms

For the purpose of this study, the terms listed below were defined as follows:

Mutual Gaze: Sustained mutual eye contact between the child and a parent. The episode was defined as brief if eye contact was sustained for at least one second. Episodes which last for more than three seconds were defined as prolonged.

Activity Level: The tempo, intensity, and frequency of the motor component of the child's behavior. Parental responses to the Perception of Baby Temperament Scale for Activity (Pedersen, Anderson, & Cain, 1976) were used to estimate activity level in this study.

Prevailing Quality of Mood: The amount of pleasant, joyful, and friendly behavior as contrasted with unpleasant, crying, and unfriendly behavior of the infant. Parental responses to the Perception of Baby Temperament Scale of Mood (Pedersen, Anderson, & Cain, 1976) were used to estimate mood in this study.

Need for the Study

There is general acknowledgement in education that infancy plays a critical role in human educability; however, few researchers have been able to identify the connecting links that would help to explain this assumption. In the last few years with some consistency, investigators have found a significant relationship between early gaze behavior of parents and infants and the subsequent competence of the infant (Beckwith, et al, 1976; Clarke-Stewart, 1973; Gordon, 1974). As a result, further study of this early influential process is indicated.

Although there is general agreement at the present time that infants actively contribute to early interactions and that the father's role is an important one in the formative period of development, little is actually known about the infant and father's specific contribution to reciprocal relationships. The exploration of these issues through the examination of the manner in which the factors--parent and infant sex and infant temperament--relate to early mutual gaze behavior of parents and infants would help to provide timely and valuable information. It is assumed that this study could provide initial data in these particular areas which would be especially useful to investigators of more comprehensive projects in the future and to educators and counselors involved in programs which involve similar parent-infant groups.

CHAPTER 2

REVIEW OF RELATED RESEARCH

Research has shown that the reciprocal or contingent gaze behavior of parents and infants plays a central role in the development of infant sociability, cognitive competence, and the parent-infant attachment bond. However, little is known about the factors which affect the early interactive gaze process. There is some limited evidence that gender of the parent and the infant, as well as the infant's style of responding in relation to activity and mood temperament, may influence this early formative process. The purpose of this review is to survey the available data concerning these issues. The specific topics included in this discussion are infant gaze capability, the meaning of the infant's visual experiences, parent-infant gaze reciprocity and attachment, the contingent gaze and infant competence development, and parent and infant sex and infant temperament as variables in parent-infant mutual gaze behavior. In the final section of the review, methodological considerations in interactive gaze research are discussed.

Importance of Early Visual Experiences to Infant Development and Parent-Infant Relationships

The visual experiences of infants play a pivotal role in early development. Humans are visually oriented organisms. This is particularly true of the immature infant. Long before the infant can deliberately smile, reach out, grasp, or crawl towards parents or significant others, the baby is capable of using gaze to explore the world or to communicate his or her interest or disinterest (Appleton, Clifton, & Goldberg, 1975).

Infant gaze capability

Research has shown that infants can see at birth. They can distinguish form, contour, brightness, and color (Appleton, et al., 1975; Haith & Campos, 1977). Their ability to focus and to track (follow with their eyes) moving stimuli develops rapidly in the first 3 months of life (Kalninis & Bruner, 1973; White, 1971; White, Castle, & Held, 1964). Babies can reduce their state of arousal by turning away from a stimulus that is too intense or too discrepant (Stern, 1974) and can seek a new stimulus if they become bored (Fantz, 1967). The onset of the infant's gaze can signal a readiness to engage in an interaction, or gaze aversion can "cut off" or terminate a social exchange (Hutt & Ounsted, 1966).

The meaning of the infant's visual experience

There is a subtle trap, according to Nunnally and Lemond (1973), in assuming that the hedonistic motive of adult gazing applies to infant gazing. With adults, one can freely interchange the terms "stimulus selection," "preference," and "pleasantness." These authors reported that studies to date indicate that the "emotionality principle" is operant in children. An infant is more likely to look at stimuli in the following order of preference--highly pleasant, highly unpleasant (noxious, but novel), neutral; whereas, in an adult, the order is more likely--highly pleasant, neutral, highly unpleasant.

In a review of the theories of infant visual perception, Bower (1966) reported that, in general, the nativists believe infants can see what adults see, and the empiricists think infants perceive "buzzing confusion." Fantz (1967) contended that the evidence that from birth infants have visual preferences indicates that infants have the capacity to receive and discriminate patterned stimuli. Both Bower (1974) and Fantz (1967)

seem to agree that infants are probably aware of the same information that adults are, but infants lack the ability to process and utilize all the information that they visualize. With maturation and exposure to diverse stimuli, these theorists believe babies gradually become better able to integrate and discriminate the various patterns in stimuli and to attend to increasing numbers of stimuli simultaneously.

Piaget (1970) postulated that more than a "simple copy of external objects" or a "mere unfolding of structures" (maturation) is involved in infant awareness and understanding of visual experiences. He contended that the "establishment of cognitive . . . relations . . . involves a set of structures progressively constructed by continuous interaction between the subject and his external world" (p. 703). Piaget theorized that at first the infant "looks for the sake of looking" (1952, p. 170). Objects and people are luminous spots. In the first few weeks of life, these images have little meaning other than brief stimuli, for they are not coordinated with sucking, grasping, or anything. Gradually people and objects are "assimilated"; the infant recognizes them and smiles. This, according to Piaget (1967), does not mean the infant conceptualizes objects separate from himself; they are instead tangible apparitions. The visual images become progressively connected with hearing, grasping, and touching. The baby begins to see form, prominence, depth, and distance; he or she begins to see things in perspective and to "look in order to see" (Piaget, 1952, p. 70). At about 3 to 4 months, the child begins to give things "meanings" and to act on things with "procedures to make interesting sights last" (Piaget, 1952, p. 153).

In summary, young infants have competence comparable to their parents in their control of eye behavior (Stern, 1974). Through prolongation of gaze or by looking away, infants can communicate their interest or disinterest. Then too, they are able to elicit the attention of their parents by engaging them in reciprocal gazing. Taking this relatively mature function of the infant into consideration, researchers have found the study of reciprocal gaze interactions a profitable mode in which to study the earliest parent-infant relationships.

Parent-infant gaze reciprocity and attachment

Until the last decade the human infant was considered a passive organism whose development was largely determined by environmental shaping and maturational forces. In 1971 Bell argued that infants should be viewed as active, dynamic contributors to the earliest social encounters. Later studies have documented the powerful effect that infants have in early socialization. One study that demonstrated that the infant's influence begins early--often with the first fleeting gazes exchanged between parents and infants--was Klaus, Kennell, Plumb and Zuehle's (1970) investigation of the mother-infant relationship in the first few minutes of life. They videotaped 12 mothers from different backgrounds during their initial contact with their infants and found that within the first 5 minutes all of the mothers had placed their babies in the "en face" (eye-to-eye) position and had become remarkably interested in the eyes of their infants. An intense interest in waking the infant was verbalized by 73% of the mothers; the researchers quoted one mother as saying "If you open your eyes, I will know you are alive" (p. 190). The investigators concluded that the results of their study revealed strong evidence for species-specific behavior in human mothers

and that early eye-to-eye contact of mothers with their babies may be one of the "innate releasers of maternal caretaking responses" (p. 191).

Researchers who have studied mother-infant bonding (the strong attachment between parents and infants) suggest that there may be a sensitive period in which eye-to-eye contact should occur for the development of optimum attachment of the mother (Bowlby, 1969; Brody & Axelrand, 1970; Klaus & Kennell, 1976). In addition, there are descriptive studies which suggest that there may be an early critical period for father-infant bonding as well (Lamb, 1975; Nash, 1976; Parke, 1974).

Stern (1974) carefully documented the sequential reciprocal effects of gaze behavior between mothers and their 3- to 4-month-old infants during play--

The presence of the infant's gaze, especially in combination with other expressive behavior, intends to elicit unique maternal facial and vocal behaviors and tends to hold the mother's gaze on the infant. The mother then modulates the stimulus configuration of her facial and vocal performance, using as cues the infant's state of arousal and affect and the quality of his visual attention. (p. 207).

Stern (1974) concluded that the import of these early social exchanges is that the infant acquires experience in regulating his or her state of arousal on the basis of another's interpersonal behavior.

Further documentation of the infant's dynamic role in early gaze interactions can be found in Brazelton, Koslowski, and Main's (1974) study of infant attention cycles. These researchers compared one minute observations of babies interacting with their mothers and one minute observations of babies playing with a toy. The 5 babies in this study were followed from 5 to 20 months. There was a marked variation in visual attention of the infants in both degree and duration for the two conditions over this period of time. When viewing the toy, infants

systematically exhibited a build up of intense interest, then abrupt withdrawal with gaze aversion. In the sequences with the mothers, infants had periods of attention and nonattention to which the mothers developed a sensitivity. The mothers seemed to realize that the infant's looking away reflected a need for the baby to maintain control over the amount of stimulation received. As a result, mothers modulated the intensity of the stimulus or allowed the infant time to recover before continuing the activity. Through this process, the researchers posited, the infant learns to master internal or physiological needs and to attend to the external world. The mother becomes sensitive to her infant's capacity to receive and utilize stimuli. Gradually, after establishing "communication," she begins to "teach" the infant to expand this ability and to attend to new stimuli.

In addition, conclusions from this study (Brazelton et al., 1974) help to clarify the probable relationship between early gaze interactions and the subsequent attachment of mothers and infants. The authors stated that in the mother-infant sequences, "no actor's behavior was ever independent of the expectancy of interaction" (p. 69). The cycle being used by each partner was approach, then withdrawal to wait for a response from the other participant. When the ongoing behavior of the interaction was sympathetic to the needs of each member of the dyad, there was a sense of rhythmic interchange in the interaction which was sensed as "positive." If, on the other hand, one of the members was out of phase with the other, there seemed to be a negative quality to the interactions. The researchers concluded--

The smoothness with which these dyads made such adjustments (to each other's needs) reflected the depth of their attachment and probably contributed a further opportunity for learning about each other member. (p. 74)

The relationship between early gaze behavior and attachment was examined in two studies of the first year of life (Blehar, Lieberman, & Ainsworth, 1977; Clarke-Stewart, 1973). In the Blehar et al. study, mother-infant pairs were rated on quality of attachment, and judged to be "securely" or "insecurely" attached. The securely attached mothers were found to be more contingently responsive in pacing their interactions, and they participated in longer face-to-face encounters with their infants. The infants in the securely attached group were judged to be more positive in their expressions. Conversely, in the insecurely attached mother-infant group, encounters were more brief, and mothers in this group were more likely to initiate interactions with silent impassive faces and often failed to respond to their babies' attempts to elicit interactions. Oddly enough, the number of face-to-face encounters did not differ significantly for the two groups. Duration of the episode and positive responsivity of the baby seemed to be the more critical variables in measuring this process. In another study of mother-infant interactions, Clarke-Stewart (1973) found a significant relationship between the child's looks, smiles, and verbalizations and the mother's expression of affection and attachment.

The lack of eye contact in attachment disorders has been well documented. Robson (1967) described mothers who failed to participate in eye contact with their babies during caregiving as "psychologically absent" in their ministrations. Conditions that have been associated with a lack of gaze behavior or with an increased incidence of gaze aversion have included childhood depression (Spitz, 1965), autism (Hutt & Ounsted, 1966) and neglected and battered children (Gil, 1970). The bizarre eye movements of children who "fail to thrive," according to

Barbero (1974), disappear much earlier in the treatment of the children than do the physical and neurological problems. He states that it is only after "normal eye contact" develops that the children begin to recover.

Recent studies with blind babies and their parents have also provided insight concerning the importance of vision in early development (Stern, 1974). Fraiberg (1974) reported that mothers found the early behavior of their sightless infants disconcerting. The infants seemed "depressed," "bland," and "had no expression or affect." In Fraiberg's study, parents were taught to look for expressive hand movements of their infant, rather than facial brightening or joyful smiles, as their baby's recognition of them. If the parents learned this nonvisual and alien vocabulary, according to Fraiberg, they came to know and respond appropriately to their infant and a dialogic interaction began.

In summary, data from studies of attachment and/or parent-infant gaze behavior suggest that there is an important link between the visual interplay of mothers and infants and their subsequent attachment to one another. There is evidence that suggests that mothers' sensitivity and responsiveness to infant elicitations play important roles in the formative months. The findings also suggest that duration of gaze may be a more sensitive predictor of the mutual gaze and attachment relationship than frequency of gaze alone.

The contingent gaze and infant competence development

A varied environment, freedom for exploration, an interested and responsive caregiver, and contingent stimulation all appear to be conducive to the development of infant competence (Appleton, et al., 1975). In the first few months of life, the visual experiences of the infant

play an immensely important role in the infant's exploration of the environment and contingent elicitation of and responsiveness to caregivers. Stern (1976) claimed that visual interactions provide the primary basis for competence development during the early period, for the infant's comprehension of the environment at this time strongly rests on non-verbal cues (see also Appleton, et al., 1975; Stern, 1974).

Goldberg (1977) has recently described a model of infant competency and parent-infant interactions which emphasized the importance of the role of the contingency experience in development. She contended that infants are instrumental in establishing the social conditions which provide for their competence development. Infants are equipped, she stated, with a repertoire of behaviors, such as sucking, rooting, crying, visual regard and fixation, smiling, and vocalizing which effectively capture adult attention and facilitate adult-infant interactions. When adults respond promptly and appropriately to the infant's elicitations, both the infant and the adult experience what Goldberg called the mutual reinforcement of "feelings of efficacy" (p. 163). The infant learns he or she is effective (i.e., can control or influence the environment). This expectation of effectiveness then enhances the infant's exploration and practice of new skills, and thereby facilitates development.

Goldberg argued that, just as Watson found that "people are important to the infant because they play the (contingency) game" (Watson, 1972, p. 340), parents continue to play the game with infants because of the "contingency experience provided by infant attention, smiles, and vocalization" (p. 165). She cited the studies of Lewis and Goldberg (1969) and Ainsworth and Bell (1974) which demonstrated that infants with responsive, attentive mothers were more advanced developmentally than infants whose mothers were

unresponsive. She also cited the study by Ramey, Starr, Pallas, Whitten, and Reed (1975) in which the researchers concluded that the provision of a contingency experience in a program for infants "who failed to thrive" significantly influenced the infants' developmental progress. Goldberg documented developmental outcomes of the contingent gaze behavior of parents and infants in particular. These were an increase in strong affectional ties at 3 months (Robson, 1967) and increased social play and learning (Ambrose, 1963).

Other studies of the first year of life have linked mutual gaze behavior of parents and infants to later infant competence. Beckwith, Cohen, Kopp, Parmalee, and Marcy (1976) studied 51 mothers and their premature infants in caregiving and play situations in their home. The analysis of their data revealed a significant relationship between mother-infant mutual gaze behavior at 3 months and the infants' competency scores on the Gesell Developmental Schedule at 9 months. Clarke-Stewart (1973) analyzed longitudinal data over the first 2 years of infancy to determine "causal directions" of mother-infant interactions and the infant's later performances. She stated that the single most plausible causal hypothesis was that the "amount of maternal attention (looking) influenced the child's later performance on comprehensive tests of intellectual competence and motivation" (p. 86). This does not suggest that it was visual attention alone, she stated, but merely that this behavior plays a prominently causal role in early competence development. In another study, Gordon (1974) reported that, in a sample of 121 low income mothers and their infants, mutual gaze behavior in the early months was significantly related to the boy infants' 12 month competency scores on the Bayley Scales of Infant Development. However, this relationship

was not significant for the girl infants of the study, suggesting the possibility of an infant sex effect in the relationship of contingent gaze and competence development.

The evidence presented in this section of the review reveals that the infant's early visual experiences play a remarkably important role in helping the infant to explore and interact with the world, seek new experiences, and develop skill in interacting with parents. Mothers of infants are, in turn, mutually reinforced as a result of the infants' active participation and responsiveness. Noticeably missing from the literature are data which describe the father's role in these formative interactions. A study of the factors which may influence the gaze process could help to explain the specific early contributions of fathers, mothers, and infants.

Factors that Affect Early Parent-Infant Gaze Interactions

It is probable that mutual gaze, like most other human interactions, may be affected by many different factors that may have a variable effect over time. The infant research literature analyzed for this review provided some evidence that infant maturational effects, parent and infant sex, and infant temperament characteristics play influential roles in the early gaze behavior of parents and infants. There are only limited data, however, concerning the effect of these factors in the give-and-take of actual gaze transactions.

Maturational effects in parent-infant gaze

Findings from the following studies have documented the infant's active involvement in the gaze process at 6 to 15 weeks (Blehar, et al., 1977), 5 to 20 weeks (Brazelton, et al., 1974), 3 to 12 weeks (Moss &

Robson, 1968), and 3 months (Beckwith, et al., 1976; Robson, 1967; Stern, 1974). Escalona (1973) conceptualized mutual gaze as the most primitive of the sustained reciprocal interactions between parent and child. These reciprocal interactions, according to her, are characterized by both partners playing a transmissive, as well as a recipient role. They cannot occur unless each partner does his or her share. She found in her intensive study of 2 children for the first two years of life, that sustained reciprocal events do occur, even in the early weeks of life. Analysis of her data supports Sander's (1976) conclusion that there is a "heightened period of reciprocal exchange" between parents and infants during the 4 to 6 month period.

Sex as a variable in parent-infant
gaze interactions

Recent reviews reflect the general lack of consensus in parent-infant sex difference research (Birns, 1976; Block, 1976; Korner, 1974b; Maccoby & Jacklin, 1974; Yarrow, Rubenstein, & Pedersen, 1975). Perhaps Korner's (1974b) recent statement accurately describes the current status of this issue.

Although we know in general terms that genetic, hormonal, and experiential factors all contribute to the development of behavioral sex differences and the formation of gender identity, we know little about the relative contribution of each to any given sex linked trait. We also have very little knowledge of when behavioral sex differences begin to emerge and under what influences. (p. 197)

One explanation for the lack of infant sex data, according to Korner, is the failure of many infant researchers to analyze their data for sex differences.

Research concerning changes of mother-father behaviors related to the attachment process in the first year of life may shed some light on the dynamics of sex differences in gaze behavior. Lewis and Weinraub

(1974) divided attachment behaviors into two primary categories-- proximal (touching, holding) and distal (looking and vocalizing). They found proximal behaviors were more prevalent in early attachment (especially the first months); then, over the course of the first year, distal behaviors became more prevalent. The changes occur, they reasoned, due to the emergence of competing infant motives, such as exploration and increasing competence in communication and mobility.

Specific findings from their study were that boys received more proximal stimulation from mothers than girls did in the first few months. However, by 6 months, mothers decreased their physical interaction with boys, so that by 1 year, girls received more proximal attention from mothers than boys did. Father-son and father-daughter relationships did not differ remarkably in this study. The father-infant relationships were similar to the mother-son relationships; that is, proximal stimulation at first, then distal prominence in the second half of the first year. These sex variations in parent-child attachment, according to Lewis and Weinraub, are probably related to the cultural expectations of early autonomy in sons, acceptability of dependency in daughters, and decreased proximal behaviors in father-infant relationships.

Some of the research evidence that has been reported concerning infant sex differences in gaze behavior in particular seems to support the Lewis and Weinraub explanation. At birth, girls respond faster to visual stimuli (Korner, 1974a). Boys at 3 weeks and at 3 months have significantly longer fixation time (Moss & Robson, 1969). At around 3 months of age boys are "crankier," according to Moss (1974), and, as a result, mothers use more visual and physical contact in soothing and stimulating them than they do girls. Two recent studies which included

fathers as well as mothers found that, for the most part, infants look at their fathers more than they do their mothers. Lamb (1977) studied 6 month old infants and found that both boys and girls look at their fathers significantly more than they do their mothers. In the Moss (1974) report, 7 month old boys looked at their fathers significantly more than their mothers. The 7 month old girls in this study looked at their mothers more often than they did their fathers but not significantly.

Very few studies are available which compare father-infant and mother-infant looking behavior. In one study of the first 48 hours of life, Parke (1974) found both fathers and mothers looked at their male infants more than their female infants. And in studies which included only mothers and their infants in the first year of life, Yarrow et al. (1975) and Gordon (1974) found variable results. Yarrow et al. (1975) studied 41 black mothers or primary caregivers and their infants and reported that the mothers (caregivers) interacted more frequently with their infant boys at higher intensities with richer, more diverse stimuli than they did their infant girls. In Gordon's (1974) study, the frequency of the mutual gaze interactions of low income mother-son and mother-daughter pairs did not differ significantly. Curiously enough, the early mutual gaze behavior of mother-son dyads correlated positively and significantly with male infant competency scores at one year, where, on the other hand, there was no significant relationship between gaze and competence for the mother-daughter pairs. Gordon suggested that further study of the variables is indicated and that fathers should be included in future studies. He hypothesized that the significant relationship of mutual gaze and infant competency of mother-son dyads could possibly be an important one for father-daughter dyads.

Moss (1974) postulated a complex relationship between infant sex differences, temperamental characteristics, and infant gaze variability. He combined data from a number of mother-infant mutual gaze studies (Moss & Robson, 1968, 1970; Moss, Robson & Pedersen, 1969; Robson, Pedersen & Moss, 1969) and found that social experiences for the infant girls and physiological state conditions for infant boys seem to affect their respective visual behavior.

In summary, sex difference research findings related to early mutual gaze behavior are varied and inconclusive. Tests of visual fixation reveal boys fixate on stimuli for longer periods than girls do. Gaze directional studies indicate that father-infant dyads are more active than mother-infant dyads. For the most part, studies that have analyzed reciprocal gaze behavior have failed to include fathers. Findings presented from mother-infant mutual gaze studies have included the following-- black caregivers are more actively involved with male infants, and in a study of a large sample of low income families, there were no sex dyadic differences in gaze encounters, but the gaze behavior had different developmental outcomes. For the boys, there was a significant relationship between gaze and infant competence; however, this relationship was not significant for the girl infants. The survey of these studies suggests that the sex effect on parent-infant reciprocal interactions may be a complex one and may involve an interaction between infant sex and parent sex.

Infant temperament as a variable in parent-infant interactions

It is certainly conceivable that the infant temperament or behavioral style may affect the tempo, rhythm, valence, and intensity of infant gaze patterns. There is empirical and theoretical evidence that two

temperament characteristics in particular--activity level and mood quality--play important roles in infant gaze behavior. Thomas, Chess, and Birch (1968) have defined these qualities as

Activity level: The motor component present in a given child's functioning and the daily proportion of active and inactive periods.

Quality of mood: The amount of pleasant, joyful, or friendly behavior as contrasted with unpleasant, unfriendly behavior, or crying present in a given child's functioning.

Even though the Thomas et al. studies (1963, 1968) and many later studies (Sameroff, 1975) have concluded that temperament characteristics of the infant have an important transactional effect on parents, very little is understood about how these traits specifically affect parent-infant interactions.

Infant activity level

Infant activity level, according to Murphy and Moriarity (1976), is far more than locomotion. According to them, the proportional energy level of the infant varies as a reflection of the infant's internally generated impulses and also as a result of the infant's tendency to react to external stimuli by using motor activity. Moss and Robson (1970) found that the quiet alert state of infants was correlated with an increase in visual scanning and fixation time. These findings lend further support to Escalona's (1968) earlier conclusion that inactive babies use the visual modality more than active babies do. Data from Stern's (1974) study indicated that gaze-to-gaze intervals--or the frequency of a given infant's gaze behavior--may be a physiologically controlled function of the infant. The finding seems to support indirectly a relationship between activity level of the infant and infant gaze behavior. Stern stated that gaze duration on the other hand, is dependent on infant interest,

and therefore, it is not dependent on biological givens (such as activity level) of the child.

There are some data that suggest a curvilinear relationship between the activity level of the infant and gaze behavior. Both hyperactive and anaclitically depressed children fail to participate in reciprocal gazing (Pretchl, 1963; Spitz, 1965). Withdrawn, apathetic children in institutions often stare at strangers for a prolonged period. However, this looking behavior has been called "vacuous," "empty," "dull." It lacks the reciprocity described in the contingent gaze process (Provence & Lipton, 1962; Spitz, 1965).

In summary, data from normal infant studies indicate that the activity level of infants may determine infant availability for gaze or the frequency of gaze-to-gaze intervals of the infant. The evidence suggests that the infant who is considered inactive (but within a normal range of activity) or in a quiet state participates in increased visual fixation or prolonged gaze behavior. It is uncertain, however, how this effect influences gaze exchange behavior of parents and infants.

Infant mood temperament

The available research data concerning infant mood temperament and parent-infant gaze behavior are both elusive and difficult to interpret. Haviland (1976) cautioned that many investigators in infant research fail to differentiate between the two qualities, visual responsivity and affective responsivity. In a recent publication, she used Piaget's observations of his 2 month old daughter to illustrate the difficulty involved in separating these areas.

For example, Lucienne sees Piaget at the extreme left of her visual field and smiles vaguely; she then looks away but constantly returns to the place in which she sees him and dwells on it. If the infant had merely turned her head with a vacant gaze

and no facial mobility, Piaget probably would have found it difficult to say she recognized him or was "bringing to himself /sic/ the image of her desires" (Piaget, 1972, p. 2). There is something in the smooth turn of the head accompanied by a searching gaze, the stopping of the head, the fastening of the gaze on the "desired" object, and the looking with interest and even pleasure that arouses in the heart of the trained genetic epistemologist a belief that the child has desires and recognizes a particular object (pp. 360-361)

Haviland contended that it is possible to isolate and study infant affect and that this variable has a particularly meaningful place in the interpretation of infant behaviors. In addition, DeCarie (1965), Escalona (1973), Gordon (1974, 1975), Spitz (1965), Stechler and Carpenter (1967), and Yarrow et al. (1975) have strongly advocated the need for the study of infant affect.

Martin (1975), in writing about parent-child relationships in general, stated that once an infant begins to look, smile, coo, or show other signs of delight, the mother's responsive behavior is further reinforced and a strong dyadic system maintained by mutual reinforcement is likely to develop. Recently, Clarke-Stewart (1973) reported that, over the period of the first year of life, the child's expression of positive emotion to the mother was related to the mother's expression of more positive emotion at a later time. Although Brody and Axelrand (1970) did not specifically study infant affectivity and gaze variability, their explanation of the effect of "unpleasure" on infant behavior in general offers some insight in this area. They postulated that infant states that include irritability or discomfort interfere with the infant's awareness of external stimuli. In these states, Brody and Axelrand explained, infants become "preoccupied" with internal (physiological) sensations, and thereby are less likely to attend to stimuli from the environment. Stechler and Carpenter (1967) reported that the baby's expression of positive emotion encouraged or

elicited the approach of caregivers and increased the probability of continuation of a concurrent interactional pattern. Conversely, they stated that the negative affect of infants inhibited the concurrent behavior of the caregiver and caused the caregiver to change his or her behavior.

Spitz (1965) theorized that both pleasure and displeasure are important in infant developmental research. He posited that infant affect markedly influences infant perception; it makes the perceived experience seem important or unimportant; and it endows the infant's perception of the event with a valency that enhances or discourages the repetition of the experience (p. 85). He stated that the affective investment of the infant insures the storing of the experience in the infant's memory. The study of infant affect is particularly important, according to Spitz, for it is during infancy that "affective processes are statu nascendi, observable without contamination" (p. 140).

In summary, the research evidence presented to describe the relationship between infant mood (affect) and parent-infant gaze behavior consists primarily of indirect data. There are data which support the contention that infant affect influences the infant's availability for participation in gaze behavior, the approach of mothers in parent-infant relationships, and the mother's positive response to the infant on subsequent occasions.

Methodological Considerations in the Studies Reviewed

Studies selected for this review were topically representative (not inclusive) of the vast amount of information available in the area of patient-infant gaze behavior. Investigations with obviously poor research designs, inappropriate statistical techniques, invalid and

unreliable conclusions were excluded. It was assumed that most of the sampling procedures for these studies were "convenient" since explanations of sampling techniques were often not given. Few studies described any loss of subjects or control measures for the highly variable infant state (e.g., drowsy, fussy, or crying). All of the studies were concerned with American parents and infants and represented a range of socio-economic groups. Contextual settings for the studies ranged from single observations of highly controlled, standardized laboratory settings to weekly observations of "familiar friends" in naturalistic settings over an extended time. Criteria and techniques for measurement of gaze variables, sex effects, and infant temperament varied remarkably from study to study. Statistical methodology ranged from simple descriptive percentages to complex multivariate methods.

Many of the studies selected for review dealt with the elements of gaze behavior, or its static qualities such as "baby looks in direction of mother." As a result, the findings from these studies have limited value in predicting the effect or relationship of various factors on the mutual exchange involved in gaze interactions. Findings from the studies suggested father-infant combinations look at each other more than mother-infants (Lamb, 1977; Moss, 1974; Parke, 1974). Infants who are inactive or who may be in a quiet alert state are more likely to use the visual modality.

It is important to note that, in the studies that did deal with interactive effects, parent-infant mutual gaze behavior proved to be an effective predictor of more positive response in mothers (Clarke-Stewart, 1973) and in babies (Blehar, Lieberman, & Ainsworth, 1977), secure attachment (Blehar, et al., 1977), increased sensorimotor skills

(Appleton, Clifton, & Goldberg, 1975), and advanced cognitive competence (Beckwith, Kopp, Cohen, Parmalee, & Marcy, 1977; Clarke-Stewart, 1973; Gordon, 1974). Fathers were not included in the mutual gaze studies.

Although findings from a preponderance of the studies were based on behavior from naturalistic home settings, studies such as Brazelton, Koslowski, and Main (1974) and Gordon (1974) were not. The significant contributions of these two studies suggest that, with careful planning, laboratory settings can provide an opportunity for indepth investigations of phenomena that reflect natural behavior. Gewirtz and Boyd (1976) admit that it is important to map mutual behavioral regularities as they occur in the natural environment; however, they say it is possible to experimentally simulate and approximate natural settings by simplifying routinely occurring events in laboratory settings. After careful, extensive reviews of mother-infant observational studies, Cox (1975) and Lytton (1971) also advocated the use of experimentally contrived interactions for indepth study of highly complex interactive data and also for increasing the probability of comparability among subjects. However, both of these theorists suggested replication of such studies in naturalistic settings before findings of the studies were widely disseminated.

Historically there has been an overdependence on intercorrelation techniques in parent-infant research (Bell, 1971). It was not unusual, according to Bell, for investigators in the past to be biased in interpreting these results. It was not uncommon for significant findings of relationships between parent and infant behaviors to be interpreted as "parent caused," rather than to recognize the bi-directional relationship inferred by the correlation. Bell considered the recent recognition of the infant's contribution to early relationships particularly important, for it has provided an impetus for the use of more

sensitive research designs and their appropriate statistical methodology in the study of parent infant relationships.

Statistical methodology utilized by the studies reviewed demonstrated a wide-range in choice of techniques. Klaus, Kennell, Plumb, and Zuehle (1970) expressed the data related to mother eye-to-eye contact in simple percentages. Stern's (1974) study was enhanced by his use of Markovian chain to describe sequential effects of gaze, and Escalona (1973) developed a technique which she called prominence of behaviors at developmental periods which emphasized the likenesses rather than variability of behavior between the two subjects of her study. Moss' (1974) retrospective look at his extensive data on mother-infant mutual gaze demonstrated that there may be complicated interrelations between gaze, sex, and temperament variables. McCall (1970; 1977) has recently advocated the use of multivariate techniques in studying developmental issues. (See also Kagan, 1976; Yarrow, Rubenstein, & Pedersen, 1975.) According to him the more global display offered by these techniques prevents excising variables out of their natural context. In these procedures, the interrelated, often complementary, multiple effects of interactive behavior can be studied simultaneously and thereby provide for better explanations of natural phenomena. Several of the studies included in this summary utilized multivariate statistical techniques: Beckwith et al., 1976; Gordon, 1974; Lamb, 1977; Yarrow et al., 1975. Yarrow et al. (1975) cautioned future researchers to carefully interpret findings from studies whose variable number is greater than subjects studied. He suggests the results of these studies may be misleading and have limited generalizability.

Methodological issues considered as a result of this review of literature suggest further study of the sex and infant temperament effects

on parent-infant mutual gaze behavior is indicated. There are no available studies that have examined the relationship of father-infant and infant temperament to the parent-infant reciprocal gaze process. There were data available that suggested contrived experimental situations provide valid data for indepth study of complicated processes such as mutual gaze interactions. Multivariate research designs were advocated for the study of social phenomena which have multidimensional inter-related effects.

Summary

Critical analysis of the research studies in this review supports the view that early parent-infant reciprocal gaze behavior plays a critical role in the development of infant sociability and cognitive competence and parent-infant attachment. It is uncertain, however, what factors affect the give-and-take of these early interactions. Data from studies that, for the most part, have measured the direction of parent and infant gaze behavior (but not its mutual effects) have provided evidence that parent and infant sex and the infant's activity and mood temperament affect this process. Fathers have not been included in studies that have examined reciprocal effects of the gaze process. Some of the data presented suggested that the relationship of sex and temperament factors and parent-infant gaze behavior may be a complex one and that the study of these factors requires the use of multivariate research designs. In addition, the duration of gaze interactions may be a particularly sensitive measure for the study of parent-infant relationships.

In summary, the major conclusions from this review of parent-infant interactive research literature were:

1. Reciprocal gaze behavior of parents and infants plays a critical role in their early formative relationships. It has been shown to have a significant relationship to infant competence and socialization and parent-infant attachment.
2. There is some evidence that inactive babies use the visual mode of behavior more than active babies, but it is uncertain what this means in terms of the transactional gaze process.
3. Positive affect of the infant functions to make the infant more available for socialization, and it influences mutual reinforcement of parent-infant interactions. Its specific influence on gaze interactions is not known.
4. Very little is known about early father-infant reciprocal interactions. There is some evidence that suggests that father and infants may look at each other more than mother and infants do.
5. There are data which suggest that there may be a complex interrelationship between parent sex, infant sex, and infant temperament.
6. Multivariate studies of the sex and temperament factors and their relationship to the frequency and duration of reciprocal gaze behavior are warranted.

CHAPTER 3
METHODOLOGY

This study explored the relationships between mutual gaze behavior of parent-infant interactions in a structured play situation and the following factors: the sex of the infant, the sex of the parent, and the parents' perception of their infant's activity level and prevailing mood.

The hypotheses tested were:

1. There are differences among father-son, mother-son, father-daughter, and mother-daughter dyads in the frequencies of observed brief and prolonged mutual gaze encounters in a structured play situation.
2. There is a relationship between parental perceptions of the infant's activity and mood and mutual gaze behavior within structured parent-infant interactions.
 - a. The parents' perception of infant activity has a positive relationship with brief gaze and an inverse relationship with prolonged gaze.
 - b. The parents' perception of infant mood has a positive relationship with brief and prolonged gaze.

Data collected as a part of a more comprehensive project, "The Parent-Infant Transactions and Infant Competency Project" (i.e., the PITIC Project), were used in this study. The PITIC Project was sponsored by the National Institute of Mental Health and was based at the Institute for the Development of Human Resources, University of Florida, Gainesville,

Florida. The period of study funded for the project was March, 1976 to August, 1978. This study ("The Relationship of Sex and Temperament to the Mutual Gaze Behavior of Early Parent-Infant Interactions") used the following data from the PITIC Project: videotapes of the parent-infant structured play interactions and parental responses to the Perception of Baby Temperament Scales.

Sample

Families were recruited through public media, local maternity clinics, obstetricians, pediatricians, and prepared childbirth classes. In order to participate, families had to expect to be in the Gainesville area until the baby was one year old; the parents had to be married and had to agree to attend all taping sessions. (For the PITIC Project, there were 7 taping sessions, 1 every 6 weeks while the baby was 13 to 49 weeks of age.) Recruiting efforts were directed at recruiting white, middle class families with firstborn infants. In all 42 families were chosen as volunteers for the project. One family withdrew from the project, leaving a final sample number of 41.

The Hollingshead Two Factor Index of Social Position (Hollingshead & Redlich, 1958) was used to assess the social status of the sample. The advantage in using this scale is that it considers both the occupational and educational background of respondents in the calculation of social position. Using factor analyses techniques, Hollingshead and Redlich (1958) demonstrated a relationship between index class position on this scale and actual social behavior of the respondents in their study. At that time their index position was based on data from fathers only. For this project, both father and mother scores were averaged to produce the family social index. A summary of the results are listed below.

Social Status Classification

	<u>Number of fathers in class index</u>	<u>Number of mothers in class index</u>	<u>Number of families in class index</u>
Class I (major professionals)	11	5	11
Class II (lesser professionals)	12	18	11
Class III (white collar workers)	16	13	19
Class IV (skilled manual laborers)	2	5	1
Class V (unskilled manual laborers)	0	0	0

The majority of families in this sample were rated as major and lesser professionals and white collar workers. In this study use of family rating instead of the father rating produced little change in the final description of the sample.

All of the parents were Caucasian, native-born Americans. The mean age for the fathers was 28.6, standard deviation, 4.04. The mean age for the mothers was 26.4, standard deviation, 2.94.

The babies were firstborn. There were 26 boys and 15 girls. Each baby was determined to be healthy by a pediatrician's examination provided with project funds. One child was diagnosed as having congenital hip dysplasia at a later date but was not excluded from the sample.

There were no known complications during the mothers' pregnancies as reported by the parents. Childbirth classes were attended by 37 of the 41 fathers and mothers. Twenty of the fathers were present in the delivery room during the birth of their baby. One family chose to have their baby delivered at home. None of the families reported attendance at parenting or child development classes since the birth of their baby. The infant feeding methods reported by the parents were 30 of the babies were being breast fed, 4 were being bottle fed, and 7 of the families were using a combination of both bottle and breast feedings. There were serious infections in two of the babies during the newborn period. No

significant periods of separation of any of the family members were reported except for one mother who was hospitalized several times during the first month following the birth of her baby.

Procedure

The initial contact with the parents was usually a phone conversation. A series of questions was asked to screen the families (see Appendix A). If the family was recruited for the project, a home visit was made. At this time, the project staff member outlined the project's purpose and answered the parents' questions (see Appendix B). During this visit, the mother and father signed informed consent forms (see Appendix C). Arrangements were made with the family for a visit to a pediatrician of their own choosing for the baby's examination, and the first observation session was scheduled.

All of the observations were taped in the same studio under uniform conditions. Upon their arrival parents were welcomed and asked to read the directions for the "game" they were to play with their infants during that session. The area used for videotaping was enclosed on all sides with four partitions. The television camera lenses were placed in specially cut portholes in the partitions. During the filming no one but the parent participating in the play activity was visible to the infant. No instructions were given to the parents regarding an optimum position for taping for themselves or the infant. The parent who was not being taped remained outside the partitioned room. A television monitor was nearby on which this parent could watch the encounter.

One of the three cameras was placed in position to afford wide view of the episode at all time. The other two cameras were used for close-up shots and alternative views of the interaction. The three images were

viewed simultaneously on adjacent monitors to determine which images should be recorded. The operator could record one, two, or all three images (simultaneously) if they contributed to the view of the interactions. Project staff members operated the cameras and the "switcher" which determined the camera image or images that were recorded.

Each taping segment included a 3 minute segment with the mother and infant and a 3 minute segment with the father and infant. (For the PITIC Project a third videotaped segment which included both of the parents and the infant together for 3 minutes was also taped. This segment was not used in this study.) In 21 of the taped observations, the mother interacted with the infant first and in 21 the father interacted with the infant first; this order was randomly assigned.

In the early plans for this study, the 13th, 19th and 25th play sessions were chosen as data for this study. However, choice of the "games" used in these sessions resulted in making the data from only the 13th session appropriate for this analysis. The standard game for the 13 week observation was called "Dialogue." In this game, the parents attempted through various means to get the infant to respond to their actions. When the infant responded, the parent was encouraged to respond positively and/or mimic the response. (See Appendix D for parent directions for the game.) In the games chosen for the 19th and 25th week play sessions, the parents' and infants' attention was often focused on toys. Thus, only data from the 13th week play session was used in this study.

Temperament data for this study were based on parental responses to the Perception of Baby Temperament Scales for Activity and Mood. Prior use of this particular scale has been restricted to parents with babies 20 weeks old or older (Pedersen, Anderson, & Cain, 1976). The research

literature supports the notion that temperament qualities are stable traits of the infant (Chess, 1973; Scarr-Salapatek, 1976), but that the behaviors used by the infant to express these characteristics may change with development. Hence, the researcher felt justified in analyzing gaze data from the 13 week session in conjunction with the 19th week temperament estimates.

Instrumentation

This study used two instruments: one for mutual gaze and one for measuring parents' perception of infant temperament. The mutual gaze categories of the study were based on those of Escalona's (1973) Scale of Social Interaction. The Perception of Baby Temperament Scale (Pedersen, Anderson, & Cain, 1976) was used to estimate infant activity and mood.

Mutual gaze data

Criteria for mutual gaze were based on the gaze categories described by Escalona (1973) for the Scale of Social Interaction. She called mutual gaze behavior the most primitive of the sustained reciprocal behavior, which according to her definition were "prolonged social exchanges in which both partners play a transmissive, as well as a recipient role . . . and which cannot take place unless each partner does his or her share" (p. 210). The PITIC Project staff revised the Escalona Scale to make it appropriate for use with videotaped data. For this study, only two categories of mutual gaze were coded, brief and prolonged.

1. Mutual gazing, brief. Mutual gaze was defined as sustained eye contact between the child and parent. It excludes a casual meeting of glances. In infants younger than 5 months, brief mutual gaze was defined as lasting at least one second, and mutual gazing must have been the primary activity on the child's part. Some body movement by the

infant was acceptable if the infant's gaze was riveted to the parent's eyes.

2. Mutual gazing, prolonged. Mutual gaze was defined as sustained eye contact between the infant and parent. Prolonged mutual gaze differed from brief mutual gaze in the duration of the episode in that it lasted for more than three seconds.

Two raters were trained by the PITIC Project staff. Both were University of Florida undergraduate students, one majoring in medical technology and the other in psychology. The raters judged the duration of the mutual gaze episode by verbalizing "one-one thousand," "two-one thousand," etc. Both raters were asked to code all of the play sessions (82 in number-- 41 father-infant, 41 mother-infant), and a mean was calculated using both raters' observations for each play session to produce father-infant and mother-infant mutual gaze observations.

Reliability of mutual gaze data

An intraclass correlation using the Bartko formula (1966; 1976) was used to test interrater agreement reliability for coding mutual gaze behavior. Both raters coded all 82 play sessions (41 father-infant and 41 mother-infant). For brief gaze, the intraclass coefficient was .65, and for prolonged gaze, it was .64.

In a previous project, Gordon (1974) reported reliability measures which were based on 14 of the Escalona items. He reported 0.84 percentage of interrater agreement. Escalona did not report reliability or validity estimates at the time the scale was published nor in subsequent research employing the scale.

Infant temperament data

The second instrument used in the study was the Perception of Baby Temperament Scales (PBT), developed recently by Pedersen, Anderson, and

Cain (1976) to measure the parents' perception of their infants' temperament. It was one of the few scales developed that could be used with equal facility by fathers as well as mothers. Nine temperament qualities were first described by Thomas, Chess, Birch, Hertzog, and Korn in 1963. Only two of these qualities--activity and mood--were selected for this study.

The PBT has six items for each of the temperament characteristics. Two versions of the items for each dimension were used, one for male babies using masculine pronouns and a second for female babies using feminine pronouns. The inclusive list of items that measured the patients' perception of the activity level of a female infant were--

1. During a bath, she kicks, splashes, and wiggles. She is full of activity at these periods.
2. Her play with toys is active; she often kicks her legs and waves her arms.
3. During diapering and dressing, she squirms and kicks much of the time. She is so active that I sometimes have trouble doing these tasks.
4. She usually lies still during diapering and dressing. She rarely squirms and kicks during these activities.
5. She usually lies fairly still during sleep. She awakens in just about the same position as when she fell asleep.
6. When I feed her solid food, she tends to sit quietly, she rarely squirms or kicks. (Pedersen, Anderson, & Cain, 1976, p. 1)

The items that measured the parents' perception of the mood quality of a female infant were--

1. When I bathe her, she usually smiles or laughs. She seems to enjoy bathing times.
2. Sometimes people come over whom the baby has been around fairly often. She generally is friendly and laughs or smiles at them.
3. When she wakes up for a nap, she almost always smiles and seems happy.
4. When she wakes up from a nap, she often is a bit fussy.
5. When I feed her and I need to interrupt the feeding for such things as burping, she seems to fuss for a bit when these interruptions occur.
5. She almost always has a fussy period each day. (Pedersen, Anderson, & Cain, 1976, p. 5)

Each of the items was written on a separate card. To reduce social desirability bias, the behaviors described were likely to be considered "normal" by the parents. Half of the items in each scale were stated in a positive direction (i.e., the respondent must agree to score highly) and half in a negative direction (i.e., the respondent must disagree to score highly).

One item of the activity scale, item number 6, was deleted for this study. Very few of the babies were being fed solid food at 19 weeks of age. So this item was considered inappropriate for use in this investigation.

The PBT was administered in a format similar to a Q-sort. Each parent was tested separately. They were asked to sort the items into the response categories which represented the degree to which the statements described their infants. The response categories were--

Very much like my baby
 Sometimes or occasionally like my baby
 Not like my baby at all
 Have no experience with this

Numerical values of scoring these categories ranged from 0 to 3. For items that were stated in a positive direction, the following were correspondent values: "very much like my baby"--3 points; "somewhat like my baby"--2 points; and "not like my baby at all"--1 point. For the items that were stated in a negative direction, the following were correspondent values: "very much like my baby"--1 point; "somewhat like my baby"--2 points; "not like my baby at all"--3 points. (See Appendix E for additional information concerning scoring of this instrument.)

Data from mothers and fathers who used the category "have no experience with this" were deleted from this part of the study. The parent's zero rating would have been misleading, for it would have implied a zero level of the trait, rather than the lack of the parent's experience. A mean was

calculated for each parent for activity (5 items) and mood temperament (6 items). When the ratings of fathers and mothers who used the category "have no experience with this" were deleted, the remaining sample number for temperament data was 34 fathers and 38 mothers.

Reliability of the temperament data

Several measures were used to assess the reliability of the activity and mood temperament data. They were internal consistency of the items, correlation of each parent's responses for the 19th session and for the 25th session, and correlation of agreement between father and mother responses. The Cronbach alpha coefficient (Cronbach, 1970) was used to estimate how well the scores obtained at the 19th week session represented the universe scores for the temperament quality. The fathers' alpha coefficient for activity was 0.39 and for mood was 0.49. The mothers' alpha coefficient for activity was 0.25 and for mood was 0.36. When the fathers' scores at 19 weeks were compared with fathers' scores at 25 weeks, the resulting Pearson product moment correlation coefficient for activity was 0.41 for activity and 0.40 for mood. For the mothers' scores at 19th and 25th week sessions, the correlation coefficients were 0.53 for activity and 0.55 for mood. Fathers' and mothers' 19th week scores were compared using Pearson product moment correlations. For activity the coefficient was 0.49, and for mood it was 0.34. These data suggest a moderate degree of homogeneity among these psychological trait items, a lack of stability in parental responses over a 6 week period, and a lack of agreement between independent observers' responses.

Pedersen, et al. (1976) used split-half reliability estimates and father-mother agreement to analyze the reliability of the PBT. Their use of the split-half technique in measuring this scale is inappropriate.

Equivalent halves of each temperament trait scale would be improbable due to the limited number of behavior items and their limited range of variability. These authors also report correlation of agreement between fathers' and mothers' scores; they were 0.43 for activity and 0.57 for mood. There was no description of the distribution of the scores reported in their study of the scale.

Design

In the initial research design for this study, the plan was to use a multivariate model which would have permitted the simultaneous consideration of the gaze, sex, and temperament variables. A review of literature related to these variables indicated that they may be a multi-level and interrelated effect among these variables. At the beginning of the PITIC Project, the estimated sample number was 80 families; however, only 42 families were recruited. As a result and in order to assure adequate statistical power, the hypotheses of this study were tested separately. The hypotheses were--

Hypothesis I--there are no differences among parent-infant sex dyads in a structured play situation in brief and prolonged mutual gaze behavior.

Hypothesis II--there is no relationship between parental perceptions of infant activity and mood temperament and the mutual gaze behavior of parents and infants in a structured situation.

Hypothesis I

Hypothesis I postulated no differences among the four parent-infant sex dyads in brief and prolonged mutual gaze behavior. This required a repeated measures design for the father-child and mother-child play interactions, and it required a design which would allow simultaneous consideration of both the gaze and sex variables. The research design

chosen was a split-plot, two-way factorial, and the statistical procedure selected was a multivariate analysis of variance (MANOVA). The split-plot design is an appropriate one for the study of variables which may involve increased levels of variability within individuals and in which there are repeated measures for each subject (Kirk, 1968). A two-way factorial was indicated for there were two levels of parent and infant sex and a possible interaction between parent and infant sex. This hypothesis asked the question, are there differences among the group mean vectors. When this research questions exists, McCall (1970) stated that the MANOVA procedure was the appropriate statistical analysis.

The MANOVA technique was selected for several specific reasons. First, with two dependent variables (brief and prolonged gaze), MANOVA provided a single test of each contrast, rather than repeated univariate tests. Also, MANOVA examines the differences while considering the interrelationship among dependent variables (Kerlinger & Pedhazur, 1973). The classical regression method for MANOVA (Woodward & Overall, 1975) was used to adjust each effect for all other model effects. Olsen (1976) has advocated the use of Pillai's Trace as the multivariate statistic of choice when there is diffuse variability on many variables. thus making it an appropriate choice for this analysis. Embedded in the MANOVA are the univariate analysis of the dependent variable (Hummel & Sligo, 1971). If the multivariate tests of this analysis were significant, tests of the univariate or single variable measures would be indicated. Non-significant multivariate tests would

indicate a lack of systematic co-variation of the main effects of this model. No univariate tests would be indicated due to the inability to control for error in the univariate tests. The Statistical Analysis System's (Barr, Goodnight, Sall, & Helwig, 1976) general linear model (MANOVA) computer program was used for the calculation of this data. Computer facilities of the Northeast Regional Data Center on the University of Florida campus were utilized for this study.

Hypothesis II

Hypothesis II investigated the relationship between mutual gaze and the parents' perception of the infant's activity level and mood quality. Since a bivariate correlation coefficient summarizes the relationship between two variables by indicating the degree to which variation in one variable is related to variation in another, correlation coefficient was selected as the statistical technique to test Hypothesis II. The Pearson product-moment correlation was selected as the appropriate statistic as it measures the strength of the linear relationship between two interval level variables. Scatter plots of the raw data for activity and brief and prolonged gaze were examined for possible curvilinear relationships.

Eight Pearson correlations were considered. The fathers' perception of infant activity level, the mothers' perception of infant activity level, the fathers' perception of prevailing infant mood, and the mothers' perception of prevailing infant mood each were correlated with the number of brief mutual gazes and prolonged mutual gazes. Significance tests derived from the uses of the Student's *t* with *N*-2 degrees of freedom were calculated for each coefficient.

CHAPTER 4

ANALYSIS AND INTERPRETATION OF DATA

This study explored the relationship of sex and temperament to mutual gaze behavior in parent-infant interactions. The study sample consisted of professional and white collar families with firstborn infants. There were 26 boy and 15 girl infants. The data were collected when the infant was 13 weeks of age. Structured play interactions between father-infant and mother-infant pairs in a laboratory setting were video-taped separately. Raters were asked to code brief and prolonged mutual gaze behavior. Infant activity and mood temperament data were based on each parent's responses to the Perception of Baby Temperament Scale. There were two hypotheses to be tested. One hypothesis examined the effect of parent and infant sex on brief and prolonged parent-infant mutual gaze, and the second hypothesis examined the relationship of the parents' perception of infant activity and mood temperament with brief and prolonged mutual gaze.

The first hypothesis stated that there would be no differences among the parent-infant sex dyads' (father-son, mother-son, father-daughter, and mother-daughter) brief and prolonged mutual gaze behavior. The research design for this hypothesis consisted of a split-plot, repeated measures, two-way factorial model. Dependent measures were brief and prolonged gaze and the independent variables were parent sex and infant sex. Infant sex was nested under a variable named family number. The statistical procedure selected to test this hypothesis was multivariate analysis of variance (MANOVA).

For the second hypothesis a relationship was postulated between parent-infant gaze behavior and infant temperament. The specific relationships that were predicted were

- a. The parents' perception of infant activity has a positive relationship with brief gaze and an inverse relationship with prolonged gaze.
- b. The parents' perception of infant mood has a positive relationship with brief and prolonged gaze.

Each of these 8 relationships (father-activity, mother-activity, father-mood, and mother-mood with brief and prolonged gaze) were tested statistically with Pearson product moment correlations.

Analysis of the Data

Gross inspection of the data revealed that in many of the individual parent-infant pairs, there were no mutual gaze observations. Frequency tables were constructed and revealed that in 52% of the parent-infant pairs there were no brief gazes. In 21% of the families there were no prolonged gazes.

Analysis of the means and standard deviations also indicated a lack of mutual gaze observations. There was evidence of a skewed distribution; in 5 of the 8 parent-infant sex dyads (4 for brief gaze and 4 for prolonged gaze) the standard deviation exceeded the value of the mean. As a result, the raw data were transformed by taking the square root of each observation, and a scalar of one was added to each observation to prevent the occurrence of singular matrices in the multivariate analysis of variance due to the abundance of zero observations. In Table 1, the transformed means and standard deviations for the sex effect on mutual gaze are reported.

Table 1
 Parent-Infant Sex Dyadic Gaze Behavior: Mean Transformation*
 Standard Deviations, and Within Group Variance
 Covariance Matrix

	<u>Child Sex</u>			
	<u>Sons</u>		<u>Daughters</u>	
	<u>means</u>	<u>sd</u>	<u>means</u>	<u>sd</u>
<u>Father</u>				
Brief	1.25	0.29	1.29	0.33
Prolonged	1.49	0.35	1.32	0.34
<u>Mother</u>				
Brief	1.24	0.32	1.26	0.33
Prolonged	1.52	0.34	1.43	0.31

*Transformation = square root of rater mean gaze observation plus one

Within Groups Variance Covariance Matrix

DF = 38	<u>BMG</u>	<u>PMG</u>
Brief mutual gaze (BMG)	2.654	-0.125
Prolonged mutual gaze (PMG)	-0.125	3.094

The means for all the parent-infant sex dyads are remarkably similar. Mean range was 1.24 to 1.52. The smallest mean (1.24) was for mother-son brief gaze, and the largest mean (1.52) was for mother-son prolonged gaze. In all parent-infant sex dyads, prolonged gaze means exceeded those of brief gaze.

The MANOVA for Hypothesis I revealed a within group variance covariance matrix which indicated 2.654 sum of the cross-products for the sex variables, -0.125 for the gaze variables, and the total sum of the cross-products for all variables in the model was 3.094. The most noticeable finding of the tests for the parent sex and infant sex effect on brief and prolonged gaze and the interaction parent sex x infant sex were the remarkably small multivariate test values for these effects. For the parent sex effect on the gaze variables, Pillai's Trace was .1009 ($F(2,38) = 2.3, p > .05$). For infant sex effect on the gaze variables, Pillai's Trace was 0.175 ($F(2,38) = 0.16, p > .05$). The parent sex and infant sex interaction effect results was a Pillai's Trace of .008 ($F(2,38) = 0.34, p > .05$). The hypothesis of early parent-infant interactions was not rejected at the .05 level of significance. In other words, tests of this hypothesis revealed that, in a structured play situation, the parent-infant dyads (father-son, mother-son, father-daughter, and mother-daughter) of this sample did not differ significantly in the frequency of their brief and prolonged mutual gaze behavior. Further tests of the univariate hypotheses were not warranted, given the non-significant multivariate findings.

Hypothesis II

Hypothesis II postulated a relationship between the parents' perception of infant temperament and parent-infant gaze behavior. Pearson product moment correlations were used to test the relationship of father-activity, mother-activity, father-mood, and mother-mood with brief and

prolonged mutual gaze. Positive relationships were predicted for the correlations between brief and prolonged gaze and activity and between brief and prolonged gaze and mood temperament. An inverse relationship was predicted for activity and prolonged gaze.

Analysis for the data for Hypothesis II revealed that the means for the parents' temperament ratings were remarkably similar for all fathers and mothers on both activity and temperament scales. Standard deviations suggested little variability for the parents' ratings. In Table 2 these data are summarized; the eight correlation coefficients can also be found on Table 2. Scatter plots of the gaze and activity data were constructed; no curvilinearity was indicated. The Pearson Product Moment Correlations coefficients were small; none was significant at the .05 level of significance. Hypothesis II was rejected. In this study parent-infant mutual gaze behavior did not related significantly to the infant temperament measures.

Interpretation of the Data

An extensive review of the literature for this study provided substantial support for the selection of the attributes sex and infant temperament as viable influences on gaze variation in early parent-infant reciprocal relationships. However, results from this present study suggest that these two factors have no statistically significant relationship to mutual gaze behavior of parents and infants. Careful interpretation of the findings from the literature and from this study is necessary to provide some explanation for these unexpected outcomes.

Table 2
 The Relationship of Gaze Temperament: Means, Standard
 Deviations, Correlation Coefficients

	<u>n</u>	<u>Temperament estimates</u>		<u>Correlation Coefficients for temperament and gaze</u>	
		<u>mean</u>	<u>sd</u>	<u>with brief gaze</u>	<u>with prolonged gaze</u>
Father-activity	34	2.5	0.39	0.21	0.01
Mother-activity	38	2.4	0.50	-0.15	0.18
Father-mood	34	2.4	0.31	0.15	0.20
Mother-mood	38	2.5	0.44	0.14	-0.15

Sample characteristics

It was decided arbitrarily at the beginning of this study to limit the sample to white middle class participants. As a result, recruitment measures and careful screening produced a relatively homogeneous sample. In addition, this sample of parents showed evidence of having more common experiences related to early child care than those of the general population. A convincing majority, 74 out of the 82 mothers and fathers, attended prepared childbirth classes; half of the fathers in the sample were present at the birth of their child, and 30 out of 41 babies were breast fed. Unusual commitment of these parents to parenting is further evidenced by their willingness to participate in the 12 month long PITIC Project which involved 7 taping sessions. This suggests that control of the sampling procedures for this project could have functioned to limit variability in gaze behavior.

The age of the infant may have remarkably influenced the gaze behavior of parents and infants of this sample. Rapid change of states (crying, alert, sleepy) is not unusual for infants at 13 weeks. There was no control for infant state in this study. Taping of the episode began at the ascribed time regardless of infant state. Brazelton, Koslowski, and Main (1974) used only behavior that evidenced that the interaction "was going well" in their study. Mothers in Stern's (1974) study felt "programmed to maintain the positive arousal of their infant." Both of these studies used several periods of observation for data collection. The single short period for this study may have resulted in distorted findings as a result of infant age and state.

Project Instrumentation

Mutual gaze behavior proved to be a difficult variable to assess by viewing "canned" videotaped recordings. The project's "switcher" operator may not have always chosen the image that portrayed the best perspective for judging the eye-to-eye contact of the parent and the infant. Also the research conditions of this study allowed the parents to move about and assume whatever positions they chose in playing with their infant; this often limited camera perspectives. Because of these conditions, the coded gaze observations may not reflect the true number of gazes exchanged.

Previous studies have anticipated these difficulties. Brazelton et al. (1974) used videotaped observations, but they placed two mirrors in strategic positions (out of camera range) so that all of the interactive effects would be simultaneously recorded on one camera image. Stern (1974) also used one camera, but he placed two observers, one behind the mother and one behind the infant to record the mutual gaze sequences. In retrospect, it seems that reciprocal gaze behavior studies require specially engineered situations in order to record this complex data accurately for detailed analysis.

The reactive effects of the laboratory setting with the videotape equipment may have influenced parent-infant gaze behavior. This may have been particularly true of the 13th week session which was the family's first visit to the studio. There was general agreement among the PITIC Project staff, however, that if anything, the game "Dialogue" (13th week game) optimized the probability of increased parent-infant interaction. Behavior on the tapes suggests that the game was more familiar to some parents and infants than others and might have, as a result, provided additional source of unexplained variance.

Results from this study suggest that the PBT scale may not be a sensitive indicator of the temperament attributes. The remarkable similarity in parent mean ratings could suggest that some scale items may reflect more socially desirable behavior than others, thus interfering with the assessment of the parents' accurate description of their baby's temperament.

A prevalent problem in parent-infant interactive research studies is how to provide for the study of the multidimensional variables of parent-infant interactive data within the limitations imposed by the small and limited sample populations often characteristic of infant research. Because of the limited sample size (42 families), the theoretical construct implied in the summary of the review of the literature--that there was a complex interrelationship of sex, infant temperament, and parent-infant mutual gaze--was not tested. The sample number was adequate, however, for the MANOVA of no relationship due to a sex effect on mutual gaze, and the statistical results of this test should be considered conclusive of the sex effect. However, the multiple correlation procedures used to statistically test the gaze and temperament relationships should be viewed with caution. Due to the lack of ability to estimate error, some of these findings could be due to chance.

Summary

In a laboratory setting, in which American professional and white collar parents were asked to play a 3-minute standardized game with their firstborn infants, there were no significant differences in the brief and prolonged mutual gaze behavior of the parent-infant sex dyads--father-son, mother-son, father-daughter, and mother-daughter. The homogeneity of the volunteer sample, the age of the infant, and reactivity of the laboratory

setting were considered to be factors which may have influenced the mutual gaze observations used to assess this hypothesis. The small Pearson correlation coefficients resulting from multiple tests of the relationship of the parents' perception of the infant's temperament and parent-infant gaze variability suggest that there was little practical significance in the relationship of temperament and gaze measures as it was assessed in this study. The Perception of Baby Temperament Scale may lack sensitivity as a measure of infant activity and mood levels; and may have, thereby, prevented valid tests of the relationship of temperament and gaze variables.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

Purpose of the Study

This study explored the relationship of sex and temperament to the mutual gaze behavior of parent-infant dyads. It was hypothesized that there are differences in the mutual gaze encounters among father-son, mother-son, father-daughter, and mother-daughter pairs. It was further hypothesized that there is a relationship between the parental perceptions of their infant's activity and mood level and the mutual gaze behavior of parent-infant interactions.

Need for the Study

Early mutual gaze behavior between parents and infants plays a key role in the initial formative parent-infant relationships. It has been shown that the mutual gaze of mothers and infants is significantly related to infant cognitive and social competence. Yet, surprisingly enough there have been very few studies of early parent-infant reciprocal gaze interactions, particularly those of the father and the infant. This investigation was designed to produce initial data concerning the relationship of sex and temperament to mutual gaze behavior of parents and infants. Data from this study could provide information for future researchers involved in more complex studies and for educators and counselors involved in programs with similar parent-infant groups.

Procedure

This study was designed to study the relationship of four factors--parent sex, infant sex, infant activity, infant mood--to the brief and prolonged gaze of parents and infants. Structured 3-minute play interactions between the father and the infant and the mother and the infant were videotaped separately in a laboratory setting when the infant was 13 weeks of age.

The participants

There were 42 parents and their firstborn infants who volunteered and were selected to be included in this study. There were 26 infant boys and 15 infant girls. All of the participants were white, native born Americans; the social status approximation for the families ranged from higher professional to white collar workers.

Mean age of the fathers was 28.6 and for the mothers 26.4. There were no known complications during pregnancy or childbirth, and all of the babies were healthy.

Data collection

Two raters coded the total 82 videotaped play interactions for mutual gaze behavior using the following criteria. Both the parent and the infant had to have their eyes fixated on each other. Gazes which lasted for more than 1 second were called brief, and gazes which lasted for more than 3 seconds were called prolonged. Final gaze observations represented the mean score for both raters.

Infant activity and mood temperament levels were based on their father and mothers' separate responses to the Perception of Baby Temperament Scales. At the 19th week session, parents were asked to respond to this scale's Q-sort questionnaire. There were 5 items for activity and

6 items for mood. Final score for each category was based on each parent's mean rating.

Analysis and interpretation of the data

Two hypotheses were formulated for this study:

Hypothesis I--there are differences among father-son, mother-son, father-daughter, and mother-daughter dyads in the frequencies of observed brief and prolonged mutual gaze encounters in a structured play situation.

Hypothesis II--there is a relationship between parental perceptions of the infant's activity and mood and mutual gaze behavior within structured parent-infant interactions.

a. The parents' perception of infant activity has a positive relationship with brief gaze and inverse relationship to prolonged gaze.

b. The parents' perception of infant mood has a positive relationship with brief and prolonged gaze.

A split-plot, two-way factorial, repeated measures research design was used to analyze Hypothesis I data. The multivariate analysis of variance was the statistical procedure chosen to test this hypothesis. Pillai's Trace, a robust multivariate statistic, tested the effects of parent sex and their interaction in the brief and prolonged mutual gaze behavior of parents and infants. The hypothesis of no significant differences due to the effect of parent and infant sex was not rejected at the 0.05 level. No univariate test effects were analyzed due to the non-significant multivariate findings.

Eight Pearson product moment correlations were used to test Hypothesis II. Correlations were calculated for brief and prolonged mutual gaze behavior and the following--father-activity, mother-activity, father-mood, and mother-mood temperament mean scores. None of the

predicted relationships between temperament and gaze was statistically significant at the .05 level.

A number of factors were discussed as possible reasons for the lack of statistical evidence of a relationship between the sex and temperament attributes and mutual gaze behavior as they were assessed in this study. Similarity in the background of sample families, age of the infant, and the reactivity of the laboratory setting were considered as possible influences on the variability mutual gaze behavior of the participants. Parental perceptions of activity and mood temperament as it was measured in this study may not have related in a systematic fashion to the actual infant activity and mood traits.

Conclusions

Present day theorists (Kagan, 1976; McCall, 1977; Scarr-Salapatek, 1976) have advocated an increased emphasis in the study of what has been called the canalizations of development--developmental milestones that have a pervasive influence over the entire human lifespan. Rheingold (1961) called the visual function of an infant a powerful, influential evolutionary behavior. Further support for this view can be found in Piaget's (1952) extensive descriptions of the visual system's major role in coordinating early organismic developmental phenomena and the infant's response to the world. An extensive review of current research literature emphasized the critical role that interactive gaze plays in the development of the parent-infant attachment process. It also emphasized the need for further study of this important process.

The present study was designed to investigate the relationship of sex and infant temperament to the early mutual gaze behavior of parents and infants. Results of this study revealed that, within limitations

imposed by this investigation, there were no significant differences in parent-infant mutual gaze behavior due to sex or temperament factors. In light of these findings, a retrospective critical review of research literature was done and the following implications for research were formulated.

Implications

1. There are a lack of substantial data which describe the evolutionary development of the influential parent-infant mutual gaze process. McCall (1977) has recently pointed out the need for investigations that emphasize studies of what children do, rather than what they can do. There is probably no question in the minds of those who have studied parent-infant gaze behavior that infants at very young ages can participate in interactive gaze behavior, but ultimately, if the necessary and sufficient causes of this area of development are to be understood, the examination of what parents and infants actually do in terms of mutual gaze behavior must be systematically studied. Studies in naturalistic settings which examine the evolution of the mutual gaze process in children and their parents from varied backgrounds in many contexts over time are needed.

2. Sample numbers in these studies should be ample to provide for use of multivariate statistical procedures. Through the use of multivariate techniques in analyzing naturalistic data, the nature and magnitude of multidimensional factors of gaze variation can be described as they appear in complex, real situations. Extensive descriptive studies could provide for more rational selection of variables to be studied in laboratory settings and, thus, provide for increased effectiveness in the generalization of findings from laboratory studies. It is rare in infant research studies to find an investigator that does not point out the need

for larger samples. Yet sample numbers continue to be too small to examine the complex multivariate questions that are being asked. Rheingold (1967) attributes this to the lack of public awareness. She suggested that better dissemination of the results of studies to lay parent groups would be helpful in stimulating their interest and concern and would serve to create more potential research subjects.

3. The finding of this study of no difference due to sex in parent-infant mutual gaze behavior is an interesting one. Generalization of this finding must be restricted to homogeneous middle class samples in laboratory settings. Further study of the relationship between sex and gaze in naturalistic settings with large and varied sample populations is indicated. Other studies from the literature have reported no infant sex difference in mutual gaze of mothers and infants, but have found sex differences in developmental outcomes of the transactional effects of gaze across time. Future studies should assess the long range transactional developmental effects of parent and infant sex and mutual gaze behavior.

4. There are some data that suggest that the study of the sequential effects of the gaze process (the flow of the interaction and participants' specific contributions) may help to better identify the sex differences in reciprocal gaze behavior. Further study in this area is advocated. Care in the design of the research procedure should be exercised so that the critical behaviors are recorded without distortion. Research instrumentation that utilizes mechanical recording, such as videotape equipment, should include additional observers, use of mirrors, or stabilization of the positions of the participants in the interaction to accurately record the details of the interactions.

5. Further study of infant temperament could provide a profitable mode for defining the specific contributions of the infant to early interactions. Studies which validate measures of infant temperament would provide timely contributions. Subsequent studies could then describe the relationship between parental perceptions of the infant and infant characteristics. With these data, the effect of parental perceptions (expectations) on subsequent infant development and parent-infant relationships could be examined.

In summary, visual interactions are important components of all social exchanges. In large measure they may provide a means for communicating with young infants and for evaluating the effects of a variety of factors in infant development and parent-infant relationships. Further extensive study of this important and pervasive canal of development is strongly advocated.

APPENDIX A

Questionnaire for Parents

Name: _____ Address: _____
Spouse: _____ Phone #: _____

How did you hear about the project?

Doctor _____ Friend _____
Radio Ad _____ Poster _____
TV Ad _____ Other _____
Newspaper _____

What do you know about the project? (Make sure the following are covered.)

- _____ Studying mother/father/child transactions (interested in way parents and their children interact).
- _____ Must be married.
- _____ In Gainesville area for one year.
- _____ Mother/father/child must come to studio in Health Center once every 6 weeks beginning at 13 weeks for one half hour.
- _____ Only parents of normal firstborn children are eligible.
- _____ Child will receive free check-up at 3 months (we will pay pediatrician's bill).
- _____ At one year detailed observation of baby's mental and motor behavior.

How long to remain in area? _____ Race: _____

Occupation: _____ Spouse Occupation: _____

Education: _____ Spouse Education: _____

Any previous children: _____

Child: If born: Name: _____

Date of birth: _____ Where: _____

Sex: _____

If not: Expected date: _____

Will you sign statement: _____

Because of research design, not everyone who wants to will be able to participate. We will call back in a few days to tell you if you are eligible. If so, we will come to visit you when the baby is about 10 weeks old to gather some additional information.

APPENDIX B

Parent-Infant Transaction Project - Home Interview

FATHER'S NAME _____ MOTHER'S NAME _____

BABY'S NAME _____ WEIGHT AT BIRTH _____ LENGTH _____

BABY'S SEX _____ PLACE OF BIRTH _____

1. Were there any complications during pregnancy? _____

2. Was this a planned pregnancy? _____
3. Were any medications used during delivery? _____
4. If so, what kind of medication was used? _____

5. How much? _____
6. What kind of delivery was it? _____

7. Was the father present during delivery? _____
8. How are they feeding the baby? _____
9. Has the baby had any illnesses since birth? _____
10. What was it? _____

11. Was the mother working or going to school prior to the
delivery or pregnancy? _____
12. Is the mother going back to work or school in the
immediate future? _____
13. If so, when is she going back to work or school? _____

14. If she is going back to work or school, what are the plans for the care of the infant? _____

15. Does the father share in the chores related to the infant's care? _____
- | | <u>FATHER</u> | <u>MOTHER</u> |
|--|---------------|---------------|
| 16. Who will be the major caretaker for the baby? | _____ | _____ |
| 17. Have either of you had any courses in child development? | _____ | _____ |
| 18. Did either of you participate in a training course for the baby's birth? | _____ | _____ |
| 19. Are either of you at present participating in an infant related group or activity? | _____ | _____ |
| _____ | | |
| 20. Is there anyone else besides the parents and the infant living in the house? _____ | | |
| 21. If so, who? _____ | | |
| 22. Who else beside the mother and the father care for the baby? _____ | | |
| 23. How long will this caretaker(s) be helping out? _____ | | |
| _____ | | |
| 24. Does each parent babysit so the other parent can go out? | | |
| _____ | | |

APPENDIX C

INFORMED CONSENT

UNIVERSITY OF FLORIDA

Subject's Name:

Address:

Title of Project: Parent-Child Transactions and Infant Competence

Project Number:

Principal Investigator: Ira J. Gordon

For this study, "Parent-child transactions and infant competence," we, the parents of _____, understand that we will be asked to play with our infant at specific times. These play sessions will be videotaped at the Learning Resource Center, J. Hillis Miller Health Center, once every 6 weeks beginning at child's age 13 weeks until 7 sessions have been completed at 49 weeks. We will be given specific activities (such as hide and seek with a small object) with him/her. Each session will include 3 minutes play with the father and baby; 3 minutes play with the mother and baby; and 3 minutes play with both parents and baby.

We understand the purpose of this study is to acquire information on the behavior of parents with babies and the way such behavior might be connected to baby performance on scales of infant development at age one.

The information obtained in this study will be used for scientific analysis only. The videotapes will be maintained at the Institute for Development of Human Resources, College of Education, University of Florida. Further written permission will be requested if these materials should be used for any purpose other than scientific analysis, such as in classes.

We understand that we can withdraw from the study at any time.

When our baby is one year old, his performance will be evaluated using the Bayley Scales of Infant Development. (This is not an intelligence test.) Individual scores of our infant will not be used in reports of the study but will be available, with interpretation, to us upon request.

Subject's Signature

Date

Signature of parent or guardian, if
subject is a minor (where applicable)

Date

I, the undersigned, have defined and explained this study to the volunteer.

Investigator's Signature

Date

Witness

Date

The proposed research has been approved by the University of Florida Committee for the Protection of Human Subjects. If there are any further inquiries, they may be addressed to the Chairman of the UCPHS or to the Director of the Division of Sponsored Research for the University, and your inquiry will be given prompt attention.

APPENDIX D
DIRECTIONS FOR PARENTS FOR GAMES

DIALOGUE

(Game for 13 Week Session)

This is probably a familiar activity. The purpose of this activity is to engage in a conversation with your baby. Try to get your baby to make a sound. When your baby does make a sound like a coo or gurgle, respond to him by a combination of stroking his stomach, moving your head close enough and smiling so you're sure he sees you, and repeating the sound s/he makes. S/he may then coo some more and you have a "conversation" in progress.

Please feel free to sit in one of the chairs or on the floor or you may stand. If you have an infant seat, it's quite all right to use it. The most important thing is for you and your baby to be as comfortable and natural as possible.

APPENDIX E

Perception of Baby Temperament Scales and Coding Technique

Temperament Dimension	Items	Very much like my baby	Somewhat like my baby	Not at all like my baby	Don't know
I. Activity	1. During a bath she kicks, splashes, and wiggles. She is full of activity at these periods.	3	2	1	X
	2. Her play with toys is active; she often kicks her legs and waves her arms.	3	2	1	X
	3. During diapering and dressing, she squirms and kicks much of the time. She is so active that I sometimes have trouble doing these tasks.	3	2	1	X
	4. She usually lies still during diapering and dressing. She rarely squirms and kicks during these activities.	1	2	3	X
	5. She usually lies fairly still during sleep. She awakens in just about the same position as when she fell asleep.	1	2	3	X
	6. When I feed her solid food, she tends to sit quietly, she rarely squirms or kicks.	1	2	3	X
II. Mood	1. When I bathe her, she usually smiles or laughs. She seems to enjoy bathing times.	3	2	1	X
	2. Sometimes people come over whom the baby has been around fairly often. She generally is friendly and laughs or smiles at them.	3	2	1	X
	3. When she wakes up from a nap, she almost always smiles and seems happy.	3	2	1	X
	4. When she wakes up from a nap, she often is a bit fussy.	1	2	3	X

Temperament Dimension	Items	Very much like my baby	Somewhat like my baby	Not at all like my baby	Don't know
5. When I feed her and I need to interrupt the feeding for such things as burping, she seems to fuss for a bit when these interruptions occur.		1	2	3	X
6. She almost always had a fussy period each day.		1	2	3	X

(A separate set of items with masculine pronouns is used for male infants.)

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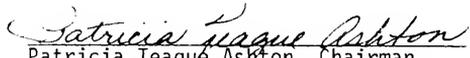
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JoAnn Howard Patray was born in McAlpin, Florida, on September 7, 1934. A summary of her previous educational experiences includes graduation from Columbia High School (Lake City, Florida) in 1952, Florida State University (Tallahassee) with a Bachelor of Science in Nursing in 1956, and the University of Florida with a Master's in Nursing in 1967. In 1976, she entered the doctorate program in Foundations of Education at the University of Florida as a full-time student.

Her professional work experience from 1956-1975 includes staff nursing in Pediatrics, nursing administration, public school teaching (7th and 8th grade), and teaching nursing in community college and in an undergraduate and graduate program in a university. Employment for these experiences was in the following Florida agencies--St. Vincent's School of Nursing, Jacksonville; Shands Teaching Hospital, Gainesville; Bradford High School, Starke; Lake City Community College, Lake City; and the College of Nursing, University of Florida, Gainesville.

Mrs. Patray is married to James W. Patray, a physician, and they have three children, Briar, Jim, and Beth. The family is residing in Keystone Heights with exception of Briar, who is attending Florida State University as a first year student. Jim and Beth attend Bradford High School in Starke, Florida. The permanent address of Mrs. Patray is P. O. Box 145, Keystone Heights, Florida.

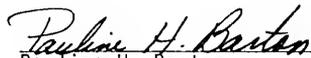
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Patricia Teague Ashton, Chairman
Assistant Professor of Education

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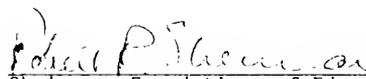

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This dissertation was submitted to the Graduate Faculty of the Department of Foundations of Education in the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June, 1978


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