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Touch and Gaze in Parent Infant Social Play

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TOUCH AND GAZE IN PARENT INFANT SOCIAL PLAY

by

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Lori A. Roggman

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ABSTRACT

Touch and Gaze in Parent-Infant Play

by

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Twenty first-born infants age three to five months, nine males and eleven females, were observed and videotaped for five minutes with each parent, in order to explore touch and gaze in free-play parent-infant interactions. Gazing behaviors of parents and infants and mutual gazing were measured in vivo; touching behaviors were measured from the videotapes of each dyad. For each behavior, four measures were taken: percent of total time, average rate per minute, mean duration of the behavior, and mean duration of the intervals between behaviors. The results show that, on the average, parent touch and gaze were typical of parents at play with infants: frequent short touches and frequent long gazes. The infants look back at parents much less often, typical of infants whose parents are trying to get their attention. The data show unique response patterns depending on the sex of the infant and parent. Both mothers and fathers use touch with boys, but not girls, as an instrumental attention getting technique, touching more when the infant looks less often. Mothers show a more complex response than fathers, probably learned from their greater caretaking experience. Touching to

girls is related only to the parent's own attention, seeming to be a more expressive response. Mothers, but not fathers, increase their gaze reciprocally with girls' gaze but not boys'. These unique relationships for mothers and fathers with sons and daughters may be the beginnings of differential sex-typed socialization. Mothers and fathers of the same infants show very different behaviors, often negatively correlated, indicating that they may have developed complementary relationships with their infants.

(112 pages)

INTRODUCTION

Play has been defined as behavior which occurs voluntarily, for its own sake, and is characterized by repetitive exaggerated variations in behavior and stimuli (Ellis, 1973). Play is thought to be among the most crucial experiences in the infant's social development (Stern, 1977), and one of the main functions of the infant's social network (Weinraub, Brooks, & Lewis, 1977). The behaviors exercised in play are integrated intellectually (Bruner, 1973) if the infant has had a positive human relationship which has helped stabilize sensory organization (Wolfgang, 1974). Adults provide sensory feedback to the infant who is yet unable to manipulate the environment directly (Murphy, 1972). Such interactions are the beginnings of social play.

This study explored specific behaviors of parents and infants that have been found to be major components of early adult-infant social play: parent and infant visual attention (Crawley, Rogers, Friedman, Iacobbo, Criticos, Richardson, & Thompson, 1978; Moss, 1967; Peery, 1978; Peery & Stern, 1975; Stern, 1974a) and tactile contact between parent and infant (Crawley et al., 1978; Sroufe & Wunsch, 1972). Parent touching and gazing behavior in relation to infant gazing behavior during free play sessions were investigated in order to increase our understanding of the beginnings of social play in infancy.

Play Theory

Contemporary theories explaining play include learning theories, arousal seeking theories and developmental theories (Ellis, 1973; Gilmore, 1966; Millar, 1968). Ellis (1973) suggests that all three of these theoretical perspectives may be valid and an integration useful. The developmental theories focus on the significant outcomes of play for the individual, such as the development of object relations from the cognitive point of view and the development of independence from a more social perspective. The learning theories view play in terms of a response/reinforcement model. The arousal seeking theories consider play a unique behavior reflecting optimal arousal. Play can thus be viewed as a learned class of generalized behavior that functions to vary arousal within an optimal range, with the specific behaviors emitted in play both reflecting and contributing to ongoing development.

In developmental theories play is thought to be the exercise of developing skills. The central assumption of these theories is that play is part of, and generally a contributor to the overall development of the child. When a major new skill is developing, it absorbs the infant's interest and activity, including his play (Blank, 1964). Play is seen in Piaget's theory as pure assimilation, changing the ends to fit available means--fitting an object or playmate to already acquired skills; it is the means that are important, not the ends (Phillips, 1969). The infant at play is seen as exercising new abilities to fix and retain them. Infant play in Piaget's developmental theory is seen as "mastery play" that would be reinforced simply by the "functional

pleasure of use" (Piaget, 1976). White (1959) has suggested that play is serious business but pleasurable because of "effectance," a feeling of efficacy or competence. Experimental or exploratory play produces changes in the stimulus field which provide environmental feedback that has rewarding effects via effectance. In parent-infant social play both partners are assumed to be playing; parents may also be involved in "mastery play," practicing the new skills of parenting to test their "effectance" with the infant.

Developmental theories, often presented in opposition to learning theories, suggest that "learning," per se, does not occur in play; and early skills are not systematically reinforced directly in play (Bruner, 1973). However, Schlosberg (1947) recommended using specific stimulus-response terms to describe play from a learning theory point of view. He described play as generalized behavior in response to all similar stimuli before it is differentiated and precise (similarly to Piaget's assimilation), but admitted that a lack of research attention to specific behavior sequences left the question of reinforcement obscured.

The question of reinforcement may be related to the concept of effectance. After finding that infants smile and coo in response to contingent stimuli, Watson (1972) theorized that contingency awareness becomes a releasing stimulus for cooing and smiling in early infancy. This display of positive affect occurs in response to contingent object stimuli, such as mobiles, as well as to social stimuli, such as mother (Watson & Ramey, 1972). Moss (1967) also suggests that it is as a result of the contingency of her behavior that the mother's responses acquire reinforcement value to young infants. Lewis and Goldberg (1969)

propose that these contingencies enable the infant to develop a learning motive of "generalized expectancy," a belief in control or effectance that motivates learning and the responsiveness seen in play.

Another source of reinforcement has been suggested by Rubenstein (1967) to lie in variation of stimuli. As the infant develops increasingly differentiated schema, he is able to interact in increasingly varied ways, thereby producing more variety of stimulation, which in turn reinforces exploration and experimentation. During play periods with infants, parents provide both variation in stimulation and contingent feedback.

Arousal seeking theories of play may explain the reinforcing power of variation and possibly effectance as well. Play seems to involve aroused attention to novelty, complexity, variation and change, all various elements of discrepancy (White, 1959; Ellis, 1973). Dember and Earl (1957) found that attention behaviors can be aroused by change or discrepancy in temporal of spatial stimuli. Kagan and Lewis (1965) also report increased infant attention to distortions of familiar patterns; and Brackbill (1970) reports increased arousal to intermittent sound and decreased arousal to continuous sound as early as one month. Field (1979b) found increased arousal, as indicated by heart rate (but decreased visual attention), to a bouncing doll face and to an animated mother. Field's descriptions of this arousing variation in stimuli closely follow the characteristics of playful behavior: exaggeration, fragmentation, reordering, and repetition (Ellis, 1973), which seem to be common elements of the behavior parents show when playing with infants (Stern, 1977).

The pleasurable aspects of play may be the result of certain levels of arousal. Laughter in infancy--the positive effect associated with play--occurs in response to stimuli that have these same characteristics of discrepancy that elicit attention: voice changes, bouncing, walking fingers, "gonna get you," adult crawling on floor or sucking on baby bottle, and the like (Sroufe & Wunsch, 1972). Sutton-Smith (1971) suggests that disequilibrium is tension enhancing and pleasurable and is sought on purpose in play, rather than by mistake, as implied by theories of cognitive dissonance such as Piaget's. Ellis (1973) argues that the competence/effectance behavior is a kind of arousal seeking. The mastery of disequilibrium depends on an optimal range of discrepancy, challenging but nevertheless within the range of comprehension.

In general, infant attentiveness increases to discrepant or changing stimuli in an "acceptable range above the familiar" (Dember & Earl, 1957). Sroufe and Wunschs' (1972) laughter study found that the same stimuli that provoked laughter could also provoke tears. Beyond the optimal range of discrepancy, the arousal level is higher, the tension is increased, and the effect reverses and becomes negative (Stern, (1974a). Negative effect is not associated with play. The goal of play then is seen as the maintainance of an optimal range of arousal and the variation of arousal within that optimal range. It may be the power to do this that maintains the parent's interest in play with the infant.

An integrated theory is used in this study as a means of conceptualizing early parent-infant play. Stern (1974a, 1974b, 1977) offers a view of early social play that integrates the major theoretical

perspectives. The early free play between mother and infant is seen as a purely social activity with components of discrepancy, arousal, and positive effect contributing to goal oriented social games, where the goal is to maintain an optimal range of attention and arousal in the infant.

In this "mutual dyadic feedback system," the parent provides repetitive but varying stimuli; and the infant responds with its limited repertoire of social behaviors that indicate attention, arousal, and positive effect.

Social play is interactive, with both partners engaged in the play "system." The adults involved in play with infants show the full range of playfulness in their behavior. They play voluntarily and with positive effect, with signs of delight at contingent responses in the infant. The repetitious exaggerated qualities of their behaviors fit definitions of play. They even pretend to have imaginary conversations with their infants (Stern, 1977). The adult's interest and attention seems to be maintained by feedback from the infant--a novel, complex, and marvelous "toy." The infants respond to the stimuli provided by parents with varying levels of attention and activity, and provide stimulation to the parent by their contingent responses to parent behavior. Parents are also undoubtedly entertained by the "babyishness" and novelty of the infant. The babies' responses and abilities are still very limited, but their rapid development keeps them new and interesting to parent. In return, the adults who play with the baby provide stimulation, contingencies, and even non-social objects for the infant. The role of adults is providing and highlighting stimuli functions to facilitate

the infant's cognitive, as well as social, development.

Adult-Infant Social Play

In a developmental context, infant play is associated with the developing competencies of infancy: feeding, attending, interacting, manipulation, and locomotion (Bruner, 1973), the essential skills for human competence and independence. Play, at any given age, will reflect both the cognitive and social/emotional development of the infant. It will thus reflect individual differences in development, as well as differences in experience and temperament (Kagan, Kearsley, & Zelazo, 1975). Genetic (Matheny & Dolan, 1975), prenatal, perinatal (Sigman, 1976; Field, 1977, 1979b) and experiential/environmental factors (Rheingold, 1961) influence general rates of development of play behavior in infancy, but changes in the sequence of emerging play skills have not been found. Each new type of play depends on the contributions of previously learned play behaviors. Kagan et al. (1975) have offered a useful metaphor by which we may view play development as a "series of emerging plateauing and declining behavioral systems which hold the stage for a brief era until they are displaced by a new set of activities." The major systems of play that develop during infancy are adult-infant social play, object play, and peer play. The system holding the stage in early infancy, two to five months, is adult-infant social play.

Adult-infant social play begins by about three months (Murphy, 1972; Stern, 1974a, 1974b) and is henceforth of primary importance in infancy, making up almost a third of parent-infant interactions

(Field, 1979a). As the infant becomes increasingly interested in objects, adults mediate such play by providing toys and facilitating the infant's interactions with them (Rubenstein & Howes, 1979; Yarrow, Rubenstein, & Pederson, 1975). Infants in environments with more stimulation and interaction develop skills of fixating, following, reaching, grasping, and manipulating objects sooner (Sloven-Ela & Kohen-Raz, 1978); are more responsive to novel stimuli (Rubenstein, 1967); and show a higher rate of visual habituation which is related to greater cognitive capacity (Lewis & Goldberg, 1969). Through the games that develop in adult-infant play, the infant will master autonomy (Kleeman, 1973), symbolic representation (Lowe, 1975), and imitation (Harnick, 1978). Adult-infant social play contributes to object play, which in turn contributes to social play with peers (Mueller & Vandell, 1979).

The traditional first games parents play with infants, "gonna get you," patacake, and peekaboo, may well facilitate the development of skills that are emerging in early infancy such as attending and manipulating (Bruner, 1973). Games adults play with young infants, three to four months old, include repetitive and varying stimuli (Stern, 1974b) and are primarily tactile, using touch to stimulate the infant and get its attention (Crawley et al., 1978; Lamb, 1977). Fathers, particularly, have been observed to use much boisterous physical contact in their play with infants (Field, 1978; Lamb, 1976a; Trevarthen, 1974). Tactile stimulation makes up a large part of parent behavior toward infants (Bakeman & Brown, 1977; Lewis & Lee-Painter, 1974; Parke & O'Leary, 1976), who are more responsive to tactile than other kinds of stimuli at this age (Sroufe & Wunsch, 1972). This may be because the

tactile and kinesthetic receptors are more highly developed than the visual and auditory receptors in the early weeks (Yarrow & Good, 1965). Tactile stimulation is related to arousal in newborns, as indicated by accelerated heart rates (Field, Dempsey, Hatch, Ting, & Clifton, 1979; Rose, Schmidt, Riese, & Bridger, 1980), and effects the physical and cognitive development of infants (Rice, 1977; White & Labarba, 1976). Parent touching behavior is thus seen as a very important, if not essential, component of social play with infants, functioning to stimulate, attract attention, and facilitate the development of new skills.

Since the capacity to play depends on being played with (Call, 1968), the infant may appear to be at the mercy of adults for play. However, the infant can be thought of as an active participant in the social network with behaviors that "fit" specific functions of the network, one such function being play (Weinraub et al., 1977). Infants develop social behaviors in the first few months (Sroufe & Wunsch, 1972) that seem to invite play rather than the caretaking interactions that predominate in the first months (Emde, Gaensbauer, & Harmon, 1976; Moss, 1967). Adult play with young infants is directed toward getting the infant to look, smile, and laugh (Crawley et al., 1978). In the context of the arousal model of play theory, these infant behaviors can be seen as providing stimulation to the parent, thereby maintaining parent attention in play.

The infant's gaze, in particular, seems to be effective in initiating and maintaining social play with adults. During the first two months of life, infant attention to faces and the frequency of mutual gaze increases (Carpenter, 1974; Haith, Bergman, & Moore, 1977; Maurer &

Salapatek, 1976; Moss & Robson, 1968). Mothers report that they begin to initiate more play when the infant begins to make more eye contact (Robson, 1967). The strong positive feelings the mothers expressed about the infant's gaze (Robson, 1967) indicate that infant attention may function as a powerful reinforcer to mother's play behavior.

It is during play rather than caretaking periods that mutual gaze is most probable (Peery & Stern, 1975). Peery (1978) suggests that the frequency of infant gazing, more than the total duration, serves as a releaser or trigger stimulus for mother's gazing time. The more often the infant looks, the more total time the mother spends looking at and playing with the infant (Peery, 1978). The games played during play with infant usually begin when the infant is alert and attentive (Call, 1968; Murphy, 1972). The play period follows a typical sequence: initial contact when mutual gaze is established, followed by games or repetetive runs of engagement and time-out, and finally termination when the infant gets bored or fussy and thus stops attending (Stern, 1974b, 1977).

Stern (1974a) has suggested that the infant's gaze alternations serve as an on/off system of attention that regulates arousal during play by (a) increasing or decreasing stimulation and (b) providing feedback about arousal level to the mother. The infant looks less the more the mother looks or tries to get his attention, but looks more at quieter imitative behaviors (Field, 1977, 1979b; Peery, 1978). Quiet imitation may be less arousing but more within an optimal range of stimulation. The gaze alternation of the infant has been found to be related to the degree of arousal, as measured by increased heart rate,

suggesting that looking away may serve to decrease or modulate arousal by providing a break for "information processing" (Field, 1979b). Although the infant's gaze seems to be determined by arousal alone, the mother's behavior seems to be influenced by the infant's gaze (Hayes & Elliott, 1979). The infant controls the play situation by choosing either to respond or ignore the parent (Beckwith, 1972), and thereby elicits and shapes appropriate parenting behavior or "socializes" the parent in play (Emde et. al., 1976; Moss, 1967).

Adult-infant social play is viewed in this study as a "mutual dyadic feedback system," during which the parent provides varied stimulation to the infant, who in turn provides feedback and reinforcement to the parent via social behavior such as gazing (Stern, 1974a, 1974b). Stern views the play period as a sequence of games made up of attention episodes. Both parent and infant attention are essential for play, and mutual gaze acts as the signal for the games to begin.

Measurement of Parent-Infant Play Behavior

Playful interactions between parents and infants have been difficult to define and quantify. The behaviors selected for investigation in this study were chosen on the basis of two criteria: 1) theoretical and empirical indications of the importance of the behavior in adult-infant play, and 2) previous research reports of high reliability in measurement.

The adult-infant play system in early infancy is primarily tactile and related to mutual gaze which depends on the developing attentional capacities of the infant and the interest of the parent. Touch was

selected as an appropriate parent play behavior to measure because it has been suggested as a primary component in early adult-infant play and has the advantage of being relatively easy to observe (Crawley et al., 1978). Gazing has been indicated as an important behavior of both parents and infants engaged in play, with mutual gaze being particularly important (Peery, 1978; Peery & Stern, 1975; Stern, 1974a), and has also been found to be easy and reliable to observe (Peery & Stern, 1975). The four behaviors investigated in this study were Parent Touch, Parent Gaze, Infant Gaze, and Mutual Gaze.

To assess the effect of tactile stimulation on the attention and arousal of parents and infants, it is necessary to measure both gaze and gaze away, since both attending and looking away have been suggested as arousal responses. Touch and not touch were both measured for similar reasons--either the touches or the pauses between touches may be part of the parent's response to attention and arousal cues from the infant. Behaviors were measured in terms of both frequency and duration. The frequency of gazing is logically the same as the frequency of gazing away, an indication of either boredom or overstimulation. However, the average length of gazes and gazes away may be quite different. Therefore, four measures were obtained for each behavior: total proportion of time spent, average frequency or rate, mean duration of behavioral occurrences, and mean duration of the intervals between behaviors.

The relationship between visual and tactile contact in play is not fully understood. Studies of the relationships between parental touch and infant gaze have been inconclusive. Lewis and Goldberg (1969) found positive correlations between maternal stimulation behaviors such

as touching and three month old's visual habituation (an indication of visual maturity). However, the above study did not measure infant behavior within the mother-infant interactions. Within interactions, Field (1978) found a positive correlation between parental play (exaggerated "infantized" behavior) and total amount of infant gaze, but a negative correlation between total infant gazing time and parent's attention getting behavior which included touching (1979b). Beckwith (1972) observed eight-month-olds and found a positive correlation between maternal physical contact and the amount of infant "ignoring" or looking away.

The purpose of this study was to explore the relationships between frequency and duration measures of touching and gazing in parent-infant play. The first objective was to measure and describe the selected behaviors as they occur in free play sessions. A second objective was to determine the direction and pattern of the relationships of touch to mutual gaze, baby gaze, and parent gaze. A third objective was to investigate possible sex differences between mothers and fathers and between male and female infants.

METHOD

Subjects

Twenty infants, age three to five months ($\bar{X}$=16.6 weeks), nine males and eleven females, were observed with each parent in a laboratory free play situation. All infants were first borns, with normal delivery and birth weight. Parents were selected from participants in a childbirth preparation class, and all fathers had been present at delivery. The probability of equal father involvement and interest was thus maximized.

Procedure

Parents were contacted by telephone and asked to participate in the study if all criteria were met. Observations were conducted in a laboratory observation room, a constant environment. After a five minute triad observation, not used in this study, each of the infants was observed for five minutes alone with each parent. The infants were randomly assigned to be observed with either the mother or the father first.

The observation room was furnished with only two chairs facing a table with an infant seat centered on it. This facing position was used to maximize the opportunities for interaction (Crittenden & Snell, 1979). Immediately before the observation session began, the infant was placed in the infant seat. The parents were told that the purpose of the study was to observe interactions between normal infants and parents and asked to do whatever they liked and to behave like they

would at home.

Gazing frequency and duration were recorded during the observation sessions by two trained observers viewing the parent's and infant's eyes through observation mirrors on opposite sides of the room. The frequency and duration of parental touching were recorded from videotapes made of the observation sessions. The videotapes were made using two cameras simultaneously, one focused on the parent and one on the infant. The dual image of both parent and infant on the screen was necessary in order to observe all physical contact between parents and infants. In many cases it would have been impossible to determine if actual physical contact had been made without observing both images.

Data Collection

Infant and parent gaze was coded as gaze (looking at the other's face) or gaze away (not looking at the other's face). Two trained observers recorded parent and infant gaze during the observations by activating a switch. The switch was connected to a multiplexor interfaced directly with a computer which kept a timed record of frequency and duration of parent and infant gazes, gazes away, and mutual gazes.

Touch was coded as touch or not touch and defined as any physical contact the parent makes with the infant. A trained observer recorded touch from the videotapes using a switch connected to the computer in the same manner.

Reliability of gazing measurements has been established in other studies using similar observation and coding techniques (Peery & Stern, 1975). The specific technique used here for measuring touching behavior

was tested for both interrater and intrarater reliability. During practice observation sessions of the videotapes, two observers recorded touching frequency and duration simultaneously. The measures from each observer were then compared. Interrater reliability was consistently greater than .89 and established at .99 for both frequency and duration measures. Intrarater reliability, tested by comparing repeated measures from the same session by the same observer, was consistently greater than .86 and established at over .99 for all of the measures used in the study. Reliability of touch measurement was determined before beginning the coding of data for this study.

Data Analysis

Over 200 minutes of behavioral data were collected from the observations of 40 dyads. The behaviors, measured and recorded, include 1,520 parent touches, 1,204 parent gazes, 793 baby gazes and 965 mutual gazes. The continuous data collected from the observations of the twenty infants with their mothers and fathers provided individual measures of total percent of time, average rate per minute, and mean length of the behavior for Parent Touch, Mutual Gaze, Baby Gaze, and Parent Gaze. In addition, the mean intervals between behavioral occurrences were calculated for Touch, Baby Gaze, and Parent Gaze.

The behavior measures were summarized by means and standard deviations for the total sample and for eight different groups subdivided by infant and/or parent sex. Means and standard deviations were calculated separately for boys, girls, fathers, mothers, fathers with boys, fathers with girls, mothers with boys, and mothers with

girls. The medians for each behavior were identified in the distributions of all of the mothers' and all of the fathers' behaviors.

Sex differences for each mean behavioral measure were tested by one and two way analyses of variance for infant sex and parent sex.

15 X 15 Pearson correlation matrices of all the behavior measures were generated for the total sample and separately for the different groups. Differences between correlations by infant sex or parent sex were tested for significance by converting to Z scores (Blalock, 1979).

Correlations between age and the behavioral measures were computed for the total sample and also for each group divided by infant sex and/or parent sex. Subsequent 15 X 15 partial correlation matrices produced the same set of matrices, but with age controlled to determine if significant correlations may have been due to spurious age effects or if age had masked significant relationships.

In order to understand further the differences and similarities between mothers and fathers, a 15 X 15 partial by age correlation matrix was generated between the mother dyad measures and the father dyad measures.

RESULTS AND DISCUSSION

Descriptions of Touching and Gazing Behavior

Parents spent an average of 39% of the observation time touching their infants. Touching behavior was measured as an indicator of playful behavior between parents and infants. Caretaking was very rarely seen in these observations. In fact, fussy babies who were subsequently picked up and held were not included in the study. The measures of touching thus indicate "voluntary" tactile contact seeming to appear for its own sake and can therefore be defined as play. This touch-play shows a large amount of variation among the parents observed. Table 1 shows the means and standard deviations of each behavior measure in the total sample and in separate groups. The standard deviation for percent of time touching is 19.82%. This reflects a wide range in the amount of parent touch, a range from 4% to 78%. As can be seen in Table 1, the standard deviations, for the touching behaviors especially, are quite large, sometimes larger than the means. Thus, not only the amount but the patterns of touching shows a large amount of variation in the sample.

The average rate per minute is a frequency measure of a behavior. The extent to which rate is related to the total amount of time spent doing something depends on how long each incident of behavior lasts and how long the intervals are between the behaviors. Rate describes the frequency of both the "on" behavior and the "off" behavior or intervals between responses. Rate may therefore be thought of in terms of a general activity level.

Parents touch their infants at an average rate of 7.7 times per

Table 1

Means and Standard Deviations of Total Sample

Variable	Mean	Standard Deviation
TOUCH percent of total time	38.56	19.82
TOUCH rate per minute	7.70	3.71
TOUCH mean duration	3.77	3.28
TOUCH mean NOT interval	7.78	8.91
MUTUAL GAZE percent of total time	27.82	20.11
MUTUAL GAZE rate per minute	4.66	2.38
MUTUAL GAZE mean duration	3.42	1.88
BABY GAZE percent of total time	33.07	22.70
BABY GAZE rate per minute	3.85	1.64
BABY GAZE mean duration	5.08	3.10
BABY GAZE mean NOT interval	14.07	12.43
PARENT GAZE percent of total time	81.41	10.37
PARENT GAZE rate per minute	5.93	2.49
PARENT GAZE mean duration	10.38	6.13
PARENT GAZE mean NOT interval	1.91	0.89

minute (SD=3.71). The mean length of touch, 3.8 seconds (SD=3.3), is shorter than the mean length of intervals between touches, 7.8 seconds (SD=8.91).[1] These characteristics of the touching behaviors of parents are typical of playful stimuli: relatively frequent and short. However, there are wide variations in these patterns for different parents. Thus, the pattern of tactile stimulation varies for the infants. Since physical contact may be stimulating to parents as well as infants, different patterns of touching may also indicate different levels of stimulation to the parent.

Parents show less variation in their gazing than in their touching behavior. On the average, parents spent 81% of the observation time looking at their infants. Of all the behaviors measured, the amount of parent gaze shows the least variance with a standard deviation of 10% and a range from 58% to 98%. Thus, all of the parents observed spent over half the observation time gazing at their infants.

Parent gazes occur less frequently than touches, 5.9 (SD=2.5) times per minute, but last much longer, an average of 10.4 seconds (SD=6.1), with gazes away lasting an average of only 1.9 seconds: a gazing pattern typical of parents in play situations (Stern, 1974b). Infants gaze at their parents, on the average, only 33% of the time (SD=22.7); and baby gazes occur less frequently, 3.8 times per minute (SD=1.6), and last, on the average, only half as long as parent gazes, 5.1 seconds (SD=3.1), with gazes away averaging 14.1 seconds (SD=12.4). (See Figure 1.)

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[1]Group means have been computed from individual average scores with skewed distributions and thus may not exactly equal 60 seconds per minute.

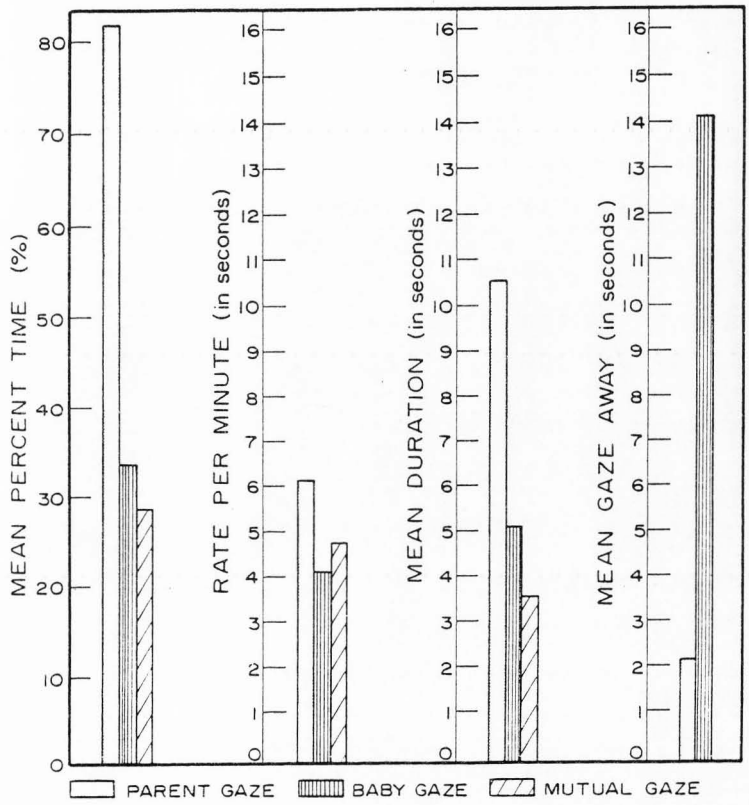

Figure 1. Group means for measures of parent, baby and mutual gaze.

Parents appear to be much more interested in the infant than the infant is interested in them. The intense attraction of parents to infants typifies the "engrossment" both fathers and mothers show with their infants (Greenberg & Morris, 1974; Parke & O'Leary, 1976), and may be due to the innate attractiveness of infants (Fullard & Reiling, 1976). The long parent gazes, accompanied by frequent but short looks away, may also be indications of parent arousal to the infant as a novel or even discrepant stimulus. The infant may be intensely attractive but also very anxiety provoking to these parents who are burdened with the awesome responsibility and challenge of socializing this yet unsocialized creature.

Another possible reason that infants look at parents less may be that the new environment of the observation room, though probably not interesting to parents, may provide novel visual stimuli to the infant. The parent is a more familiar and less interesting stimulus to the infant. This preference for novelty is common in infants (Hutt, 1967; Rubenstein, 1974) but so is a preference for faces (Kagan & Lewis, 1965). Parents are quite likely to be able to provide the variation in stimulation that is known to attract infant attention (Brackbill, 1970; Kagan & Lewis, 1965; Dember & Earl, 1957). Nevertheless, infants do not look at their parents often or for long before they are looking away again. It may be that the parent attention getting efforts are somewhat overstimulating to the infant. In fact, some studies have found that parent attention getting behaviors are related to more looking away by the infants (Field, 1977; Trevarthen, 1974).

Field (1979b) has suggested that more gazing away, which is related

to accelerated heart rates, may be an indication of arousal and may serve as an information processing function allowing the infant to "recover" from intense stimulation. Parents are the ones who control physical contact and the intervals between tactile stimuli. The infant's looks away may provide cues to the parent about the infant's arousal. The parents' own arousal may influence their behavior more directly. Since parents can interrupt physical contact at any time, and since they can be assumed to have more efficient information processing or arousal modulating processes, they may not need to look away for as long as infants.

Although Peery and Stern (1975) found baby gazes away to be approximately equal in length to parent gazes away, the infants in this sample look away for an average interval that is 7 times longer than parent gazes away. This difference may be due to the wider and older age range in this sample, or due to the different observation situation. Older infants have better vision (Bornstein & Kesson, 1979) and may be more interested in visual stimuli other than the parent. It is also possible that these parents may look away for shorter intervals because they are less aroused by the older infant as the infant has become more socialized.

Data for the Peery and Stern study were collected in the home. The laboratory observation situation used here and the short five minute observation sessions may have influenced parent behavior differently. Under the circumstances, parents undoubtedly felt some anxiety. This anxiety about their performance in front of researchers may have contributed to more attentiveness to the infant but frequent

short glances away. Although a few parents did comment on their anxiety about the situation, several also commented after the observations that they had relaxed and forgotten about being observed.

Mutual gaze is a measure of interaction. Since mutual gaze has been suggested as an essential ingredient in play (Bruner & Sherwood, 1976; Stern, 1974a) and in social interaction (Argyle & Cook, 1976), it can be interpreted as an indication of the opportunities for play. The lesser amount of infant gazing time seems to allow less opportunity for mutual gaze which occurs only 28% of the time (SD=20.1). However, this means that on the average, 85% of the time when the infant is looking at the parent, the parent is looking back, whereas the infant looks back at the parent during only 41% of the parent's looking time. Parents may be using their frequent short tactile contacts in an effort to get the infant's attention and establish eye contact.

Mutual gazes occur slightly more often than baby gazes, 4.7 times per minute (SD=2.4), and are shorter, only 3.4 seconds (SD=1.9). Thus, mutual gazes are not entirely determined by baby gaze but may be interrupted when the parent glances away. Adults, in social interaction with each other, break their mutual gazes regularly as part of conversations to indicate pauses and look back to indicate emphasis and attention to feedback from the listener; but the listener generally looks the longest and the most (Argyle & Cook, 1976). Thus, it seems that although parents were the only ones talking in these interactions with their infants, they are behaving more like listeners in the conversation, attending closely to whatever the infant expresses.

Whether or not the parent breaks a mutual gaze will depend on the parent's tolerance for mutual gaze. This tolerance may be different for mothers and fathers (Argyle & Cook, 1976). Other research has indicated that many parent behaviors may be different for mothers and fathers and different for boys and girls (Rebelsky & Hanks, 1971; Clark-Stewart, 1978; Lamb, 1976a).

Sex Differences

Table 2 presents the means and standard deviations of each behavior for boy infants, girl infants, fathers, and mothers. Medians are also presented for mothers and fathers. Table 3 shows the same measures further divided into four subgroups: fathers with boys, fathers with girls, mothers with boys, and mothers with girls. Figures 2 through 5 compare the different group means in the behavior categories for the different groups.

Although fathers have been observed to be more physical and boisterous than mothers in their play with infants (Field, 1978; Trevarthen, 1974; Lamb, 1976a) and even in their first interactions with newborns (Parke & O'Leary, 1976), the fathers in this sample did not touch their infants more than the mothers. In fact, mothers touched slightly more, though not significantly more, than fathers. Figure 2 shows the means of the various touching measures in each group. It can be seen that, on the average, mothers touch both boys and girls slightly more than fathers do. In general, boys are touched more than girls, as has been found with newborns (Parke & O'Leary, 1976). However, when medians are compared, mothers' median touch to girls is slightly longer than their median touch to boys.

Table 2

Means and Standard Deviations of Separate Groups

	Boys	Girls	Fathers	Mothers
Touch				
Percent Time	41.68 (20.07)	36.00 (19.71)	34.77 (20.73)	42.35 (18.62)
Rate	7.82 (4.43)	7.60 (3.10)	7.37 (3.40)	8.03 (4.06)
Mean Duration	4.04 (2.89)	3.56 (3.62)	3.24 (2.40)	4.31 (3.96)
Median			.94	1.29
Mean NOT	7.99 (8.82)	7.60 (9.20)	9.26 (11.48)	6.29 (5.16)
Mutual Gaze				
Percent Time	23.01 (18.30)	31.76 (21.06)	25.94 (18.37)	29.70 (22.02)
Rate	4.65 (2.65)	4.66 (2.20)	4.73 (2.60)	4.58 (2.21)
Mean Duration	2.76 (1.37)	3.96 (2.08)	3.13 (1.31)	3.71 (2.31)
Median			1.87	2.18

Table 2 (Cont.)

Means and Standard Deviations of Separate Groups

	Boys	Girls	Fathers	Mothers
Baby Gaze				
Percent Time	28.11 (21.27)	37.14 (23.51)	32.68 (23.12)	33.47 (22.88)
Rate	3.96 (1.82)	3.76 (1.52)	3.94 (1.79)	3.75 (1.52)
Mean Duration	4.12 (2.52)	5.86 (3.36)	4.84 (3.07)	5.32 (3.19)
Median			2.67	2.68
Mean NOT	14.19 (10.12)	13.98 (14.28)	14.29 (13.94)	13.86 (11.07)
Median			4.40	4.34
Parent Gaze				
Percent Time	79.19 (10.24)	83.23 (10.36)	79.46 (10.58)	83.35 (10.05)
Rate	6.55 (2.90)	5.42 (2.04)	5.92 (2.31)	5.94 (2.73)
Mean Duration	9.48 (6.20)	11.11 (6.12)	9.81 (5.83)	10.94 (6.52)
Median			3.70	3.67
Mean NOT	1.99 (0.69)	1.84 (1.04)	2.16 (1.08)	1.66 (0.57)
Median NOT			.797	.937

Table 3

Means and Standard Deviations of Subgroups

	Fathers/Boys	Fathers/Girls	Mothers/Boys	Mothers/Girls
Touch				
Percent Time	38.70 (21.56)	31.56 (20.48)	44.67 (19.26)	40.45 (18.80)
Rate	7.69 (4.20)	7.11 (2.76)	7.96 (4.89)	8.08 (3.48)
Mean Duration	3.58 (2.36)	2.95 (2.51)	4.51 (3.43)	4.15 (4.52)
Median	.94	.92	1.09	1.281
Mean NOT	9.35 (11.16)	9.19 (12.28)	6.63 (6.03)	6.01 (4.61)
Mutual Gaze				
Percent Time	21.07 (17.53)	29.92 (18.89)	24.94 (19.90)	33.59 (23.82)
Rate	4.51 (2.90)	4.91 (2.45)	4.80 (2.55)	4.40 (2.01)
Mean Duration	2.75 (1.36)	3.44 (1.25)	2.76 (1.46)	4.49 (2.64)

Table 3 (Cont.)

Means and Standard Deviations of Subgroups

	Fathers/Boys	Fathers/Girls	Mothers/Boys	Mothers/Girls
Baby Gaze				
Percent Time	25.79 (21.53)	38.31 (23.81)	30.42 (22.04)	35.97 (24.30)
Rate	3.97 (2.27)	3.92 (1.40)	3.94 (1.37)	3.59 (1.69)
Mean Duration	3.84 (2.53)	5.66 (3.34)	4.40 (2.62)	6.07 (3.53)
Mean NOT	15.57 (11.91)	13.24 (15.91)	12.80 (8.46)	14.73 (13.19)
Parent Gaze				
Percent Time	79.62 (10.77)	79.34 (10.95)	78.76 (10.32)	87.12 (8.49)
Rate	6.09 (2.82)	5.78 (1.92)	7.01 (3.06)	5.06 (2.18)
Mean Duration	10.22 (7.01)	9.48 (5.00)	8.74 (5.60)	12.74 (6.91)
Mean NOT	2.09 (0.88)	2.21 (1.27)	1.89 (0.48)	1.47 (0.60)

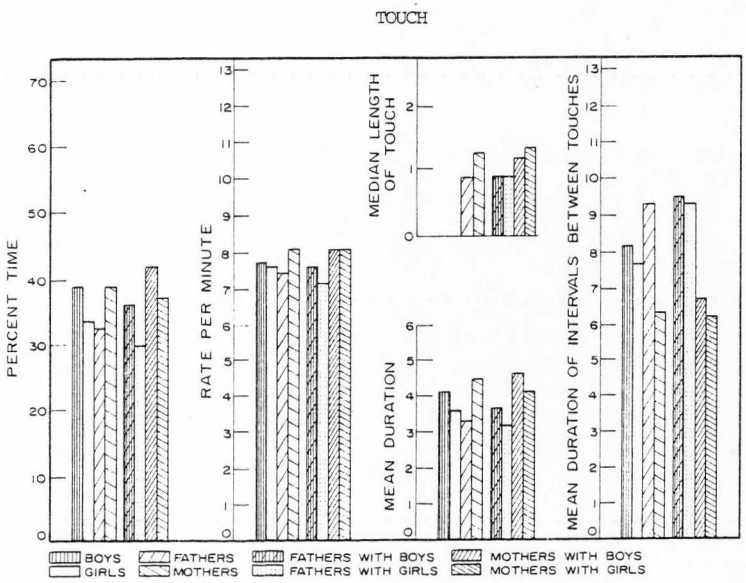

Figure 2. Group means for separate groups comparing touch measures.

Figure 3 compares group means for the measures of parent gazing. Mothers gaze more than fathers, and girls seem to be gazed at more, though less frequently than boys. It is mothers with girls that show the greatest amount and longest gazes with less frequent and shorter gazes away. Fathers show less difference in gazing at boys or girls.

Graphs of means of baby gazing measures of the different groups are presented in Figure 4. Although there is little difference in baby gazing at mothers compared to fathers, girls seem to look more and longer at both parents than boys do. This is consistent with research findings that female infants attend more to faces than male infants do (Kagan & Lewis, 1965; Fagan, 1972), although more recent studies have not confirmed this sex difference (Fagan, 1979).

Means of mutual gaze measures in the groups are shown in Figure 5. There is slightly more and longer mutual gaze with mothers. This may be due to their greater experience and familiarity with the infant which may help them learn how to facilitate mutual gaze. Even more noticeable is the greater amount and length of mutual gaze with girls. With both mothers and fathers, there is a greater average amount and a longer mean length of mutual gaze with girls compared to boys. This may be due to lower activity rates of girls (Phillips, King, & DuBois, 1978) which would result in less gaze shifting, or it may be due to the possible sex difference in attention to faces that was mentioned above.

Analyses of variance by infant sex and/or parent sex revealed only one significant difference. There was a main effect by infant sex for mutual gaze length with girls' mutual gazes lasting significantly

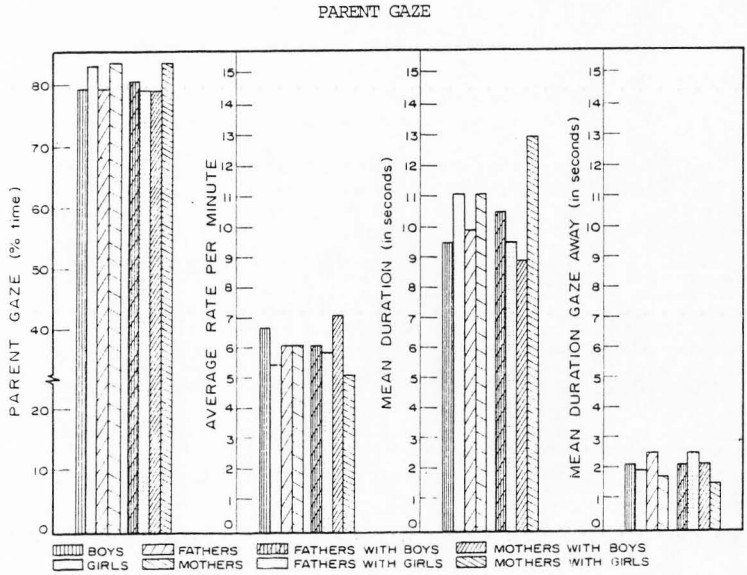

Figure 3. Group means of separate groups comparing parent gaze measures.

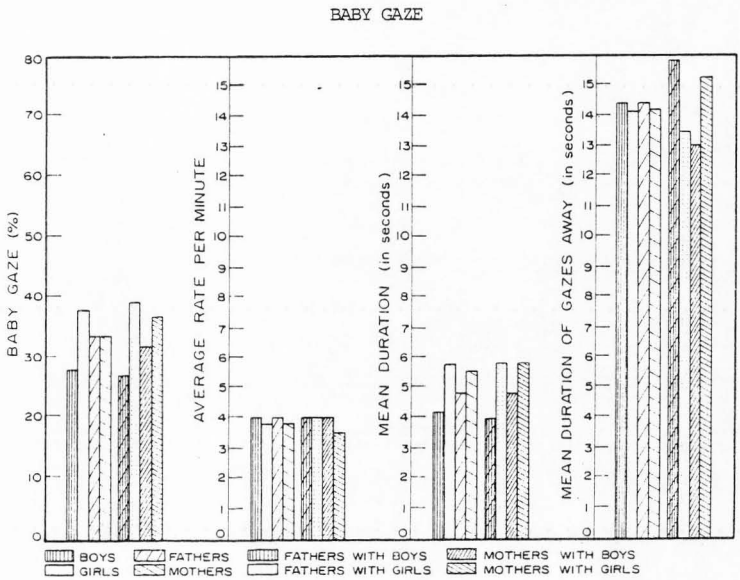

Figure 4. Group means of separate groups comparing baby gaze measures.

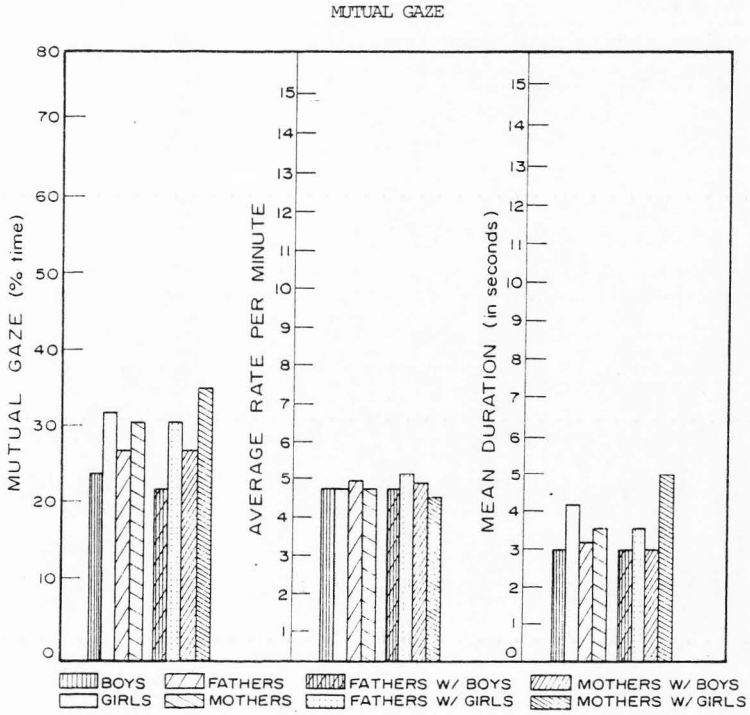

Figure 5. Group means of separate groups comparing mutual gaze measures.

longer than boys (Boys $\bar{X}$=2.76, SD=1.37; Girls $\bar{X}$=3.96, SD=2.08; F=4.44, p=.04). This difference is supported by a similar, although not significant, infant sex difference in baby gaze length (Boys $\bar{X}$=4.12, SD=2.52; Girls $\bar{X}$=5.86, SD=3.36; F=3.16, p=.08). The only comparable difference by parent sex was for length of gazes away, with fathers looking away for longer periods of time than mothers (Fathers X=2.16, SD=1.1; Mothers X=1.66, SD=0.6; F=3.21, p=.08).

The lack of statistically significant differences is probably due to the large amount of variance within groups in the relatively small sample. Concerns about sex differences nevertheless led us to investigate correlations separately for boys and girls and for mothers and fathers, as well as for the total sample.

Age Effects

The age of the infants ranged from 13 to 20.5 weeks ($\bar{X}$=16.6, SD=2.8). Although this is not an exceptionally wide age range, there are many changes in development during this period that may influence social interaction. Correlations between age and the various individual behavior measures, shown in Table 4, reveal a significant negative relationship between age and the percent of time spent touching (r=-.35*) and a positive relationship with the length of intervals between touches (r=.27*). Parents seem to spend less time touching and pause longer between touches as babies get older. Older babies may require less arousal modulating and fewer attention getting efforts from parents.

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*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$

Table 4

Correlations of Age with Touch and Gaze

	INFANT AGE				
	Total	Boys / Girls		Fathers / Mothers	
Touch					
% Time	-.35*	-.41*	-.27	-.23	-.50*
Rate	-.18	-.30	-.09	-.08	-.26
Mean Duration	-.05	-.06	.00	-.12	-.02
Mean NOT Interval	.27*	.42*	.27	.25	.40*
Mutual Gaze					
% Time	.10	-.06	.03	.26	-.03
Rate	.22	.08	.39*	.16	.29
Mean Duration	-.05	.00	-.35	.29	-.24
Baby Gaze					
% Time	.09	-.10	.05	.22	-.03
Rate	.13	.00	.34	.07	.22
Mean Duration	.06	-.03	-.12	.25	-.12
Mean NOT Interval	-.13	-.05	-.19	-.24	.00
Parent Gaze					
% Time	.21	.37	-.02	.41*	.01
Rate	-.07	-.19	.28	-.34	.16
Mean Duration	.03	.27	-.25	.40*	-.31
Mean NOT Interval	-.22	-.38	-.14	-.26	-.22

*$p \leq .05$

When the sexes are considered separately, however, these relationships hold true only for boys and for mothers. Two possible explanations are suggested for this finding. Touching may change with age only for boys, because their higher activity rates may require more soothing when they are younger, or because cultural pressures against male affection may begin to inhibit parents from touching boys as they get older. This is evidently more true of mothers, who may be both more sensitive to the infant's need for soothing, and who may also be more anxious about cultural norms since childrearing and the outcome of the child are often considered the mother's responsibility in our culture.

The only significant age correlation for girls is a positive relationship of age with mutual gaze rate ($r=.39^*$). Mutual gaze occurs more often with older female infants. Although the age range is about the same for both male and female infants in this study, the boys were, on the average, younger than the girls, with a mean age of 15.1 weeks, compared to the girls' mean age of 17.7 weeks. This difference could contribute to differences in correlations for the boys and girls when tested separately.

For fathers, age is found to be positively correlated only with the length and percent of time of parent gazing ($r=.40^*$, $r=.41^*$). The correlation of age with mother gaze length, although not significant, is strong and in the opposite direction from fathers ($r=-.31$, $p=.09$). The difference between these relationships for mothers and fathers is significant ($Z=2.17$, $p=.03$). Fathers appear to become more interested in their infants with time, whereas mothers may decrease their attention to the infants. Now that the infant is becoming more social, fathers

may begin to interact with them more. Mothers, on the other hand, have been interacting a lot already because of frequent caretaking demands of young infants, and may be decreasing their attention as caretaking demands gradually decline. They may also be decreasing their attention somewhat as a complementary process in response to the increasing interest of fathers in the infants.

Age effects may contribute to statistical relationships between behaviors. It is possible for a significant correlation to be a spurious effect of the relationship between age and both behaviors. For example, if age causes an increase in both infant gazing and parent touching, there may be a positive relationship between the behaviors that is due only to a parallel increase in both with age. Partial correlations that control for age are analagous to testing the effects of age at each point on the age continuum. Controlling for age will show which relationships are due to a spurious age effect and which may have been masked by age effects. Changes in significance due to controlling for age will be noted as relationships are reported and discussed.

Relationships Between Touching and Gazing Behavior

Relationships between touching and gazing behaviors in the interactions observed were explored by computing correlation matrices with all of the behavior measures. There were more significant correlations in these matrices than would be expected by chance alone. However, it is not the number but the distinct patterns of significant correlations that contribute to our understanding of playful interactions between

parents and infants. These patterns of significant correlations are interpreted as indications of response systems in the dyads. The patterns differ from the total sample to the various subgroups formed by dividing by parent or infant sex. Therefore, the significant correlations found for the total sample and for each group will be discussed separately.

Total Sample

The correlations between measures of touch and gaze in the total sample (N=40) are presented in Table 5. A significant negative relationship was found between the total time that parents touch and the rate of mutual gaze (r=-.30*). The more often mutual gaze occurs between parent and infant, the less time the parent spends touching the infant. This correlation appears to be more of a function of the rate of baby gaze which is also negatively and significantly related (r=-.26*), than a function of parent gaze rate which shows a relationship in the opposite direction, although not significant (r=-.22). The only other significant relationship found between touch and gaze in the total sample was for the mean length of intervals between touches and the same measure for parent gazes (r=.34*).

After controlling for age (see Table 6), only the relationship between mean "not" intervals of parent touch and parent gaze remained significant (r=.43**); the relationships of touch with mutual and baby gaze lost significance. Thus, those relationships that lost significance may have been due to spurious age effects on touching time for boys and mothers and on mutual gaze rates for girls. However, these same correlations, when significant in separate sex groups, were not

Table 5

Relationships of Touch with Gaze in Total Sample

(N=40)	TOUCH			
	%	Rate	Mean Duration	Mean NOT Intervals
GAZE				
Mutual Gaze				
%	-.14	-.20	-.01	.12
Rate	-.30*	-.13	-.14	.11
Mean Duration	-.03	-.24	.11	.13
Baby Gaze				
%	-.20	-.23	-.05	.22
Rate	-.26*	-.12	-.09	.05
Mean Duration	-.13	-.23	.01	.26
Mean NOT Interval	.19	.20	-.02	-.17
Parent Gaze				
%	-.04	-.03	-.04	-.10
Rate	.22	.16	.10	-.17
Mean Duration	-.19	-.04	-.17	.13
Mean NOT Interval	-.12	-.18	.00	.34*

*$p \leq .05$

Table 6

Correlations of Touch and Gaze in Total Sample with Age Controlled

(N=40)	TOUCH			
GAZE	%	Rate	Mean Duration	Mean NOT Interval
Mutual Gaze				
%	-.12	-.19	-.01	.10
Rate	-.25	-.09	-.13	.06
Mean Duration	-.05	-.25	.10	.15
Baby Gaze				
%	-.18	-.22	-.04	.21
Rate	-.23	-.10	-.09	.01
Mean Duration	-.12	-.23	.01	.25
Mean NOT Interval	.15	.18	-.03	-.14
Parent Gaze				
%	.04	.01	-.03	-.16
Rate	.21	.15	.10	-.16
Mean Duration	-.20	-.04	-.17	.13
Mean NOT Interval	-.22	-.23	-.01	.43**

*$p \leq .05$, **$p \leq .01$

affected by controlling for age. The effect of controlling for age in the total sample may be due to the older mean age of the girls for whom these relationships are not significant.

In the total sample, the strongest relationship indicates that, as parents increase the intervals between their gazes, they also increase the pauses between their touches; and this relationship becomes even stronger with age controlled. In general, it seems that parent touching of infants is related to the overall attention and arousal of the parent. Both visual and physical contact with their infants may provide unique stimulation to the parents, requiring varying lengths of pauses. Parents may use touch to modulate their own arousal to the infant as a novel stimulus. As well as a novelty, the infant may also represent a discrepancy to the parent, another source of psychological arousal. Babies are intensely attractive but still very unsocialized at this age. Parents may find them very pleasant and interesting to look at, but also anxiety provoking since the infant's behavior is as yet not quite "human," and parents will be responsible for the "humanizing."

Relationships between gaze behaviors are shown in Table 7. All but one of the relationships between mutual gaze measures and baby gaze measures were highly significant, indicating, as expected, that it is the infant's gaze more than the parent's that determines mutual gaze. Although mutual gazing with girls increases with age, and fathers increase the amount and length of their own gazes as infants get older, controlling for age (Table 8) did not noticeably affect any of the relationships between gazing measures.

Table 7

Correlations Between Gaze Measures in Total Sample

(N=40)	MUTUAL GAZE			
	%	Rate	Mean Duration	Mean NOT Interval
INDIVIDUAL GAZE				
Baby Gaze				
%	.97***	.71***	.72***	
Rate	.47***	.84***	.06	
Mean Duration	.84***	.40**	.82***	
Mean NOT Interval	-.69***	-.77***	-.41**	
Parent Gaze				
%	.33*	.05	.42**	
Rate	-.36*	.08	-.62***	
Mean Duration	.33*	-.15	.62***	
Mean NOT Interval	-.18	-.16	-.07	
(N=40)	PARENT GAZE			
BABY GAZE				
%	.17	-.29*	.21	.00
Rate	-.07	.06	-.14	-.04
Mean Duration	.19	-.37**	.30*	.07
Mean NOT Interval	.00	.13	-.07	-.04

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

Table 8

Correlations Between Gaze Measures in Total Sample with Age Controlled

(N=40)	MUTUAL GAZE			
	%	Rate	Mean Duration	Mean NOT Interval
INDIVIDUAL GAZE				
Baby Gaze				
%	.97***	.71***	.73***	
Rate	.46**	.84***	.06	
Mean Duration	.84***	.40**	.83***	
Mean NOT Interval	-.68***	-.76***	-.42**	
Parent Gaze				
%	.32*	.01	.44**	
Rate	-.35*	.10	-.63***	
Mean Duration	.33*	-.16	.62***	
Mean NOT Interval	-.16	-.12	-.08	
(N=40)	PARENT GAZE			
BABY GAZE				
%	.16	-.28*	.21	.02
Rate	-.10	.07	-.14	-.01
Mean Duration	.18	-.37**	.30*	.08
Mean NOT Interval	.03	.12	-.07	-.07

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

The only mutual gaze measure that is not significantly related to all of the baby gaze measures is mean duration or length. The average length of a mutual gaze does not seem to be related to how often the infant looks or looks away; however, it is significantly related to the parents' gaze rates (r=-.62**). The amount and length of parent gaze is also strongly related, but positively, to the length of mutual gazes (r=.42**, r=.62**). These parent gaze measures are also positively related to the total percent of time spent in mutual gaze (r=.33*, r=.32*). However, parent gaze rate is negatively related (r=-.36*) to the total amount of mutual gaze, whereas baby gaze rate is positively related (r=.47***). It seems that although infant gaze patterns determine mutual gaze to a large extent, parents facilitate longer mutual gazes by slowing down their rates of gazing and lengthening the total and average duration of their gazes.

The opposite effects of parents and baby gaze rates on mutual gazing time are probably due to the negative relationship of parent gaze rate with the amount and duration of infant gazes (r=-.29*, r=-.37**). The average durations of parent and baby gazes are positively related (r=.30*). It appears that although these infants spent less time looking, the more frequently parents looked, as suggested by other studies (Field, 1977, 1978; Peery, 1978); they looked for longer periods if parent gazes were longer. The longer slower looks of parent may be less arousing to the infants, who then do not look away as often, thereby making longer looks.

Another interpretation of these data is that the parents are responding to the infant more than vice versa. Hayes and Elliott (1979)

have found infant gaze to be determined by general arousal alone, but parent gaze to be influenced by the infant's gazes and vocalizations. As these babies gaze more and for longer durations, parents slow down their gazing behavior and lengthen their gazes, and mutual gazes get longer. Thus, it is not only the frequency of baby gaze that parents respond to, as suggested by Peery (1978), but also the mean and total duration of baby gazes. In this sample, the frequency of baby gaze influences parent touch, but parent gaze is related only to the duration measures of infant gaze. It may be simply that parents are more interested in babies who gaze more, or it may be that parents are taking advantage of longer baby gazes by adjusting their gaze rate and length to maximize the probability of mutual gaze. When these babies look longer, the parents slow down and look longer at the baby. This change in parent behavior contributes little to the rate of mutual gaze, which is determined primarily by the infants, but more to the length of the mutual gazes. Parents evidently spend a lot of time looking and waiting for the baby to make eye contact; and when the baby finally looks, the parents look as long as they can tolerate it (Argyle & Cook, 1976) before making a brief glance away.

Sex Differences

Groups were divided by either infant or parent sex and analyzed separately. "Boys" are all the male infants with both mothers and fathers; "mothers" are all the mothers in the sample with their male and female infants, etc. A relationship that is significant only for boys and mothers would not necessarily only be significant for boys with mothers. The groups were further subdivided by both infant

and parent sex in order to examine the effect of sex interactions without making possibly misleading assumptions.

Although ANOVA's showed few sex differences for the specific behaviors, correlations between behaviors within the different sex subgroups did reveal some interesting and sometimes significant sex differences. The negative relationships found for the amount of touch with mutual and baby gaze rates in the total sample hold true for boys, mothers, and mothers with boys when considered separately, but not for girls or fathers. On the other hand, the significant relationships found between parent gaze rates and infant gaze amount and length are true of girls, mothers, and girls with mothers, but not for the other groups.

The different significant relationships indicate that parents respond differently to boys and girls. Boys are responded to with changes in touch; girls are responded to with changes in gazing. This basic difference in parent response to male and female infants may represent the early sex-typed differences in parent response that contribute to differential socialization for sex roles.

The differences between mothers and fathers may reflect differences in experience. Mothers may be more sensitive and show more responsiveness with infants because of the greater experience with caretaking. Caretaking demands that mothers learn which cues in the infant's behavior indicate distress and which of their own behaviors seem to sooth or stimulate the infant.

These ideas will be discussed further as the specific results for the different groups are compared.

Relationships for Male and Female Infants. A correlation matrix for touch and gaze relationships for boys and girls, considered separately, is presented in Table 9. Boys will be discussed first.

The negative relationships between touching time and the rate of mutual and baby gaze reported for the total sample are even stronger for boys when they are considered separately ($r=-.57^{**}$, $r=-.40^{*}$). In addition, there are significant relationships for boys only between touch time and mutual gazing time ($r=-.43^{*}$), baby gaze time ($r=-.43^{*}$), length of baby gazes ($r=-.42^{*}$), and the length of intervals between baby gazes ($r=.50^{*}$). Also for boys only, the mean length of intervals between touches increases as parent gaze length increases ($r=.44^{*}$), although this relationship loses significance when age is controlled (Table 10). For girls, none of these relationships even approach significance.

Distinct differences in parent response to male and female infants can also be seen in the gazing responses of parents. Few correlations of parent gaze with mutual and baby gaze are significant for boys, with the exception of the relationships of mutual gaze length with parent gaze rate and length ($r=.62^{**}$, $r=.41^{*}$) which are significant for both sexes, even with age controlled. (See Tables 11 and 12.)

Parents seem to have different response systems with male and female infants. Time spent touching boys is negatively related to measures of mutual and baby gaze. For girls, the significant relationships for touching are with parent gaze only, and are often in the opposite direction of those for boys. It may be that only boys are highly stimulated by touching and thus look away more often and for longer periods

Table 9

Correlations of Touch and Gaze for Boys and Girls

Boys/Girls (N=18) (N=22)	TOUCH							
	%		Rate		Mean Duration		Mean NOT Interval	
GAZE								
Mutual Gaze								
%	-.43*	.11	-.26	-.15	-.15	.09	.12	.14
Rate	-.57**	-.04	-.28	.08	-.25	-.06	.13	.10
Mean Duration	-.35	.21	-.35	-.20	.04	.18	.28	.08
Baby Gaze								
%	-.43*	.00	-.25	-.23	-.15	.03	.11	.32
Rate	-.40*	-.16	-.19	-.03	-.14	-.07	-.04	.13
Mean Duration	-.42*	.10	-.29	-.21	-.08	.09	.28	.28
Mean NOT Interval	.50*	.01	.29	.15	.08	-.07	-.14	-.19
Parent Gaze								
%	-.32	.25	-.34	.34	-.08	.01	.38	-.46*
Rate	.35	.01	.23	.03	.04	.14	-.30	-.06
Mean Duration	-.32	-.06	-.13	.07	-.18	-.16	.44*	-.10
Mean NOT Interval	.13	-.28	.10	-.43*	.20	-.09	-.23	.64***

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Table 10

Correlations of Touch and Gaze of Boys and Girls with Age Controlled

Boys/Girls (N=18) (N=22)	TOUCH							
	%		Rate		Mean Duration		Mean NOT Interval	
GAZE								
Mutual Gaze								
%	-.50*	.12	-.29	-.15	-.16	.09	.16	.14
Rate	-.59**	.07	-.27	.12	-.25	-.07	.10	-.01
Mean Duration	-.38	.13	-.36	-.25	.04	.20	.31	.19
Baby Gaze								
%	-.51*	.02	-.29	-.22	-.15	.03	.17	.32
Rate	-.44*	-.07	-.20	.00	-.14	-.07	-.05	.04
Mean Duration	-.48*	.07	-.31	-.23	-.09	.09	.32	.32
Mean NOT Interval	.53*	-.05	.29	.14	.08	-.07	-.13	-.15
Parent Gaze								
%	.20	.25	-.26	.34	-.07	.01	.27	-.47*
Rate	.30	.09	.18	.06	.03	.14	-.25	-.14
Mean Duration	-.23	-.14	-.05	.05	-.17	-.16	.37	.03
Mean NOT Interval	-.04	-.33	-.02	-.45*	.19	-.09	-.09	.71***

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

Table 11

Correlations Between Gaze Measures of Boys and Girls

GAZE RELATIONSHIPS	MUTUAL GAZE							
Boys/Girls (N=18) (N=22)	%		Rate		Mean Duration		Mean NOT Interval	
Baby Gaze								
%	.99***	.96***	.78***	.70***	.73***	.71**		
Rate	.56**	.45*	.82***	.87***	.20	.01		
Mean Duration	.82***	.84***	.53*	.35	.75***	.83***		
Mean NOT Interval	-.75***	-.68***	-.81**	-.79***	-.49*	-.41*		
Parent Gaze								
%	.21	.37*	.03	.08	.38	.40*		
Rate	-.25	-.42*	-.02	.18	-.62**	-.66***		
Mean Duration	.04	.50**	-.23	-.07	.41*	.74***		
Mean NOT Interval	.02	-.25	-.05	-.25	.18	-.13*		
	PARENT GAZE							
Baby Gaze								
%	.12	.15	-.18	-.34	-.04	.36*	.08	-.02
Rate	-.00	-.07	-.13	.30	-.13	.13	.16	-.18
Mean Duration	.13	.15	-.17	-.50**	-.01	.46*	.08	.10
Mean NOT Interval	.00	.00	.29	.02	.00	-.11	-.23	.04

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

Table 12

Gaze Correlations for Boys and Girls with Age Controlled

Boys/Girls (N=18) (N=22)	MUTUAL GAZE							
	%		Rate		Mean Duration		Mean NOT Interval	
Baby Gaze								
%	.99***	.96***	.79***	.74***	.73***	.78***		
Rate	.56**	.47**	.83***	.85***	.20	.14		
Mean Duration	.82***	.85***	.54*	.43*	.75***	.85***		
Mean NOT Interval	-.76***	-.69***	-.81***	-.79***	-.49*	-.51**		
Parent Gaze								
%	.25	.37*	.00	.10	.41	.42*		
Rate	-.26	-.45*	.03	.08	-.63**	-.62**		
Mean Duration	.06	.53**	-.26	.03	.42*	.72***		
Mean NOT Interval	-.01	-.25	-.03	-.21	.20	-.19		
	PARENT GAZE							
Baby Gaze								
%	.17	.15	-.21	-.37*	-.02	.39*	.04	-.01
Rate	-.06	-.06	-.14	.23	-.14	-.05	.17	-.14
Mean Duration	.16	.15	-.18	-.49*	.00	.44*	.06	.09
Mean NOT Interval	.03	-.01	.28	.08	.02	-.17	-.27	.01

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

when parents touch more. It may also be that parents change their touching in response to infant behavior only if the infant is a male.

The relationships with boys may be because parents use touch with boys as an attention getting technique or because they use it as a stimulating or soothing technique to modify the male infant's arousal. For example, the increase in percentage of time touching with longer baby gazes away may be due either to more attention getting efforts by parents when the infant is not attending, or to more arousal by the male infants when parents touch more. The association of decreases of touching, with a decrease in both rate and length of baby gaze, implies a decrease in infant attention and gazing activity level when parents are touching more. Since males are more active from birth (Phillips et al., 1978) and take a more "leading place" in adult infant play by the age of two months (Trevarthen, 1974), interactions with boys may have been more likely to shape parents' responsive touching behavior. This may also be why boys are touched slightly more than girls, even though they are touched less with age.

There may be another explanation for these relationships that are significant only for boys. As baby gaze, and therefore mutual gaze increases, parents may become more aware of the infant "as a person," as suggested by Robson (1967), and also as a male. Cultural norms against physical affection with males may explain the decrease in parent touching with boys who gaze more. This idea is supported by the negative effect of age on parent touch which holds for boys but not girls. Parents may have concepts in their minds that include sex-typed expectations of male and female infants and of their own appropriate

behavior with each sex. Boys, even newborns, are described as harder and tougher and more active (Rubin, Provenzano & Luria, 1974). The greater activity rates may be real, but these characteristics are attributed to infants labeled male regardless of their actual sex. These stereotypes are evident in groups as young as three years of age (Haugh, Hoffman & Cowan, 1980) and are assumed to be very strong in adults, even well educated adults who may support egalitarian sex role values (Fagot, 1974).

The behaviors parents use to respond to female infants are quite different. As boy babies look more, parents touch less, but do not change their gazing behavior much. As girls look more, parents look more but show little change in touching. Although touch measures are not related to mutual or baby gaze measures for girls, there are some significant relationships between parent touching and parent gazing with girls only. Touch rate with girls is faster and the intervals between touches shorter if the intervals between parent gazes are shorter ($r=-.43^*$, $r=.64^{**}$). Also, the length of intervals between touches are shorter as the percentage of parent gazing time at girls increases ($r=-.46^*$).

This last relationship mentioned for girls is in the opposite direction for boys and significantly different ($Z=2.6$, $p=.009$), although the correlation for boys only approaches significance ($r=.38$, $p=.059$). The relationships of intervals between touches with the intervals between parent gazes are also opposite and significantly different for boys and girls ($Z=2.88$, $p=.004$). A more meaningful comparison may be made between the relationships of intervals between touches with length

of parent gazes for boys (r=.44*) and length of parent gazes away for girls (r=.64**). If these relationships are assumed to be in the opposite direction and compared directly, the sex difference is highly significant (Z=3.59, p=.0004). With female infants, parent touching changes only in relation to their own attention--parent attention to girls is related to less frequent and shorter pauses between touches. Parent attention to boys, on the other hand, is related to longer pauses between touches.

With girls, parent gazing behavior seems to be more responsive than touching. The parent gazing response to infant gaze that was seen in the total sample is evident for girls but not boys when considered separately. When girls make longer gazes, parents both slow the frequency of their gazes (r=-.50**) and lengthen their gazes (r=.46*). Parents also gaze significantly longer at baby girls who spend more total time gazing (r=.36*). As girls look more frequently and for longer durations, parents slow down and lengthen their gazes. This change and shorter gazes away appear to contribute to the longer mutual gazes with girls. They are also related to shorter intervals between touches. Since the intervals between touches to girls shorten as the percent of parent gazing time increases, and touch rate slows down as parent gazes away lengthen, touch with girls appears to be related not to feedback from the infant nor to parent arousal, but more simply to parent attention. Since touch with girls does not vary with mutual and baby gazing, it seems to be used less as an attention getting or arousal modulating technique than an expression of the parents' attention and affection.

Touching female infants does not decrease with age like it does with male infants, nor does it change with changes in girls' attention and arousal cues. One possible explanation of these differences between boys and girls is that the greater neurological maturity of female infants and lower activity rates, regardless of age, may demand fewer adjustments in parent touching in response to arousal cues from infant gazing behavior. Another possibility is that touching girls is a more direct expression of attention and affection unhampered by cultural values.

Relationships for Fathers and Mothers. Table 13 shows the touch/gaze correlation matrix for both fathers and mothers. Mothers and fathers show different relationships between touching and gazing behaviors, indicating unique patterns of responding to infants. Mothers will be discussed first.

The rate of mother touch is negatively related to the percent of time and rate of both mutual ($r=-.49^{*}$, $r=-.56^{**}$) and baby gaze ($r=-.52^{**}$, $r=.49^{*}$) and positively related to the length of intervals between baby gazes ($r=.51^{*}$). The length of time between mothers' touches increases as mutual gaze rate ($r=.63^{**}$) and baby gaze rate ($r=.38^{*}$) increase. For mothers, their own gazing behavior is unrelated to their touching behavior, but increases in mutual and baby gazing time and rate and decreases in baby gazes away are related to decreases in touching rates and increases in the intervals between touches. In other words, as infants gaze more often, mothers touch less often; and the pauses between touches lengthen. The same relationships for fathers are not significant.

Table 13

Correlations of Touch and Gaze for Mothers and Fathers

Fathers/Mothers (N=20) (N=20)	TOUCH							
	%		Rate		Mean Duration		Mean NOT Interval	
GAZE	F/M		F/M		F/M		F/M	
Mutual Gaze								
%	-.29	-.05	.19	-.49*	-.36	.14	.09	.29
Rate	-.33	-.27	.31	-.56**	-.47*	.09	-.09	.63**
Mean Duration	-.28	.06	-.22	-.28	-.03	.12	.35	.00
Baby Gaze								
%	-.33	-.08	.10	-.52**	-.36	.13	.19	.37
Rate	-.40*	-.07	.27	-.49*	-.47*	.18	-.09	.38*
Mean Duration	-.23	-.07	-.13	-.34	-.13	.07	.31	.26
Mean NOT Interval	.36	-.04	-.08	.51*	.30	-.26	-.12	-.37
Parent Gaze								
%	-.10	-.05	.03	-.11	-.10	-.06	-.04	-.15
Rate	.43*	.02	.32	.04	.10	.11	-.43*	.25
Mean Duration	-.36	-.08	-.18	.05	-.20	-.19	.36	-.21
Mean NOT Interval	-.11	.03	-.36	.11	.13	-.02	.39*	-.03

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

The touching response of mothers is more affected by the age of the infant than the touching response of the fathers. The negative effect of age on touch, found in the total sample, holds true for mothers but not fathers. As age increases, mothers spend less percentage of time touching (r=-.50*) and longer intervals between touches (r=.40*). The relationships between age and touch measures for fathers were not significant. After controlling for age (Table 14), the correlations of mothers' pauses between touches with baby gaze rate lost significance, and those with baby gazing time and gazes away gained significance (r=.42*, r=.40*). Thus, despite parallel age effects, there seems to be a stable relationship between mothers' non-touching intervals and baby gaze, with mothers pausing longer between touches when the infant gazes more.

Mother touching is related to other baby and mutual gaze measures as well and seems to represent a sophisticated complex response. Mothers may slow down their touches and lengthen the pauses between them without significantly changing the length or total time of touching. While touch length increases slightly, but not significantly, in relation to baby gaze rates, the total time spent touching shows almost no relationship to baby gaze. Thus, mothers seem able to change the pattern and intensity of tactile stimulation without changing the amount much. This pattern may include both consistency and change at the same time, characteristic of arousing and playful stimuli, by slowing down and pausing longer while still touching as much. With this "fine-tuned" response, mothers may be able to maintain the infant's attention while keeping him from becoming overstimulated. This

Table 14

Correlations of Touch and Gaze for Mothers and Fathers with Age Controlled

Fathers/Mothers (N=20) (N=20)	TOUCH							
	%		Rate		Mean Duration		Mean NOT Interval	
GAZE								
Mutual Gaze								
%	-.25	-.08	.22	-.52*	- 34	.14	.02	.33
Rate	-.31	-.15	.33	-.52*	-.46*	.10	-.13	.59**
Mean Duration	-.23	-.07	-.21	-.37	.00	.12	.30	.11
Baby Gaze								
%	-.29	-.11	.12	-.55**	-.34	.13	.14	.42*
Rate	-.40*	.05	.27	-.46*	-.47*	.19	-.11	.33
Mean Duration	-.18	-.15	-.11	-.39	-.10	.07	.27	.34
Mean NOT Interval	.32	-.05	-.10	.53**	.28	-.26	-.06	-.40*
Parent Gaze								
%	.00	-.06	.07	-.11	-.05	-.06	-.16	-.17
Rate	.39	.12	.31	.09	.06	.11	-.38	.20
Mean Duration	-.30	-.28	-.17	-.03	-.16	-.21	.29	-.10
Mean NOT Interval	-.19	-.10	-.40*	.06	.11	-.02	.49*	.07

*p $\leq$.05, **p $\leq$.01, **p $\leq$.001

responsiveness of mothers' touching may be due to their experience with the infants as primary caretakers. The responsibility of caretaking requires mothers to learn sensitive and complex responses to cues about the infant's state.

Correlations between gazing measures for mothers and fathers are presented in Table 15. Mothers seem to be more responsive than fathers in terms of their gazing as well as touching behaviors. As the length of mutual and baby gazes increase, mothers spend more total time gazing (r=.65**, r=.50*), at a slower rate (r=-.66**, r=-.41*), for longer durations (r=.77**, r=.52**), with shorter gazes away (r=-.41*, r=-.42*). The total amount of mutual and infant gaze is also significantly related to mothers' total gazing time (r=.54**, r=.46*), length of gazes (r=.47*, r=.39*), and length of gazes away (r=-.48*, r=-.44*). Very few of these correlations are significant for fathers. Mothers seem to show a strong attention response to infant gazing and to make a significant contribution to mutual gaze not indicated in the correlation matrix for fathers.

None of the specific touch correlations were found to be significant for both mothers and fathers when considered separately. Mutual and baby gaze, related to mother touching rate and pauses between touches, are related instead to father touching time and length. The relationship between rates of mutual and baby gaze and length of touches are significant for fathers only (r=-.47*, r=-.47*). Fathers' touches are shorter when baby gaze and mutual gaze occur more often. The significant relationships found in the total sample for touch percent time with baby gaze rate are significant for fathers but not for mothers

Table 15

Correlations Between Gazing Measures for Mothers and Fathers

Fathers/Mothers (N=20) (N=20)	MUTUAL GAZE							
	%		Rate		Mean Duration		Mean NOT Duration	
Baby Gaze								
%	.97**	.99**	.74**	.69**	.71**	.78**		
Rate	.52**	.45*	.89**	.77**	.05	.08		
Mean Duration	.81**	.87**	.41*	.40*	.82**	.87**		
Mean NOT Interval	-.68**	-.73**	-.74**	-.81**	-.44*	-.44*		
Parent Gaze								
%	.09	.54**	.03	.10	.04	.65**		
Rate	-.29	-.41*	-.02	.18	-.61**	-.66**		
Mean Duration	.12	.47*	-.09	-.20	.35	.77**		
Mean NOT Interval	.03	-.48*	-.11	-.33	.31	-.41*		
	PARENT GAZE							
Baby Gaze								
%	-.10	.46*	-.24	-.33	.01	.39*	.23	-.44*
Rate	-.08	-.04	-.02	.15	-.07	-.20	-.03	-.12
Mean Duration	-.15	.51*	-.32	-.41*	.04	.52**	.38*	-.41*
Mean NOT Interval	.10	-.12	.28	-.02	-.11	-.03	-.18	.28

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

(r=-.40*). The more often the baby looks at the father, the less total time he spends touching.

The relationship between touch rate and mutual gaze rate with age controlled (Table 16) shows the greatest difference by sex of parent (fathers r=.33, mothers r=-.52*; Z=2.68, p=.007). When the rate of mutual gazing increases, mothers touch less often and fathers touch more often. This finding adds more support to the idea of distinct response patterns for mothers and fathers, possibly based on different reactions to eye contact with the infant.

Although none of the measures of mother gazing are significantly related to any of the measures of mother touching, father touching seems to be related to father gazing. The relationships between intervals between touches with intervals between gazes are significant for fathers only (r=.39*). The relationship between the parent gazing rate and the length of pauses between touches is also significant for fathers only but lost significance when age was controlled (Table 14). Age effects apparently mask a negative relationship between father gazing away and touch rate, which become significant when age is controlled (r=-.40*). The longer fathers look away, the less often they touch their infants. These relationships indicate that although father touching behavior is related to infant response, it is also related to the father's own gazing patterns that may be measures of the father's attention or arousal level.

Fathers respond to infant arousal, as indicated by baby gaze rates, simply by shortening their touches, thereby decreasing the total amount of touching. Fathers slow their touching and lengthen their pauses

Table 16

Gaze Correlations for Mothers and Fathers with Age Controlled

Fathers/Mothers (N=20) (N=20)	MUTUAL GAZE							
	%		Rate		Mean Duration		Mean NOT Duration	
Baby Gaze								
%	.96***	.99***	.73***	.73***	.69***	.79***		
Rate	.52*	.46*	.89***	.76***	.30	.14		
Mean Duration	.80***	.87***	.39	.45*	.81***	.87***		
Mean NOT Interval	-.66**	-.73***	-.74***	-.84***	-.39*	-.46*		
Parent Gaze								
%	-.02	.54**	-.04	.11	-.09	.67**		
Rate	-.22	-.41*	.04	.14	-.56**	-.65**		
Mean Duration	.02	.49*	-.17	-.13	.27	.75***		
Mean NOT Interval	.10	-.50*	-.08	-.29	.42*	-.49*		
	PARENT GAZE							
Baby Gaze								
%	-.22	.46*	-.18	-.33	-.08	.40*	.31	-.45*
Rate	-.11	-.05	.00	.12	-.10	.15	-.02	-.07
Mean Duration	-.29	.51*	-.26	.40*	-.07	.51*	.48*	-.45*
Mean NOT Interval	.22	-.12	.22	-.02	-.01	-.03	-.26	.29

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

only in relation to their own gazes away. Thus, although fathers may use touch to modulate their own arousal, they do not appear to have a very complex response to indications of infant arousal. The fathers spend less time taking care of the infant and may thus be less responsive. They may also be more interested in the infant as a novel stimulus, and therefore respond more in terms of their own attention.

Other studies have found that fathers end up being the preferred playmate of older infants (Clarke-Stewart, 1978; Lamb, 1976a, 1976b; Lynn & Cross, 1974). The characteristically physical play between fathers and their infants (Clarke-Stewart, 1978; Lamb, 1976a; Trevarthen, 1974) may have its beginnings in early infancy, and may continue because the infants continue to be novel and interesting to fathers who continue to be less involved in caretaking and will be less familiar both with and to the infant. Although the fathers do not touch the infants more than the mothers do, their touching occurs in a different pattern than mothers and is related more to their own attention. This difference may make the father's behavior less predictable to the infant and thus more interesting or fun. Contrary to previous findings, there were no indications here that these very young infants preferred their fathers, at least not in terms of the gazing behavior measured. The preference documented in other studies may develop later, but the unique patterns of father-infant interaction seem to be present as early as four months.

Although mothers show a complex gazing response, very few correlations between gazing measures were significant for fathers. For fathers, the only significant correlations are between their own gaze

rate and mutual gaze length (r=-.61**), and the pauses between father gaze which increase with the length of baby gazes (r=.38*). This last relationship is also significant for mothers but in the opposite direction (r=-.42*). The difference between the correlations is significant (Z=2.47, p=.01), and is even greater with age controlled (Table 16).

It seems that as infants look longer, mothers look more and look away more briefly, but fathers look away longer. This difference may also reflect the greater experience of mothers and the greater attention or arousal of fathers to their infants. The greater reciprocity in the mother-infant relationship may be due to a greater level of intimacy. The fathers may be responding in a more complimentary manner, adjusting their gaze to compensate for infant gaze and maintain some sort of equilibrium.

The different response to the infant's gaze may also be due to a greater tolerance of mutual gaze on the part of the mothers. Other studies have found that females look more and maintain longer mutual gazes (Argyle & Dean, 1965; Exline, Gray & Schuette, 1965). Even infants and young children show this difference (Kagan & Lewis, 1965; Levine & Sutton-Smith, 1973), which may explain the increase in mutual gaze for girls only in this sample. If girls are looking longer and mutual gaze with them is lasting longer, mothers and fathers may have differing reactions to the female infants. However, such interpretations require information from the various subgroups.

Relationships for Fathers with Boys and Girls and Mothers with Boys and Girls. Correlations between behaviors were computed for each of

four subgroups: fathers with boys, fathers with girls, mothers with boys, and mothers with girls. The small size of the subgroups (N=9 or 11) requires that correlations be even stronger to be considered significant. Nevertheless, several correlations are highly significant in the smaller subgroups and support the pattern of sex differences previously discussed. Table 17 shows the correlation matrices for mothers and fathers with boys. Table 18 shows the same relationships for mothers and fathers with girls.

Mothers with Boys. It is mothers' touching behavior that seems most responsive to boys behavior. The complex response system of slowing touching and making longer pauses between touches as babies gaze more is true only in this subsystem. As baby boys spend more time looking at their mothers, mothers slow down their touching rate ($r=-.65^*$) and make longer pauses between touches ($r=.63^*$). Also, mothers touch less often when mutual and baby gaze rates increase ($r=-.78^{**}$, $r=-.76^{**}$), and touch more often with shorter pauses as boys look away longer ($r=.87^{**}$, $r=-.59^*$). When boys make longer looks at mothers and when mutual gaze occurs more often, the mothers pause longer between touches ($r=.73^*$, $r=.63^*$). The complex gazing response of mothers is not evident in this subgroup. Mother gaze is not related to baby boy gaze, but does seem to contribute to mutual gazes which are longer when mothers spend more time looking and look away less often ($r=.65^*$, $r=-.68^*$).

It seems that mothers with boys use touch both as an arousal modulating technique depending on the boys' gaze rate and as an attention getting technique when boys are looking away longer and making

Table 17

Correlations for Mothers and Fathers with Boys

Boys Mothers/Fathers (N=9) (N=9)	TOUCH							
	%		Rate		Mean Duration		Mean NOT	
	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads
Infant Age	-.59*	-.26	-.44	-.14	-.05	-.09	.58*	.37
Mutual Gaze								
Percent Time	-.45	-.45	-.64*	.23	.03	-.50	.54	-.09
Rate	-.70*	-.50	-.78**	.23	.01	-.63*	.89**	-.21
Mean Duration	-.17	-.52	-.47	-.19	.10	-.06	.17	.38
Baby Gaze								
Percent Time	-.50	-.41	-.65*	.22	.00	-.42	.63*	-.14
Rate	-.26	-.49	-.76**	.20	.37	-.62*	.32	-.16
Mean Duration	-.53	-.36	-.49	-.06	-.16	-.02	.73*	.08
Mean NOT	.46	.59*	.87**	-.16	-.30	.55	-.59*	.00
Parent Gaze								
Percent Time	-.33	-.31	-.36	-.32	-.02	-.17	.18	.50
Rate	.03	.63*	.14	.34	-.04	.10	.19	-.59*
Mean Duration	-.05	-.48	.10	-.35	-.14	-.20	-.23	.72*
Mean NOT	.43	.02	.24	.03	.14	.34	-.47	-.20

Table 17 (Cont.)

Correlations for Mother and Fathers with Boys

	PARENT GAZE							
	%		Rate		Mean Duration		Mean NOT	
	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads
Infant Age	.12	.61*	.24	-.67*	-.33	.75*	-.67*	-.25
Mutual Gaze								
Percent Time	.54	-.14	-.38	-.13	.26	-.13	-.16	.16
Rate	.40	-.28	-.05	.06	-.09	-.31	-.47	.15
Mean Duration	.65*	.10	-.68*	-.56	.55	.30	.13	.23
Baby Gaze								
Percent Time	.48	-.21	-.30	-.10	-.17	-.19	-.17	.25
Rate	.42	-.33	-.37	.01	.10	-.25	-.06	.24
Mean Duration	.35	-.07	.10	-.29	.05	-.03	-.24	.29
Mean NOT	-.40	.27	.26	.37	-.04	-.01	.12	-.41

*$p \leq .05$, **$p \leq .01$

Table 18

Correlations for Mothers and Fathers with Girls

Girls Mothers/Fathers (N=11) (N=11)	TOUCH							
	%		Rate		Mean Duration		Mean NOT	
	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads
Infant Age	-.45	-.12	-.20	.04	.03	-.05	.45	.24
Mutual Gaze								
Percent Time	.26	-.11	-.41	.22	.22	-.23	.13	.21
Rate	.16	-.15	-.25	.46	.14	-.32	.29	.02
Mean Duration	.25	.01	-.27	-.24	.17	.05	-.05	.36
Baby Gaze								
Percent Time	.26	-.21	-.43	.03	.22	-.28	.16	.42
Rate	.03	-.32	-.29	.40	.09	-.35	.44	.01
Mean Duration	.26	-.08	-.28	-.16	-.19	-.14	-.03	.47
Mean NOT	-.29	.21	.32	-.03	-.24	.15	-.25	-.18
Parent Gaze								
Percent Time	.32	.07	.19	.45	-.08	-.04	-.55*	-.42
Rate	-.08	.20	-.09	.28	.23	.08	.32	-.29
Mean Duration	-.04	-.26	.00	.07	-.21	-.22	-.19	.00
Mean NOT	-.31	-.18	.04	-.74**	-.12	.04	.29	.69**

Table 18 (Cont.)

Correlations for Mothers and Fathers with Girls

PARENT GAZE

	%		Rate		Mean Duration		Mean NOT	
	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads	Moms	/ Dads
Infant Age	-.56*	.39	.61*	-.08	-.67*	.30	.28	-.37
Mutual Gaze								
Percent Time	.50	.26	-.38	-.46	.54*	.43	-.60	-.06
Rate	-.14	.32	.46	-.11	-.27	.21	-.36	-.30
Mean Duration	.61*	-.01	-.67*	-.70**	.82***	.49	-.48	.37
Baby Gaze								
Percent Time	.45	-.02	-.33	-.39	.49	.26	-.57*	.21
Rate	-.32	.25	.56*	-.08	-.32	.26	-.23	-.28
Mean Duration	.55*	-.20	-.59*	-.38	.68**	.14	-.40	.42
Mean NOT	-.05	-.01	-.17	.22	-.07	-.21	.43	-.08

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

shorter looks and when there is less mutual gaze. However, significant age effects indicate that this may change. As boys get older, mothers spend less time touching them (r=-.59*) and pause longer between touches (r=.57*), but their gazes away are shorter (r=-.67*). Thus, mothers are not necessarily interacting less with the older male infants, just touching less. It seems to be the mothers rather than the fathers that may be concerned about touch as inappropriate with males. This may be because mothers have a more intimate relationship with infants and may have a more distinct concept of the baby as a male and may feel more cultural pressure than fathers to provide appropriate sex-typed socialization to males. Or mothers may be more sensitively decreasing the use of attention getting and arousal modulating techniques with the increasing maturity of male infants. Nevertheless, even though touch to boys decreases with age, touching appears to be an important part of interaction between mothers and boys in early infancy.

Fathers with Boys. Fathers show differences in their touching behavior in relation to baby boys' gaze, but in a different pattern than mothers. The touch response seen with all fathers is evident with boys only. When boys look at or away from fathers more often, and the frequency of mutual gaze increases, the fathers shorten their touches (r=-.62*, r=-.63*); but when the baby boys look away for longer periods of time, the fathers spend more total time touching (r=.59*). Fathers may indeed shorten touches as babies appear more active or stimulated, but they seem to use touch more as an attention getting than as an arousal modulating technique, touching more when baby boys look less often and look away longer. Since none of these relationships are

significant for fathers with girls, they may reflect the greater concern of fathers with the relationship with their sons. Parents of two year olds have reported that they expect a special relationship between fathers and sons (Fagot, 1974). These expectations probably begin in early infancy and influence the father's response system with his son.

Fathers' touching of boys is also related to their own attention. As fathers' rates of gazing at boys decreases, indicating less frequent glances away, they spend less total time touching the infant (r=.63*) and pause longer between touches (r=-.59*). Also, the increasing length of father gaze at boys is related to longer pauses between touches (r=.72*). Like mothers, some fathers may also be experiencing more concern about the appropriateness of touching boys as they become more involved with them. This concern may lead fathers to be aroused by tactile contact, as indicated by their more frequent looks away when they spend more time touching their male infant even as an attention getting technique.

The gazing behavior that fathers show toward male infants does not seem to change in relation to any of the mutual or baby gaze measures, but only in relation to infant age. Fathers seem to pay more attention to boys as they get older. Age may represent the general development of the infant or simply more time and a longer history of father-infant interaction. As baby age increases, fathers gaze more (r=.61*) and for longer periods (r=.75**), looking away less often (r=-.67*). Thus, even though age is not directly related to father touching of boys, fathers touch less as they become more attentive to the male infants; and they become more attentive with age.

Fathers may be looking more when they have had more time to experience the infant, because the infant becomes less discrepant or arousing. However, these correlations were not significant in any other subgroup; fathers do not show this relationship with girls. And even though the boys in this sample were, on the average, younger than the girls, fathers looked at them slightly more. The increasing interest of fathers in boys may be due to role perceptions the father has about being a father to a son.

Mothers with Girls. Mothers seem to touch girls only in relation to their own attention. The more time mothers spend looking at their daughters, the shorter are their pauses between touches ($r=-.55^{*}$). It may be that mothers who are very interested in and involved with their daughters are less willing to break physical contact for long, regardless of the girl's response. Mother touch to girls seems to be more of a direct expression of attention and affection than a technique for arousal modulating or attention getting.

Girls' gazing measures are not significantly related to any of the mothers' touching measures. However, mothers spend more time looking when girls' gazes are longer ($r=.55^{*}$). In fact, mother gazing appears to be very responsive to the gaze behavior of girls. When girls are taking longer looks at their mothers, the mothers not only spend more time looking but lengthen their gazes ($r=.68^{**}$), and look away less often ($r=-.59^{*}$). Also, when girls spend more total time gazing, mothers gaze away for shorter periods ($r=-.57^{*}$), again apparently less willing to break contact for long.

The changes in mothers' gazes at daughters appears to facilitate

mutual gaze. Mutual gazes with girls are longer when mothers gaze more frequently and make longer gazes (r=.61*, r=.82***), and when mothers look away less often (r=-.66*). The total amount of mutual gaze also increases as mothers gaze longer (r=.54*) and gaze away for less long (r=-.60*). Mothers seem to be particularly successful at facilitating mutual gaze with girls, possibly because both females may have greater tolerance for mutual gaze, as has been indicated in other studies (Argyle & Cook, 1976). Very few of these relationships were significant for mothers with boys. In fact, even though mother gaze rate is negatively related to mutual gaze length, both with boys and with girls, the mothers gaze less frequently when boys gaze more often (r=-.37, p=.17) but more frequently when girls gaze more often (r=.56*). The correlation for boys is not significant but strong and in the opposite direction from that of girls.

It is possible that mothers respond to girls in a more reciprocal manner, increasing the frequency of gaze to match the girl's gaze rates; whereas, they may respond to boys in a more complimentary manner, compensating for frequent shifts in the male infant's gaze by slowing their own gaze rate. However, since this is the only relationship that shows such a difference in maternal behavior with boys and girls, and since gazing rates are not significantly different for boys and girls, it may be that mothers simply respond differently because of different perceptions and interpretations about the infant's gaze rates. Experience with male infants, who are more active from birth (Phillips et al., 1978), may create a general expectancy in the mothers about increasing infant gaze rates as indicators of increasing arousal or

potential overstimulation in the male infant. This expectation may not develop with girls who are not only less active but perceived by parents as slower and quieter simply because of sex-typed expectancies parents have of female infants.

Another interesting subgroup difference is found in the relationship of infant age to parent gazing. Although fathers gaze at boys more with age, mothers look at girls less with age. As female infants get older, mothers spend less total time looking at them ($r=-.56^*$), their gazes are shorter ($r=-.67^*$) and they look away more often ($r=.60^*$). Each of these correlations is in the opposite direction and significantly different for fathers with boys ($Z=2.48$, $p=.01$; $Z=2.78$, $p=.005$; $z=3.30$, $p=.0009$). It appears that as fathers are getting more interested in their sons, mothers are getting less attentive to their daughters. This difference is difficult to explain. It may be because the length of mutual gaze between mothers and girls decreases with infant age ($r=-.66^*$). Mothers may have become less anxious about the girls' gazing patterns and thus be less motivated to facilitate mutual gazes with female infants as they develop more mature gazing behavior.

Fathers with Girls. Fathers' touching behavior to girls is related not to the infant behavior but only to the fathers' own gazes away. The more often fathers touch girls and the shorter the pauses between the touches, the shorter are the fathers' gazes away ($r=-.74^{**}$, $r=.69^*$). The touching behavior of fathers with their daughters appears to be a process parallel to visual attention to the infant and may, as suggested for mothers, be a more direct expression of interest and affection.

Father behavior with girls is very different than that with boys. The pauses between father touches are longer when they look away from girls longer, but the pauses are longer when they look at boys longer. This infant sex difference in the fathers' response, if assumed to be in the opposite direction, is highly significant ($Z=3.25$, $p=.001$). This implies that the more attentive fathers are to girls, the more they touch them; whereas, with boys, they touch them less.

Fathers with girls evidently do not experience anxiety about the appropriateness of touch. Touching and gazing of fathers at their daughters seem to be two aspects of the fathers' general interest and involvement and not specific instrumental responses to the infant. The behavior patterns of fathers with their daughters seems to represent a more expressive affectionate response system.

There was only one significant correlation of father gazing behavior with either mutual or baby gaze of female infants. Although slower father gazing rates appear to contribute to longer mutual gazes with girls ($r=-.70^{**}$), there are no other mutual or baby gazing measures that are related to any of the father behavior measures.

However, there does seem to be a change in mutual gaze with fathers as their infant daughters get older. As baby girls get older, mutual gaze with fathers increases, even though it decreases with mothers. Mutual gazes are only slightly longer, but occur significantly more frequently between fathers and girls with age ($r=.52^{*}$). With age, the total amount of mutual gaze with girls increases with fathers but decreases with mothers, although neither correlation is significant. Mothers may be decreasing their gazing to girls with age

as a complementary process in response to the increased frequency of mutual gaze between fathers and daughters.

Summary of Sex Differences. There were no relationships that produced significant correlations in all of the four subgroups. Changes in parent touching with changes in baby and mutual gaze are only true for mothers with boys and for fathers with boys. With girls, both parents show more touching only in relation to indications of their own attention. The greater responsiveness of mother gazing to baby gazing is true only of mothers with girls. Mothers' gaze at boys is related to mutual gaze length, as is fathers' gaze at girls. Fathers' gaze at boys, however, is significantly related only to the age of the baby boy, increasing and slowing down as boys get older. There is an opposite effect of age on mothers' gaze at girls which decreases with age.

There seems to be unique systems of interaction in the different subgroups. Mothers seem to have the most highly developed response systems, showing many significant relationships between their touching and boys' gaze and between their gazing and girls' gaze. Fathers, on the other hand, change their touching behavior in response to boys' gaze, but show no other significant relationships with infant gazing behavior of boys or girls.

These unique patterns that develop, according to the sex of the parent and infant, may be the beginnings of differential sex-typed socialization in infancy. Parents seem to be responding differently to male and female infants as early as four months. These different response patterns are probably influenced by the parents' concept of themselves as a mother or a father to a son or a daughter.

Relationships Between Mother Behaviors and Father Behaviors

Several of the sex differences between parents that can be seen in the correlation matrices were only statistically significant at the .05 level when tested by comparing converted Z scores, and must be interpreted cautiously since the mother and father subsamples cannot be assumed to be independent. In fact, the pattern of one parent's behavior with the infant could easily influence the other parent. Tables 19 and 20 show a matrix of the correlations between mother behaviors and father behaviors. Each infant was treated as one case with two sets of variables, one for each parent. Each measure of father behavior was correlated with each of the mother behavior measures.

It was expected that each mother-father pair would show similar patterns, and therefore positive correlations between their behaviors. After all, each mother-father pair is interacting with the same infant. Since the age of the infant could easily affect the behaviors of both parents and, in fact, is often related differently to mother and father behaviors, these correlations are all partial correlations with age controlled.

The significant relationships for touching behaviors are for the length of intervals between touches which is negatively related to the other parent's touch rate (mothers r=-.56**, fathers r=-.43*) and positively related to the other parent's intervals between touches (r=.62**). The touching rates themselves are positively, but not significantly, related. Also for both mothers and fathers, the pauses between touches are longer when the other parent's gazes away are longer (mothers r=.39**, fathers r=.40*). Surprisingly, the only

Table 19

Correlations of Parent Touch with Behavior in Other Dyad

	TOUCH			
	%	Rate	Mean Duration	Mean NOT
Touch (Fathers)				
Percent Time	.23	-.04	.17	-.14
Rate	.27	.33	.02	-.56**
Mean Duration	-.04	-.34	.11	.33
Mean NOT	-.27	-.43*	.07	.62**

	%		Rate		Mean Duration		Mean NOT	
	Dads	Moms	Dads	Moms	Dads	Moms	Dads	Moms
Mutual Gaze w/Other Parent								
Percent Time	.33	-.20	-.32	-.20	.67**	.11	-.06	.13
Rate	.02	-.03	-.32	-.22	.40*	-.03	.26	-.19
Mean Duration	.28	-.36	-.20	-.67**	.45*	.24	-.17	.58***
Baby Gaze at Other Parent								
Percent Time	.30	-.16	-.37	-.25	.70**	.18	-.01	.18
Rate	-.14	.01	-.31	.31	.12	-.12	.46*	-.29
Mean Duration	.30	-.18	-.27	-.53**	.61**	.37	-.17	.46*
Mean NOT	-.05	.21	.28	.11	-.33	-.08	-.23	-.07

Table 19 (Cont.)

Correlations of Parent Touch with Behavior in Other Dyad

	%		Rate		Mean Duration		Mean NOT	
	Dads	Moms	Dads	Moms	Dads	Moms	Dads	Moms
Other Parent Gaze								
Percent Time	.49*	-.31	.14	.15	.39*	-.26	-.40*	-.07
Rate	-.34	.29	-.01	.53**	-.29	-.12	.21	-.40*
Mean Duration	.39*	-.30	-.06	-.30	.37	.00	-.26	.21
Mean NOT	-.42*	.06	-.18	-.47*	-.31	.27	.40*	.39*

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001

Table 20

Correlations of Gazing in Mother Dyads with Gazing in Father Dyads

	PARENT GAZE							
	%		Rate		Mean Duration		Mean NOT	
Parent Gaze (Fathers)								
Percent Time	.19		-.07		-.05		-.18	
Rate	-.02		.00		.08		.06	
Mean Duration	.03		-.07		-.09		.08	
Mean NOT	-.14		.02		.10		.12	
	%		Rate		Mean Duration		Mean NOT	
	Dads	Moms	Dads	Moms	Dads	Moms	Dads	Moms
Mutual Gaze w/Other Parent								
Percent Time	-.18	-.11	-.16	-.02	-.11	-.09	.35	.17
Rate	.06	-.40*	-.26	.28	.06	-.29	.16	.21
Mean Duration	-.32	.07	-.06	-.12	-.19	.07	.43*	-.01
Baby Gaze at Other Parent								
Percent Time	-.17	-.17	-.18	-.02	-.10	-.10	.34	.26
Rate	.02	-.49*	-.33	.33	.14	-.26	.27	.25
Mean Duration	-.30	-.07	.00	-.02	-.23	-.09	.33	.16
Mean NOT	.21	.31	.13	-.13	.13	.13	-.38*	-.29

Table 20 (Cont.)

Correlations of Gazing in Mother Dyads with Gazing in Father Dyads

MUTUAL GAZE

	%	Rate	Mean Duration	Mean NOT
Mutual Gaze (Fathers)				
Percent Time	-.20	-.23	-.11	
Rate	-.44*	-.43*	-.33	
Mean Duration	.26	.19	.25	

	%		Rate		Mean Duration		Mean NOT	
	Dads	Moms	Dads	Moms	Dads	Moms	Dads	Moms
Baby Gaze at Other Parent								
Percent Time	-.22	-.16	-.46*	-.21	.27	-.05		
Rate	-.15	-.39*	-.27	-.45*	.09	-.26		
Mean Duration	-.17	.04	-.38*	.04	.27	.09		
Mean NOT	.25	.20	.36	.29	-.09	.05		

BABY GAZE AT MOTHERS

	%	Rate	Mean Duration	Mean NOT
Baby Gaze at Fathers				
Percent Time	-.18	-.09	-.14	.18
Rate	-.41*	-.23	-.34	.27
Mean Duration	.05	.03	.08	.01
Mean NOT	.22	.16	.11	-.19

*$p \leq .05$, **$p \leq .01$

specific behavior that is remarkably similar between parents is the pauses between touches; however, it appears that parents do show some similarity in their touching patterns. This may be due to imitation between parents, possibly motivated by a desire for consistency in the infant's social environment. Fathers especially may imitate the mothers who are more experienced with the infants.

Another possibility is that the parents are reacting to common patterns in the infant's behavior. Touching is also significantly related to gazing behaviors between the infant and the other parent. Mother touch rate and intervals between touches are related to the lengths of mutual and baby gazes with fathers. Mothers have slower touching and longer pauses between touches when there is more mutual and baby gaze with fathers. These are the same relationships that are significant for mothers in their own interactions with infants. Even though specific infant gazing behaviors with mothers are not significantly related to their gazing behaviors with fathers, mothers may have a sort of generalized idea of the infant's response, and adjust their touching accordingly. Parents did not observe each other's dyadic interactions with the infant, but the previous triad observation session may have given them the opportunity to assess the infant's general mood or state.

Fathers too seem to have a general idea of the infant's response. Father touching time and length of touches are related to gazing behavior with the other parent, with length of touches most strongly related to measures of mutual gaze and baby gaze with the mothers. Father's touches lengthen as the amount and length of mutual and baby gaze with

the mother increases, the same relationships that are true for fathers when they are interacting with the infant.

The interval between touches is the only measure that appears to be very similar between parents. The length of the pauses between touches are shorter for one parent if they are shorter for the other parent. Even though the same behaviors are not strongly correlated between parents, they do show some similarity at least in patterns. Mothers' touching rates are related to fathers' gaze rates (r=.53**) and gazes away (r=-.47*). These significant correlations are probably spurious due to the relationships of father gazing with the intervals between father touches, which are related to the mother touch rate and pauses.

Father touching also appears to be related to mother gazing. The more the mother looks at the infant, the more time father spends touching (r=.49*), the longer his touches (r=.39*), and the shorter the intervals between his touches (r=.40*). It seems then that the more the mother is interested in or attracted to the infant, the more the father is at least tactily involved with the infant. Whether this indicates parallel interest is not clear.

The relationships between the gazing measures of the mother and father dyads may help clarify this question. The significant relationships of gazing measures in mother-infant interaction with those in father-infant interaction are all negative correlations, as are most of those approaching significance. The more gaze there is between mothers and infants and the more frequent their mutual gazes are, the less frequent the mutual and baby gazes are for fathers and infants.

Possibly greater involvement between mothers and infants precludes interest and involvement with fathers. Parents, especially mothers, may also be complementing or compensating for the behavior of the other parent. Since less frequent looks of babies at their fathers are related to longer touches by fathers, the positive relationships between father touching and mother gazing may be a spurious effect of this complementary system.

CONCLUSION

In conclusion, the data indicate that parents respond differently to boys and to girls, and that mothers and fathers show different patterns of response. Tables 21 and 22 and Figures 6 and 7 show these unique patterns of significant relationships.

Parent touching behavior with infant boys, but not girls, is negatively related to the infant gazing behaviors, indicating that touch is used instrumentally with boys as an attention getting or arousal modulating technique, which is used in a more complex or "sophisticated" way by mothers compared to fathers. When baby boys gaze more, mothers touch less often and pause longer between touches; whereas, fathers simply make shorter touches. Neither parent changes their gazing in response to male infant gaze. As baby boys get older, mothers touch them less and fathers look at them more. As baby boys mature, they may become more interesting to fathers, but also less active and inattentive, thereby requiring fewer instrumental touch responses from mothers. The changes toward boys with age may also indicate parent responses to sex-role stereotyped concepts parents have about their own relationship with a son.

Touching of infant girls appears as a part of a general expressive response related not to infant gaze but to parent gaze, for both mothers and fathers. For mothers, but not fathers, parent gaze is strongly and generally positively related to the gaze behavior of baby girls. However, mother gaze at girls decreases as the girls get older. The response of mothers to girls appears to be visual and reciprocal,

Table 21

Significant Relationships Between Touch and Gaze in Separate Groups

	TOUCH							
	% Time		Rate		Mean Duration		Mean NOT	
Total Group (N=40)	Infant Age	-.35*					P. NOT	.34*
	Mut. Rate	-.30*						
	B. Rate	-.26*						
Boys (N=18)	Infant Age	-.41*					Infant Age	.42*
	Mut. Rate	-.57**					P. M.D.	.44*
	Mut. %	-.43*						
	B. Rate	-.40*						
	B. %	-.43*						
	B. NOT	.50*						
	B. M.D.	-.42*						
Girls (N=22)			P. NOT	-.43*			P. %	-.46*
							P. NOT	.64***
Mothers (N=20)	Infant Age	-.50*	Mut. %	-.56**			Infant Age	.40*
			Mut. Rate	-.49*			Mut. Rate	.63**
			B. %	-.52**			B. Rate	.38*
			B. Rate	-.49*				
			B. NOT	.51*				
Fathers (N=20)	B. Rate	-.40*			Mut. Rate	-.47*	P. Rate	-.43*
	P. Rate	.43*			B. Rate	-.47*	P. NOT	.39*
	PARENT GAZE							
Total Group (N=40)	Mut. M.D.	.42**	Mut. M.D.	-.62***	Mut. M.D.	.62***		
	Mut. %	.33*	Mut. %	-.36*	Mut. %	.33*		
			B. %	-.29*	B. M.D.	.30*		
			B. M.D.	-.37**				
Boys (N=18)			Mut. M.D.	-.62**	Mut. M.D.	.41*		
Girls (N=22)	Mut. %	.37*	Mut. M.D.	-.66***	Mut. %	.50**		
	Mut. M.D.	.40*	B. M.D.	-.50**	Mut. M.D.	.74***		
			Mut. %	-.42*	B. %	.36*		
					B. M.D.	.46*		

Table 21 (Cont.)

Significant Relationships Between Touch and Gaze in Separate Groups

	% Time		Rate		Mean Duration		Mean NOT	
Mothers (N=20)	Mut. %	.54**	Mut. %	-.41*	Mut. %	.47*	Mut. %	-.48*
	Mut. M.D.	.65**	Mut. M.D.	-.66*	Mut. M.D.	.77**	Mut. M.D.	-.41*
	B. %	.46*	B. M.D.	-.41*	B. %	.39*	B. %	-.44*
	B. M.D.	.51*			B. M.D.	.52**	B. M.D.	-.41*
Fathers (N=20)	Infant Age	.41*	Mut. M.D.	-.61**	Infant Age	.40*	B. M.D.	.38*

Mut. = Mutual gaze
P. = Parent gaze
B. = Baby gaze
% = Percent of total time
M.D. = Mean duration

Rate = Average rate per minute
NOT = Mean duration of pauses

*p _.05, **p _.01, ***p _.001

Table 22

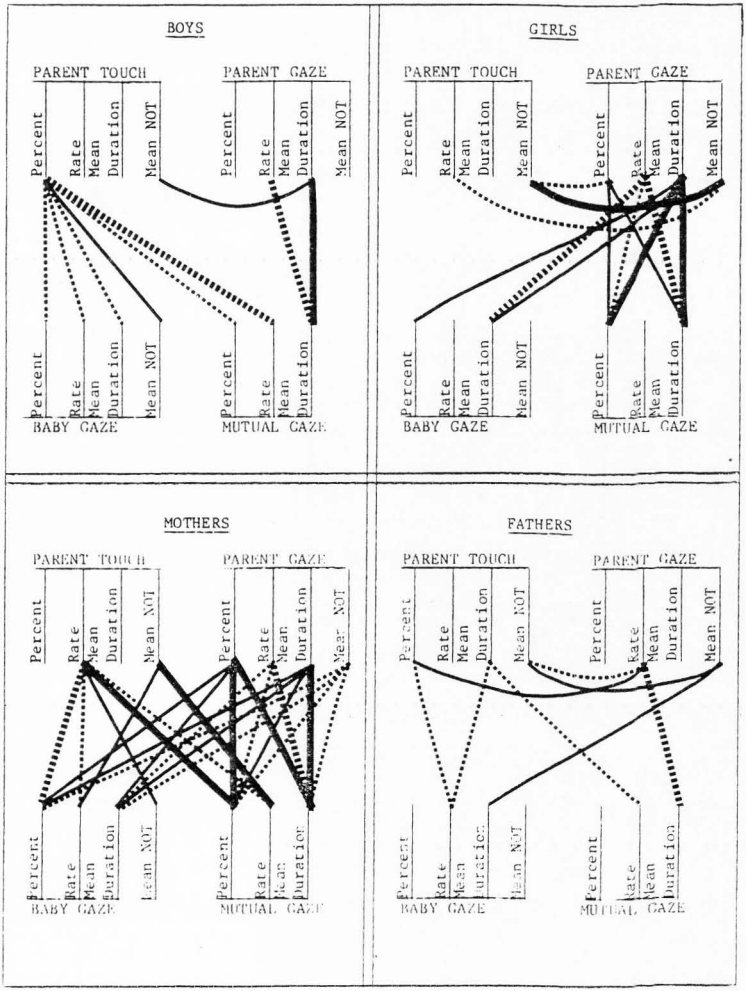
Significant Relationships Between Touch and Gaze in Subgroups

	TOUCH							
	% Time		Rate		Mean Duration		Mean NOT	
Mothers w/Boys (N=9)	Infant Age Mut. Rate	-.60* -.70*	Mut. % Mut. Rate B. % B. Rate B. NOT	-.64 -.78** -.65* -.76** .87**			Infant Age Mut. Rate B. % B. M.D. B. NOT	.58* .89** .63* .73* -.59*
Fathers w/Boys (N=9)	B. NOT P. Rate	.59* .63*			Mut. Rate B. Rate	-.63* -.62*	P. Rate P. M.D.	-.59* .72*
Mothers w/Girls (N=11)							P. %	-.55*
Fathers w/Girls (N=11)			P. NOT	-.74**			P. NOT	.69**
	PARENT GAZE							
Mothers w/Boys (N=9)	Mut. M.D.	.68*	Mut. M.D.	-.68*			Infant Age	-.67*
Fathers w/Boys (N=9)	Infant Age	.61*	Infant Age	-.67*	Infant Age	-.75*		
Mothers w/Girls (N=11)	Infant Age Mut. M.D. B. M.D.	-.56* .61* .55*	Infant Age Mut. M.D. B. Rate B. M.D.	.60* -.66* .56* -.59*	Infant Age Mut % Mut. M.D. B. M.D.	-.67* .54* .82*** .68**	Mut. % B. %	-.60* -.57*
Fathers w/Girls (N=11)			Mut. M.D.	-.70**				

Mut. = Mutual gaze
P. = Parent gaze
B. = Baby gaze
% = Percent of total time
M.D. = Mean duration

Rate = Average rate per minute
NOT = Mean duration of pauses

*p $\leq$.05, **p $\leq$.01, ***p $\leq$.001



=positive correlations, $p \leq .05$ =positive correlations, $p \leq .01$
=negative correlations, $p \leq .05$ =negative correlations, $p \leq .01$

Figure 7. Patterns of significant correlations in separate groups.

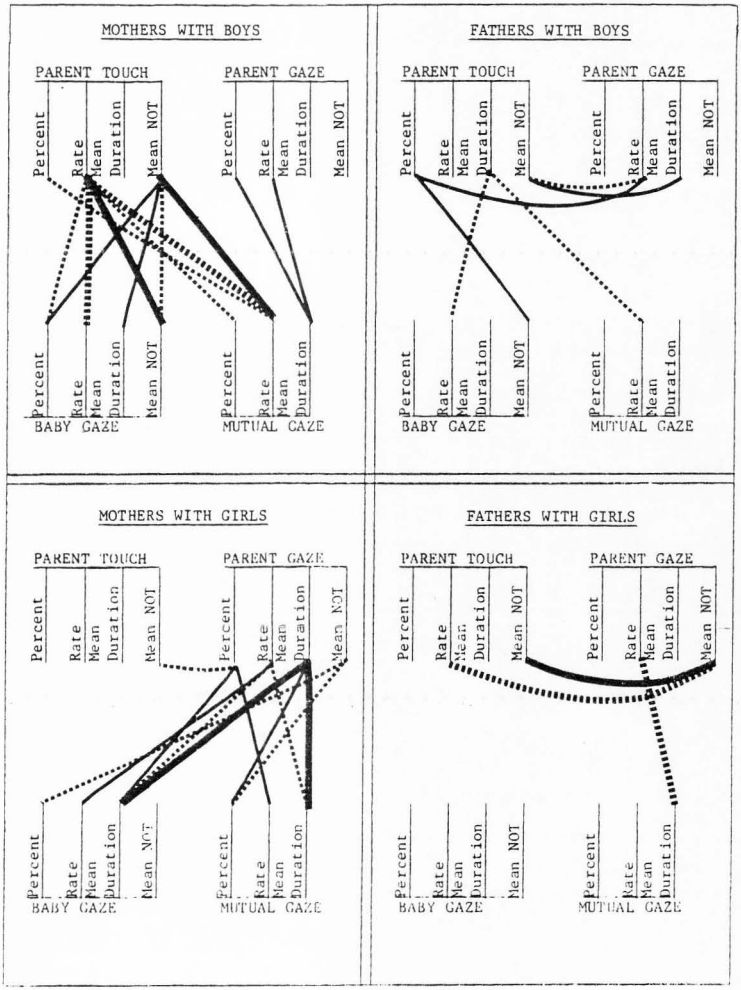


Figure 6. Patterns of significant correlations in subgroups.

rather than physical and instrumental, as with boys. The longer gazes of the female infants may require less instrumental attention getting, and allow a more expressive use of touch and more reciprocal gazing interactions, and may indicate more mature infant social behavior, demanding less parent attention with age.

The data from the mother-infant dyads show most of the significant correlations. Mothers show a complex instrumental touch response and a complementary gaze response to boys and an expressive touch and a complex reciprocal gaze response to girls. The greater complexity of the maternal response to infants may develop as a result of more care-taking and interaction experiences between infants and their mothers, as compared to infants with their fathers. The greater experience of mothers and their greater concern with the changing developmental needs of the infant may contribute to the decrease in touch to boys and gaze at girls with infant age.

Tactile contact made by fathers is negatively related to boys', but not girls', gaze behavior. Their response to infrequent attention from sons is simply to lengthen their touches, in contrast to mothers' more complex response of increasing the frequency and shortening the pauses between touches to boys. Father touch to girls does not appear to be instrumentally related to the attention of the infant, but more expressively related to the fathers' own gazing at their daughters. Slower father gaze rates seem to facilitate mutual gaze with girls, but not boys, indicating more social interaction with daughters. Fathers look away from infants longer when baby gazes are longer, a

complementary response, possibly due to their own arousal to the infant's gaze.

Although boys and girls show only slight differences in their behaviors, parents seem to have concepts in mind that lead them to respond differently. Parents seem to show more instrumental responses with boys, using touch as a technique of arousal modulating and attention getting. With girls, they seem to show a more simply expressive response, touching and gazing as part of their own attention and involvement. These differences may be due to the more highly developed social interaction system with girls reflected in their slightly but significantly greater length and rates of mutual gaze. It may also be due to stereotyped expectancies parents have of male and female infants that have contributed to differences in parent response, even during the newborn period (Rubin et al., 1974; Parke & O'Leary, 1976), and continue to influence the behavior of parents to girls and boys.

The different response patterns of mothers and fathers indicate distinct complementary interaction systems that have developed with their infants. In the last decade, there has been increasing recognition of the role of the father as more than just the provider of a secure environment for the mother and infant. This study supports recent research indications that fathers are not just secondary parents of lesser importance, that they have their own unique role with infants (Lamb, 1976a).

Theorists and practitioners are recognizing more and more the father's influence in infant development. This recognition may lead to more intervention efforts that involve fathers. One recent

intervention project (Metzl, 1980) implemented a home-based program for parents of infants which emphasized varied stimuli, reciprocal interaction, and positive relationships--essential ingredients of play. The infants whose fathers were involved, along with the mothers, made the greatest developmental gains. Early intervention programs have traditionally focused on mother-infant interactions (Bronfenbrenner, 1974) and may do well to find ways to involve fathers.

There were several limitations to this study. First, the observation situation may have affected parents' behavior. The anxiety due to being observed may have contributed to higher rates of behavior and different patterns of responding. Parents may feel obligated to interact appropriately with the infants when their interactions are under the watchful eyes of researchers. This may be even more true because of the sparsely furnished observation room that had little of interest for parents to look at except the infant. Although the infants presumably did not know they were being observed, they were in a relatively novel environment for them; and their behavior may also have been affected by the observation situation. Observations in the home environment may provide a more accurate picture of the typical interactions between parents and infants.

The advantages of home observation, however, may be outweighed by the advantages of the laboratory observation room. Not only did the observation room provide a constant environment for all of the dyads, but it also allowed the use of two observers to observe gaze of parent and infant and two cameras to film both parent and infant during the observation sessions. The dual image of parent and infant was necessary

in order to observe all of the physical contacts. The procedure used here is recommended for other studies investigating gaze and touch. Such intense observation activities required for accuracy would be disruptive in a home observation session.

A second limitation of this study is the narrow age range of infants. Although age seemed to affect parent behavior, there was an age range in this sample of only two months. More could be learned about the development of parent-infant interaction by having an older sample for comparison. Future investigations of the relationships studied here should include a broader age range or a comparison group of older infants.

Third, this study was somewhat limited by sample size. The subgroups formed had cells as small as nine subjects, which may have precluded identification of some significant results. The unique patterns found in the four subgroups may have masked relationships in the total sample. Future research may be more fruitful if there is a larger sample size and if the design separates mothers from fathers and boys from girls.

Other limitations may have been inherent in the data analysis. Medians have been suggested as more accurate measures (Peery, 1978) and may be more likely to show differences when compared. A Kruskal-Wallace test of medians is recommended in subsequent analysis of these data. Hinde and Herrmann (1977) have suggested that derived measures, such as ratios of one individual's behavior to another's behavior, may be more appropriate when analyzing dyadic data. The ratio of parent gaze to baby gaze, for example, may be related to

attention getting behavior of parents. Further analyses of these data using derived scores and median measures are recommended.

Finally, the definition of touch here was very broad. More specific kinds of touch may show different relationships, especially with older infants. The touches observed here were often to the infants' hands. Infants at this age are developing grasping skills and learning to sit up. The developmental level of infants, as indicated both by age and more mature gazing patterns, may be more closely related to this specific kind of touch. Touching with objects or toys is also commonly observed and may increase as infants become more interested in and capable of play with objects. Future studies of more specific touching behaviors of parents to infants may provide a more detailed picture of the role of tactile stimulation in parent-infant play.

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