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Comparisons of maternal eye -gaze deprivation: Responses of 3 -month -old infants to three episodes of maternal unavailability

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Comparisons of Maternal Eye-Gaze Deprivation:

Responses of 3-month-old Infants to Three Episodes of Maternal Unavailability

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ABSTRACT

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Comparisons of Maternal Eye-Gaze Deprivation: Responses of 3-month-old Infants to Three Episodes of Maternal Unavailability

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Competence at reading the communication or emotional signals of the caregiver is important in the development of an infant's increasingly organized regulatory skills. The main function of mutual eye gaze is to regulate these frequent face-to-face interactions, with the sensitivity to adult eye direction appearing early in infancy. Therefore, the goal of this study was to examine interactions in which maternal eye gaze was the only behavior that was eliminated. This study used a within-subjects design, introducing a modified Face-to-Face interaction and a modified Still-Face procedure to observe 3 conditions of interactions with 36 mothers and their 3-month-old infants. Infant eye-gaze patterns were evaluated to determine if 3-month-old infants are dependent on maternal eye gaze for information about contingency and maternal emotional communication. Mothers closed their eyes, while continuing to interact normally with their infants, then closed their eyes and did not interact in any way in a modified "still-face" condition. Main effects were found for infant behaviors, $F(6.52, 35) = 3.97$, $p < .001$. Infants were most active when mothers' eyes were open, $F(2.21, 35) = 4.10$, $p < .017$. The typical negative effect seen with the Still-Face procedure did not occur A behavior X episode interaction was found, $F(6.52, 35) = 3.97$, $p < .001$. Infants looked away significantly longer in episodes when mothers were not interacting in any way, $F(1, 35) = 53.54$, $p < .001$. Infants were less disturbed when mothers closed their eyes than when mothers stopped other kinds of interaction such as touching or talking. Main effects were found for maternal behaviors, $F(2.93, 35) = 62.38$, $p < 001$; episode, $F(2.211, 35) = 4.10$, $p < .017$; and a behavior X episode interaction, $F(6.52, 35) = 3.97$, $p < .001$, respectively. Mothers used touch most often to interact with their infant. Analyses of infant eye-gaze patterns (*look away or look at* mother) revealed main effects for both maternal behaviors and episode, $F(1, 35) = 8.53$, $p < .006$, and $F(1.68, 105) = 109.09$, $p < .000$, respectively. Whether their eyes were open or closed, regardless of where infants looked, mothers used touch more often than other behaviors. The most activity in the dyad occurred during the *look at* mother when her eyes *were open*. Analyses also revealed an episode X infant eye-gaze interaction, $F(1,35) = 9.59$, $p < .004$, and an episode X infant eye-gaze X maternal behavior interaction, $F(1.69,105) = 5.749$, $p < .008$. Perhaps by 3 months of age infants have learned to rely on maternal eye gaze over tactile or vocal behaviors as cues for an available mother. The present findings indicate there is importance of maternal eye gaze to 3-month-old infants, but that deprivation of it is not tremendously stress-invoking. Instead, maternal eye gaze appears to act as a cue telling the infant whether mother is available or not. Longitudinal studies are still needed to further explore the developing mother-infant communication system and could provide further evidence of the sensitivity of the young infant to the quality of the caregiver's communication.

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CHAPTER 1: INTRODUCTION

Social Interactions

The earliest form of relationships typically experienced by infants occurs within an interaction with a parent, usually the mother. Many theorists agree that an infant's future psychological growth is based in part on this early relationship. The patterns of coordination between the mother's and infant's behavior can be observed even in newborns. The involvement of the infant is dependent on the responsiveness of the mother, as shown by Symons & Moran (1987), who found that infant contingent behaviors were systematically related to maternal contingent behaviors.

Early in the history of infancy research, scholars began to view the mother-infant relationship as a process (Sander, 1964; Sander, Stechler, Burns & Julia, 1970, as cited in Thoman, 1979). Sander, for example, examined the organization of activity patterns of the infant and the rhythm of care-taking responses. Sameroff and Chandler (1975, as cited in Thoman, 1979) stressed the importance of analyzing the ongoing interactions between the mother and the infant. As Thoman stated "the interplay of active tendencies in infant and mother in reaching a reciprocal quality of relationship forms the unifying thread around which interactional accounts will be organized" (pp. 305-306). This early research of Sameroff and Chandler characterized the fit of behaviors by each partner, along with the mutual adaptation within the interaction by the term "harmony."

Jaffe, Stern, and Perry (1973) were among the first to describe the gaze and vocalizations of the mother-infant pair as a type of conversation wherein infants form the underlying foundations of their communication and social interactions with a significant other. Many studies of infant communication have established that infant eye-gaze behavior is related to attachment, arousal regulation and maintenance of social interactions (Field, 1981; Murray & Trevarthen, 1985; Tronick, Als, Adamson, Wise & Brazelton, 1978). For example, Tronick, Als, & Brazelton (1980) proposed that the mother-infant exchanges that occur during normal face-to-face interactions are part of a mutually regulated system. Both partners are goal-directed and evaluate the emotional meaning of the other's behaviors. According to these ongoing appraisals, each partner modifies his/her own emotional display to match the other's goals within this system.

There have been many studies examining the infant's ability to understand the meaning of the interactional partner's display (Caron, Caron, & Myers, 1985; Cohn & Tronick, 1983; Younge-Browne, Rosenfeld, & Horowitz, 1977). The experimental manipulation of a mother-infant interaction to detect infant sensitivity to changes in maternal behavior is best shown by the Still-Face paradigm developed by Tronick et al (1978). This procedure elicits the efforts of an infant to repair a social interaction which has ceased to function as normally expected. It is an ideal procedure with which to examine an infant's behavior when social expectations are violated, and it is from these observations that social competence can be evaluated.

The Still-Face Paradigm. Many studies using face-to-face interactions have been conducted to examine an infant's communication of affective need-states as well

as competency in stress regulation. The Still-Face paradigm is an experimental perturbation of mother-infant interaction mimicking emotional unavailability of the caregiver. A variety of techniques have been used to demonstrate various unresponsive maternal behaviors. A large body of research has investigated the effects of mothers becoming non-responsive and non-communicative for a brief period with their infants (Cohn & Elmore, 1988; Field, Vega-Lahr, Scafidi, & Goldstein, 1986; Mayes & Carter, 1990; Murray & Trevarthen, 1985; Toda & Fogel, 1993; Tronick et al., 1978). Other studies have included consideration of tactile stimulation during the Still-Face (Stack & Muir, 1990, 1992), live versus televised interaction procedures (Gusella, Muir, & Tronick, 1988), differing caregiving (daycare versus homecare) environments (Field et al., 1986), and stranger versus mother interaction (Ellsworth, Muir, & Hains, 1993).

Research employing the face-to-face and Still-Face paradigm has generally followed similar procedures. There are three conditions during which the interaction between caregiver and infant are videotaped. During the first episode, the mother is asked to play with the infant in a social engagement, as she would normally do at home. The second episode is the Still-Face episode during which the caregiver assumes a neutral or *still face*, unresponsive to the infant. The caregiver is typically told to sit facing the infant, but not to respond or communicate to the infant in any way although they may continue to maintain eye contact. The final episode is a reunion or return to the face-to-face social interaction, during which the caregiver is instructed to resume normal interactions. Each episode usually lasts about two to

three minutes. The above procedure or variations have been used with infants from under 2 months to 10 months of age.

Infant Behavioral Responses to Perturbation

Many studies of infant behaviors in response to perturbations of normal face-to-face interactions have demonstrated similar results (Carter, Mayes, & Pajer, 1990; Cohn & Elmore, 1988; Field et al., 1986; Gusella et al., 1988; Mayes & Carter, 1990; Segal,. Oster, Cohen, Caspi, Myers, & Brown, 1995; Smith-Gray & Koester, 1995; Stack & Muir, 1990, 1992; Toda & Fogel, 1993; Weinberg & Tronick, 1994a, 1991). An infant's typical response to the Still-Face episode includes: decreases in smiling and eye gaze at mother; increases in self-comforting behaviors (rocking, thumb sucking, hair twirling); or rhythmic motor movements such as increased leg kicking, arm waving, and touching or grabbing infant seat or clothing. Additionally, crying and distressed affective facial or vocal displays have been observed.

These same authors offer a variety of explanations of the Still-Face effect (usually negative), such as that the infant's expectation of a normal interaction is violated when the mother fails to respond. Tronick (1989) interprets the Still-Face reaction as an indication of a disruption of the infant's goal for social engagement. The infant then experiences negative affect due to the inability to reinstate or regulate the exchange (Field et al., 1986). The negative reactivity is suggested to occur when the achievement of a goal is disrupted and the infant is stressed. Stack and Muir (1990) have a somewhat different interpretation. They posit that by maternal withdrawal of contact with the infant, the necessary regulatory input for maintenance of organized social and affective states is not available. However, in other studies

attenuation of the Still-Face effect occurred when the mother was allowed to touch the infant during the Still-Face episode, implying that tactile contact may in fact provide sufficient regulatory assistance (Gusella et al., 1988; Stack & Muir, 1990, 1992).

The reunion episode (resumed face-to-face interaction) has also received some attention. Weinberg and Tronick (1994b) investigated the gaze and smiling behavior of the infant following the Still-Face episode. Generally there were increases in both gaze and positive affect, which were thought to represent the infant experiencing a positive reaction when the mother resumed a normal interaction.

None of the studies reviewed has eliminated eye-contact during the Still-Face episode. Some studies (Gusella et al., 1988) have examined variations of the Still-Face procedure such as using televised faces versus live faces; presenting averted eyes or head turned conditions (Muir & Hains, 1993); or using a contingent Still-Face condition (Cohn & Elmore, 1988). However, none has examined face-to-face interactions that eliminate any eye contact but include vocalization and touch. Muir and Hains (1993) proposed that although direction of eye gaze is important, it may be only one factor in the infant's interaction system. Nevertheless, this does appear to be an important component of most early face-to-face interactions with infants and one which warrants further investigation.

The role of eye gaze. The role of mutual eye contact in infant social development has been recognized as being an important component in the mother-infant attachment process. Response to the presence of stimuli that are similar to the eye has been shown to exist in early infancy (Freedman, 1974). Studies have shown

that eyes are more salient than any other part of the face to infants before about 5 months of age (Gomez, 1994; Rutter, 1984). The eyes contain information that plays an important role in both intra and interspecies interactions. Dominance establishment, mating signals, and the approach of predators can be indicated for many animals by the use of eye gaze.

Humans use eye gaze for many activities including appraisal of another's desires or beliefs. Some studies have suggested that insensitivity to eye gaze is associated with impairments in social and cognitive abilities, such as often seen in autistic children (Baron-Cohen, 1995). According to Hains and Muir (1996) the main function of eye gaze in a dyadic situation is to regulate face-to-face interactions. Their study demonstrated that young infants were sensitive to adult gaze aversion. Several studies have shown that infants smile more when eyes are directed at them than when averted (Hains & Muir, 1996; Symons, Hains, & Muir, 1996).

Another function of gaze behavior is arousal modulation. Studies of attention and arousal have suggested that the infant may use gaze aversion as a stimulation cut-off behavior. Use of eye-gaze in this manner may typically occur as a result of either information overload or excess stimulation levels. One of the earliest regulators of perceptual stimuli available to an infant is gaze behavior. Gaze is commonly used by infants to modulate arousal and to process information about distressing events, according to Field (1981). She found the relationship between the caregiver and infant produced more gaze aversions in high- and low-active interactions than during moderately active interactions. Infant gaze aversions, studied by Stifter and Moyer (1991), functioned as efforts by the infant to remove itself from stimuli for purposes

of reducing arousal levels, thereby acting to inhibit potential intensive responses by the infant.

Although gaze may be shown to regulate interactions, there are some aspects of development that influence the way gaze is used by an infant. By the age of 6 months, gaze may be related to cognitive changes that involve an infant's increased interest in objects or in the external world (Toda & Fogel, 1993). The authors further suggest that responses of infants in Tronick et al.'s (1978) Still-Face paradigm must involve the whole body and the entire body patterns within a context, rather than be judged only on the face or gaze behaviors. Other studies have demonstrated that context is important (Stack and Muir 1990, 1992). As mentioned previously, apparent distress in response to a simulated depressed mother was attenuated when the mothers were allowed to touch the infant even though mothers were otherwise unresponsive. These results demonstrated that infants grimaced less, smiled more, and continued to gaze at their mothers when touch was allowed. They were interpreted to mean that touch can elicit positive affect, and lessen the distress experienced when an infant is confronted with an unexpected response or a contradictory message from the caregiver.

Hains and Muir (1996) manipulated adult eye direction but allowed continuation of contingent responding in an effort to look at the influence of eye gaze as a separate component of adult-infant interactions. Results indicated that "...infants express their cognitive appreciation of the adult's eye direction by their affective behavior" (p. 1950). In other words, eye contact acts as a cue or signal to infants to engage in communication with an adult.

The role of contingency. A number of definitions (as well as a variety of almost synonymous terms) exist in the literature concerning contingency. Isabella and Belsky (1991) define synchronous interactions as "those considered to reflect reciprocal and mutually rewarding behavioral exchanges between mother and infant. These included exchanges in which both members of the dyad contributed to the observed interaction" (p.376). The basic idea is that an appropriate fit of mother and infant behaviors takes place, which is presumed to foster a state of social harmony.

Gianino and Tronick (1988) state that a mother and infant each have an interactive goal: to achieve a state of mutual regulation defined as "reciprocity". This goal is attained by joint regulation with appropriate interactive behaviors of the mother and infant. Further, Gianino and Tronick use the term reciprocity to mean a wide range of behavioral patterns including attunement, synchrony, mutual delight, mutual regulation, mutuality and matching. These terms are not equivalent, but are either related to goal outcomes or to the processes of the interaction. For example, reciprocity would be process-related, whereas mutual delight would be related to hedonic goals.

Symons and Moran (1987) stated that patterns of coordination between the mother and infant are present in the earliest interactions, and that the involvement of the infant is dependent on the responsiveness of the mother. In addition, their study posited that the concepts of maternal responsiveness and sensitivity were systematically related to infant contingent responsiveness.

Rocissano, Slade and Lynch (1987) examined dyadic synchrony and toddler compliance, defining synchrony as the measure of a dyad's ability to maintain a

shared topic. In discussing their data, synchrony was presented as "reflecting a capacity to remain available to the child and for children, it indicates an ability to assume the role of social partner" (p. 702). Their study further clarified attunement and responsiveness of the mother to infant needs as the global aspects of "sensitivity." Finally, they concluded that synchrony in response patterns was just one aspect of sensitive maternal responding. Mutuality is maintained by responding to a child's independent moves.

Tronick et al. (1978) presented the nature of the mother and infant interactional flow as a synchrony in the rhythms of responding. They characterized the rhythms as interdependent, proposing that the interdependency was at the root "of their [the infants'] attachment as well as communication" (p 74). Moreover, one could label an interaction as positive when these interactions were balanced, but feel an overall negative quality when observing an unbalanced one. Another study suggested that the mother's role during early interactions was to provide adequate stimulation and arousal modulation (Brazelton, Koslowski & Main, 1974). Tronick (1989) proposed that mother-infant interactions were mutually regulated bi-directional systems, with both partners engaged in goal-directed exchanges. These systems were found to be operating as early as 3 months of age.

Mary Ainsworth argued that caregiver sensitivity is a key focus during the first half year of life and that infants can only develop social competency in relation to the extent that the caregiver responds (Ainsworth, Blehar, Waters, & Wall, 1978). These early interactions are really more caregiver-guided interactions, with the infant becoming an increasingly active participant over time.

Accessibility and attentiveness of the caregiver are crucial to being aware of an infant's signals. Moreover, a caregiver must not distort those signals if they are to be accurately interpreted and responded to appropriately and promptly. The findings of Ainsworth's study of mother-infant face-to-face interactions showed that maternal sensitivity was associated with more harmonious relationships. For example, mothers who were highly responsive to their infant's crying had babies in later months who tended to cry less (Bretherton, 1994)

Isabella and Belsky (1991) found that interactions within secure dyads were characterized by a moderation of maternal behaviors, neither too passive nor too active. Their findings supported Ainsworth's claims that security is fostered by interactions characterized as being sensitive to and contingent upon the infant's behaviors (Ainsworth et al., 1978). Intrusive, insensitive maternal behavior produced avoidant relationships. Finally, they found that inconsistency in maternal involvement led to later resistant relationships.

Kopp (1989) also found that synchrony and contingent responsive caregiving fostered secure attachment. It is through early interactions that parents become more attached to their infants, and the infant develops attachment to the caregiver. Kopp suggests that mutual regulation is important, as Tronick and others have claimed (Isabella & Belsky, 1991; Gianino & Tronick, 1988; Rocissano, Slade & Lynch, 1987; Symons & Moran, 1987; Tronick et al., 1978). Infant and mother are involved in a series of mutual approaches and withdrawals, during which mothers constantly change their level of stimulation and behavior, learning to be sensitive and interpreting their baby's signals.

Mutual Regulation Model

As indicated earlier, research has suggested that the mother-infant interactional dyad is a system of mutuality (Cohn & Elmore,1988; Tronick,1989). Each partner uses a variety of approaches to maintain and regulate synchronous states. The exchanges are social in nature and complex, wherein eye-gaze direction, physical proximity and affect displays modulate and regulate sequences of interaction.

Tronick's mutual regulation model (MRM) follows other models suggested by Campos, Campos, & Barrett, (1989). The infant, who can express seven emotions by the end of the first year, evaluates the environmental events, appraises a situation and appreciates it (Bowlby, 1969) Gianino and Tronick (1988) found the infant compares events and their implications to the current goals that the infant may have. The infant then may communicate to a social partner by an affective display. If the partner is sensitive and responsive, the infant will be enabled to initiate, modify, or maintain an exchange within the interaction.

An interesting feature of the MRM is that while there is a goal of reciprocity between the social partners, it is the normal disruption, or mismatch, that is critical to an infant learning to regulate an interaction. Reparation of interactive mismatches has several developmental effects leading to positive outcomes (Gianino & Tronick, 1988). Emde (1983) suggested that accumulation of the successful reparation of interactions leads to establishment of a positive affect core, as well as clear boundaries between self and others. The infant develops a representation of an effective self with a trustworthy and reliable caregiver. In order for there to be a

successful affective regulation of an interaction, the partner must be sensitive and willing to modify behaviors to match the infant's communications. Tronick (1989) proposed that self-regulation and interactive regulation complement each other, concluding that when discussing an infant's social behavior, both types of regulation must be included. Sroufe (1989) supports Tronick by stating that ". . .organization exists from the outset, but. . .the organization resides in the infant-caregiver dyadic system. The developmental account, then traces the origins of the inner organization (self) from the dyadic organization--from dyadic behavioral regulation to self-regulation" (p.73).

Affect regulation. One important aspect of an infant's early development is the ability to regulate emotion (Campos, Campos, & Barrett, 1989; Tronick et al., 1978). Emotional regulation develops through transactions occurring between individuals and their environments. One way that social context may affect emotion regulation is that social partners regulate an infant's emotions early in life. The caregiver's role is one of providing adequate stimulation and external assistance with modulation of arousal, which may be accomplished by tone of voice, soothing tactile contact, regulation of environment (dimming harsh lighting, moderating noise levels, etc.) and so forth.

Another important feature of early social, emotional and cognitive development is the infant's ability to communicate effectively to caregivers about goals, need states, and affective responses to environmental stimuli (Tronick, 1989). An infant's normal development is dependent on successful acquisition of the ability to communicate such information. The infant's ability to coordinate mutuality or

dyadic goals is created within the context of repeated interactions with caregivers over the course of the first few months and years of life (Gianino & Tronick, 1988).

So important is the role of the caregiver in the early regulation of arousal and emotion that researchers have used terms like mutual regulation, as mentioned earlier (Tronick, 1989). Tronick and others (Fogel et al., 1992; Thompson, 1994) suggest that it may be more a matter of synchrony (i.e. timing) than contingency. Contingent responsiveness is much more than waiting for an appropriate response from the infant and being prompt with a reward. The caregiver creates a climate and arranges the interaction such that a response can occur.

Socialization plays a crucial role in the development of emotion and emotion communication (Barrett, 1993; Campos et al, 1989; Campos, Mumme, Kermoian, & Campos, 1994; Cole, Michel, & Teti, 1994; Thompson, 1994; Tronick, 1989). As indicated earlier, secure infant attachment has been associated with prompt and effective parental responsiveness which also best enables regulation and sharing by an infant (Kopp, 1989; Sroufe, 1989).

Internal factors-temperament. Although the development of self-regulation is predictable, important individual differences exist in the ways infants learn to regulate their affective states. Moreover, the strategies that infants acquire as a result of this learning process are really a function of numerous factors. The nature of early interactions with caregivers can act to shape both the infant's cognitive interpretation of particular affect-eliciting events and the emotions displayed in response to those events (Horowitz, 1984).

Factors determining how an infant develops regulatory strategies are both internal and external. Neuroregulatory systems, behavioral traits and cognitive components comprise the sources of internal differences in infant emotional regulation (Horowitz, 1984). A variety of researchers have attempted to conceptualize those internal factors using the term "temperament" and assigning specific characteristics associated with it (Bates, 1987; Kagan, 1997; Chess & Thomas, 1989). Bates and Kagan investigated the neurological substrates of infant temperament and reactivity to the unfamiliar. Others have examined the interactions of children with the environment and the ensuing series of matches or mismatches produced during such interactions (Chess & Thomas, 1989). The results of studies such as these have demonstrated that an infant's behavioral style may influence how that infant could interact with the environment (Chess and Thomas).

As Kagan (1997) indicates, such styles may contribute to specific reactivity to unfamiliar events within a particular interaction. Theorists propose that these interactions contribute to the risk of developing behavioral disorders, at least in infancy and childhood. This line of reasoning has led clinicians to administer temperament assessments to address concerns that parents may have about their infant's behaviors. Many clinical assessments are from the Chess and Thomas (1989) tradition, measuring nine temperament characteristics. They include activity level, rhythmicity, approach-withdrawal, adaptability, intensity, mood, attention span and persistence, distractibility and sensory threshold (Carey, 1970 as cited in Medoff-Cooper, Carey & McDevitt, 1995). A caregiver who has had substantial experience with the child or infant rates the child in these nine categories. Of particular interest to

clinicians and researchers is the information about how a child's behavior may influence the caregiver and the subsequent parent-child interactions.

The development of regulatory skills is an interactive process which includes both infant and caregiver contributions. Whether the goals of each partner agree determines the success of that development. Factors such as (temperament) that interfere with the infant's development of regulatory skills can impair the quality of infant-caregiver interactions and the growth of affective communication skills within the infant (Carter et al., 1990; Dunham & Dunham, 1990; Tronick, Ricks & Cohn, 1982; Weinberg & Tronick, 1994a). Because disturbances in infant development may occur if there is not a good fit of infant behaviors with the caregiving environment, it is important to account for the contribution of temperament in any parent-infant interaction. Therefore, it is appropriate to administer a temperament questionnaire particularly during any study of infant reactions to unfamiliar interactions with a caregiver.

Rationale for Proposed Study:

The main function of mutual eye gaze is to regulate these frequent face-to-face interactions, with the sensitivity to adult eye direction appearing early in infancy (Caron, Caron, Roberts, & Brooks, 1997, Hains & Muir, 1996). Several studies have focused on which aspects of eye-gaze are most salient to enable infants to discriminate between averted or directed adult eye gaze (Caron, Caron, Caldwell, & Weis, 1973; Hains & Muir, 1996; Lee, Eskritt, Symons & Muir, 1998; Maurer &

Salapatek, 1976; Vecera & Johnson, 1995). Infant sensitivity to adult gaze aversion has been demonstrated during face-to-face interactions beginning around 3 months of age.

Cline (1967) and other ethologists have demonstrated that eye gaze imparts information that is critical in human interactions. The pair of eyes present a dark-white contrast, which is a very simple stimulus. A study in 1963 by Gibson and Peck demonstrated that the eyes provide more salient directional information than any other white-dark contrast stimuli. Within the infancy literature using Tronick's (1978) Still-Face procedure, there are a variety of manipulations, but no studies were found that eliminate eye-contact altogether. The dark-white contrast of the eye is still present in all studies reviewed, whether in a televised episode of mother, averted or even in profile.

Finding that some infants apparently use eye gaze more for observational learning than for arousal modulation (Thomas, 1999), Thomas (2000), explored Native American infants' eye-gaze behaviors during a brief episode of no-eye-contact (mother's profile). The results revealed that those infants increased their gaze averts when maternal eye-gaze was removed, as compared to their eye-gaze behaviors during a standard Still-Face paradigm.

In previous studies where the Still-Face procedure incorporated different conditions of eye-direction (e.g. Hains & Muir, 1996), infants may still have interpreted the "eyes are looking at me" as a communication bid by the silent-faced mother. It could be argued that unless elimination of eye contact is included in the

Still-Face procedure, maternal accessibility may still be interpreted to exist by an infant.

It is still not known what aspect of maternal behavior specifically contributes to the infant's affect and attention when confronted with a Still-Face procedure or during face-to-face interactions. Some researchers have noted that newborns are adept at face perception much earlier than once thought (Morton & Johnson, 1991). By 3 months of age when visual acuity is refined, infants are able to see the face, both internal features (eyes, mouth, etc.) and external features (shape, etc), supporting research which suggests that infants are capable of interpreting adult communication signals or reading emotional signals (Hains & Muir, 1996).

Competence at reading the communication or emotional signals of the caregiver is important in the development of an infant's increasingly organized regulatory skills. Since much of what we know about emotional regulation of infants and strategies that may be used by them is derived from studies employing the Still-Face procedure, introduction of a "no eye-contact condition" should provide more understanding about the contribution of adult eye-gaze to infant social-emotional development. In addition, it is assumed that when the baby is no longer visible to the mother, her ability to respond contingently to the infant's behaviors may temporarily be disrupted. It is important to establish whether young infants are able to discriminate maternal unavailability or discrepancies in contingencies through the use of eye contact. Development of competence and generalized expectancies about the infant's control of his world comes about from the successful interactions with

significant others. Therefore, investigation using a no eye-contact condition is warranted.

CHAPTER 2: METHOD

The Study

This study used a modified Face-to-Face interaction and a modified Still-Face procedure to observe three conditions of interactions with mother-infant pairs. The Still-Face paradigm and Face-to-Face procedures were employed to evaluate infants' skill in maintaining self-regulation during mild stress. The Still-Face procedure has been used to demonstrate an infant's skill in adopting some regulatory behaviors to cope with stress as well as to regulate affect. Additionally, eye gaze patterns were evaluated to determine if 3-month old infants are dependent on maternal eye gaze for information about contingency and maternal emotional communication.

Generally, as an independent variable, the mother's non-responsiveness during the Still-Face procedure introduces a mild stressor with all interactional dyads for comparison of infant behavior and self-regulation. For this study, the infant behaviors during an episode of Face-to-Face normal play interaction were compared to three conditions: (1) an episode of maternal non-responding, known as the Still-Face procedure, was modified such that the mother **closed her eyes** while presenting a still or neutral face and did not interact in any way (Still Face/Eyes-Closed condition); (2) mother interacted as if in normal Face-to-Face play interaction, but again with eyes closed (Face-to-Face/Eyes-Closed condition); and (3) a profile condition where the mother turns 90 degrees from the infant, and does not interact in any way. Infant behaviors in all conditions were compared using standard statistical procedures as described further in the results section. Video-taped interactions were subjected to micro-analytic coding and analyses were computed to examine infant eye-gaze behavior, affect,

vocalization, and self-regulation strategies, such as rhythmicity and self comfort. Maternal behaviors during the dyadic interactions of the normal Face-to-Face baseline and Face-to-Face/Eyes-Closed conditions were also examined. Those behaviors included vocalization, touching, visual strategies and waiting behaviors.

General Hypotheses

Differences were expected in terms of infant gaze aversion, affect, rhythmic behaviors, vocalizing, and use of self-comforting behaviors when comparing conditions of interaction.

Infant Behaviors:

(1) It was hypothesized that infants would respond more negatively when eye gaze alone was withdrawn during the "Face-to-Face/Eyes-Closed condition" than when confronted by a "Still Face/Eyes-Closed condition". According to Mutual Regulation Model (MRM), there should be no violation of expectations during a Still-Face/Eyes-Closed condition, because the infant would not be getting a contradictory message. If so, baby would be less distressed than during the regular Still Face procedure. This may indicate that an infant had learned that when mother is "not looking at me, she is not available." Note that although the usual Still-Face procedure was not used (out of consideration for effects of possible fatigue in 3-month-old infants), the results of this study were compared to those typically reported in the extensive literature using this paradigm.

(2) Increases in gaze aversion, compared to Episode 1, were predicted for all episodes following Face-to-Face interactions (i.e. the profile and both Eyes-Closed conditions). It was expected that the greatest increase in gaze aversion would occur

during the Face-to-Face/Eyes-Closed condition; this was based on the assumption that maternal contingency responding would not be as effective when she could not see the infant's behavioral cues.

(3) Frequency of vocal, self comforting, and rhythmic infant behaviors were predicted to increase during all episodes as compared to Episode 1, with the Face-to-Face/Eyes-Closed condition having the highest increase in infant self-comforting behaviors and rhythmic movements.

(4) Affect was predicted to be more negative in all conditions as compared to baseline face-to-face interaction; affect was predicted to be the most negative in the Face-to-Face/Eyes-Closed condition. [Baby tries to repair mismatched interaction but is ineffective, therefore according to the Mutual Regulation Model, distress in infant was expected to increase when mother could not regulate the interaction (she did not respond contingently).]

Maternal Behaviors:

(1) It was predicted that mother's behaviors (vocalizing, touching and use of visual strategies) would increase during the Face-to-Face/Eyes-Closed condition (since the mother does nothing during the Still-Face/Eyes-Closed condition)

(2) It was predicted that touch and vocalization would increase when mothers closed their eyes.

Participants

Mother-infant dyads (n = 36 pairs) were recruited from the Missoula area. There were 20 males and 16 females The infant age was between 10 and 14 weeks (M =11.90, SD = .90). The infants were primarily first or second born (75%) to intact middle-class

families from Missoula, Montana. The majority of infants were cared for at home (75%) with only four who were in childcare for more than three hours per day (See Table 1). Participants were paid $10 per videotaping session. Informed consent was obtained before any session began, in accordance with American Psychological Association Ethical Guidelines (See appendix B). The University of Montana Institutional Review Board approved the study before beginning data collection.

Materials

Participants filled out a demographics questionnaire, and a child temperament questionnaire (Medoff-Cooper, B., Carey, W. B., & McDevitt, 1995) before the taping session (see Appendix A). The infant sat in a standard infant seat secured to a table during all procedures.

Procedure

Observational Procedure. The following observational procedures took place at The University of Montana, in the Clinical Psychology Center observational rooms. All mother-infant interactions were videotaped with the infant sitting in an infant seat on a table in front of and facing the mother. Each of the mother-infant dyads was videotaped during these interactions as follows:

(1) 3 minutes of normal Face-to-Face interaction (the first minute is a "warm-up" period, but not coded)

(2) 1 minute of 90-degree turn-away (profile).

Following the turn-away, two conditions were presented in counterbalanced order as follows:

(3) 2 minutes of a Still-Face/Eyes-Closed interaction or 2 minutes of a Face-to-Face/Eyes-Closed interaction.

(4) 2 minutes of resumed normal Face-to-Face interaction.

The total interaction time was 10 minutes. The first Face-to-Face interaction served as a baseline measure for both maternal and infant behaviors of interest.

Expanded Description of Procedures

Episode 1–Face-to-Face Interaction. The mother was instructed to interact with her infant (both seated) as she would normally do at home, by being shown a demonstration sheet with pictures of procedures [See Appendix B]. There were no toys or objects of any kind present during the interaction. The interaction lasted 3 minutes with the 1st minute considered "warming up" and only the 2nd and 3rd minutes coded.

Episode 2-Turnaway profile. Following the first episode, the mother turned in her chair 90° so that she would longer be face-to-face with her infant. This phase lasted 1 minute during which the mother did not interact with her infant. The purpose of the turn-away was to interrupt or stop the mother's interactive behaviors in preparation for the next procedures, (Episodes 3 & 4 were counterbalanced).

Episode 3–Still Face/Eyes-Closed condition. The mother was asked to face the infant again, but not to respond in any manner and to keep her eyes closed. Responding included any form of communication, touching, speaking or facial expression. (2 minutes)

Episode 4-Face-to-Face/Eyes-Closed. The mother was asked to face the infant, but to close her eyes. She was instructed to interact in the same way she would normally interact even though her eyes were closed. (2 minutes)

Episode 5-Reunion. The mother was told to resume normal interactions as in Episode 1. The interaction lasted for 2 minutes, and primarily served to re-establish normal communication between mother and infant; their behaviors were not coded for this episode.

Two orders of this procedure were conducted, with 15 subjects in Order 1, (Still-Face eyes-closed condition following the initial Face-to-Face and Profile conditions), and 21 subjects in Order 2, (Face-to-Face/Eyes-Closed condition following the initial Face-to-Face and Profile condition).

Each interaction was recorded using two video cameras from behind a one-way mirror and a special-effects generator to create a split-screen image. Each camera was positioned to record a frontal view of either the infant or the mother. Videotapes were then observed and coded for 2 minutes per episode using a remote-controlled video-cassette recorder (VCR).

Infant Behaviors. Frequency of infant behaviors falling into the general categories of rhythmic behaviors, self-comforting behaviors, gaze avert, positive affect, neutral affect, negative affect, and vocalizations were coded. Additionally, duration of gaze avert was coded. Duration was coded because the frequency of gaze avert may not tell the entire story. For example a high frequency of gaze averts with very short durations (e.g. 1 second) may indicate very different things than a lower frequency of gaze averts that are of long duration (e.g. 40 seconds), or one continuous bout of looking away.

Frequency of Maternal Behaviors. Behaviors such as touching, vocalizing, waiting or visual responses were coded (see details below). Only behaviors which lasted for at least 1/2 second were coded. Each episode was coded independently. Coders were

trained to find the starting point of the first episode by running the video backwards 2 minutes from the moment the mother turns 90° in preparation for the profile episode. All coders were blind to the exact hypotheses of the experiment.

Reliability. Inter-observer reliability was calculated, using 10% of the subject tapes as practice tapes, with a criterion of 80% agreement or better among coders. Coding agreements for eye gaze behaviors were 89.5% between 4 coders; and 90% on other frequency of infancy behaviors. Maternal behaviors were coded at a rate of 95% agreement between 2 coders. Agreements were calculated between two coders, for the frequencies of all mother and infant behaviors except for gaze avert, which was coded for both duration and frequency.

Coding System.

A modified version of the behavior coding system developed by Koester (1995) was used to code individual infant behaviors of interest during the Face-to-Face baseline interactions, the Profile episode, the Face-to-Face/Eyes-Closed episode and the Still-Face/Eyes-Closed episode, as follows:

Rhythmic Activities. These activities included cycling feet, kicking, waving arms, closing/opening fists and rocking.

Infant Affect. These behaviors included:

Positive: Any form of smiling, turning up of corners of mouth, laughter, giggles;

Negative: grimacing, frowning, furrowing of brows, crying, arching back, stiffening of arms or legs or any combination of above;

Neutral: Looking, no change of face or eyes, no smile or frown, relaxed with neither arching of back or body nor any appearance of distress.

Infant Self-Comforting. These behaviors included sucking thumb or fingers (or other objects, e. g. clothing), twirling hair, and rocking.

Infant Vocalization. Vocal behavior is any incidence of laughing, pleasant, non-fussy vocalizations including cooing, babbling, fussy intermittent protest sounds but not full cry, crying (sustained or prolonged).

Look away (or gaze avert) or Look at. "*Look away*" included gaze at self or objects in the surroundings. It included any look that was not directed at the mother's face as part of an ongoing interaction. For example, if mother was playing a game and moved her hands and baby followed her hands, that was not considered a look-away. When baby broke the interaction by looking away for at least 1/2 second, the behavior was considered a look-away. A "*look at mother*" was coded whenever the infant was looking directly at the mother's face as part of an on-going interaction.

Maternal Behaviors. Frequencies of overall maternal behavior were coded. The frequency with which caregivers engaged in vocalizing, touching behaviors, visual behaviors and waiting during the Face-to-Face interaction (baseline) and the Face-to-Face/Eyes-Closed condition were coded. In addition, the frequencies of maternal behaviors were also coded according to one of two types of infant gaze, that is whether the infant *looked away* from (avert) or *looked at* the mother. Maternal behaviors included any instance of responding by vocalizing, touching, and visual activity (waving, smiling, pointing etc.) or a combination of these when they occurred when the infant looked away from her and then when the infant looked back at the mother.

Regardless of whether behaviors were contingent or not, it was of interest to compare overall activity in these various modalities in normal Face-to-Face play interactions when the mother could see her infant compared to her activity when she could not see the infant's behavioral responses. Maternal behaviors were coded separately, when the infant either looked away from her in an avert or looked at her following an avert. Maternal behaviors included the following:

Vocal response. Vocalization was defined as the mother speaking or calling to the infant, singing, or humming.

Tactile response. Tactile was defined as any behavior in which the mother touched the infant in any manner.

Visual response. Visual was defined as the mother using any visual or gestural activities within the infant's visual field. This included shaking or nodding the head, pointing to objects, animated facial expressions, and finger play.

Waiting response. Waiting was defined as the mother just observing the infant but not vocalizing, touching or engaging in any behavior as an effort to regain the infant's attention. Waiting needed to occur for at least 1 second to be coded.

CHAPTER 3: RESULTS

Analyses of Infant Behaviors

Main effects of infant behavior. The durations and frequencies of the infant gaze behavior were totaled for each infant of each dyad, and means and standard deviations computed for the entire sample. The frequencies of the other 6 infant behaviors (positive affect, neutral affect, negative affect, self-comforting, rhythmic behavior, vocalization) were totaled for each infant of each dyad, and overall means and standard deviations computed. Table 2 contains the descriptive statistics of the infant behaviors in the four interaction conditions.

Insert Table 2 Here

A repeated-measures analysis of variance was conducted, using a 4 (episode) X 7 (infant behavior) design in which the 7 infant behavior frequencies represent the between-subjects factor and the 4 episode frequencies represent the within-subjects factor. Tests of sphericity were statistically significant. Significant findings indicate unequal variance within subjects, therefore Greenhouse-Geisser adjustment was applied.Main effects were found for behaviors, $F(2.930, 35) = 62.382$, $p < 001$. Self comfort was the least frequent behavior in all episodes. The most frequent behavior was rhythmicity in all four episodes (Figure 1).

Main effects for episode. Tests of sphericity were statistically significant. Using the Greenhouse-Geisser adjustment, main effects were found for episodes, $F(2.211, 35) = 4.104$, $p < .017$. Overall, infants were more active during the

Face-to-Face baseline than during any other conditions. In terms of gaze avert, self comfort, rhythmic, and vocalization, the Still-Face/Eyes-Closed and Face-to-Face/Eyes-Closed conditions were not significantly different. In terms of affect, neutral and positive infant affect were significantly more frequent in conditions when mother was touching, vocalizing or using visual stimulation (Baseline and Face-to-Face/Eyes-Closed). Conversely, when the mother was still or not interacting (Still-Face/Eyes-Closed, Profile), infant affect was more negative (Figure 2).

Insert Figure 1 Here

Behavior by episode interaction: An episode X behavior interaction was also found, $F(6.521, 35) = 3.974$, $p < .001$. Eighty-six post hoc paired-sample t tests were conducted on the mean frequencies of infant behaviors, with the family-wise error rate $\alpha < .01$. Analyses revealed 2-tailed statistically significant differences in 64% of 86 comparisons; 55 pairs $p < .01$. (See Appendix C1 for significant individual pairs).

Gaze avert frequency increased significantly from the Face-to-Face baseline to the other three episodes. However, it did not increase in frequency following the Profile. Self-comforting did not change significantly following the Face-to-Face baseline episode. Rhythmicity differed significantly from the Face-to-Face Baseline episode compared to the Profile, Face-to-Face Eyes-Closed and Still-Face /Eyes-Closed condition. Rhythmicity in the Profile condition also differed from the two Eyes-Closed conditions. However, the Rhythmicity in the two Eyes-Closed conditions did not differ.

Infant Vocalization was also significantly higher in the Face-to-Face Baseline condition than the Profile, Face-to-Face/Eyes-Closed or the Still-Face/Eyes-Closed condition. Vocal pattern frequencies did not differ significantly in the Profile, Face-to-Face/Eyes-Closed or the Still-Face/Eyes-Closed condition. Vocalizations were also significantly higher than Gaze Avert in the baseline episode, but decreased to a level significantly lower than Gaze Avert in the following three episodes. Gaze Avert frequency increased, and infant Vocalization decreased across episodes (Figure 1).

Infant Positive Affect was the highest in the Face-to-Face Baseline condition. It was also significantly higher in the Face-to-Face/Eyes-Closed than in either the Profile or the Still-Face/Eyes-Closed condition. Neutral Affect was found to have similar patterns to those observed for Positive Affect. Neutral Affect was significantly more frequent in Face-to-Face Baseline than the Profile, Face-to-Face/Eyes-Closed and the Still-Face/Eyes-Closed condition. However, Neutral Affect did not differ significantly between Profile and the Still-Face/Eyes-Closed condition. Negative Affect was significantly higher in the Still-Face/Eyes-Closed and Profile conditions, than either Face-to-Face condition. The Face-to-Face Baseline and Face-to-Face/ Eyes-Closed conditions did not differ in terms of negative affect elicited in the infant.

Insert Figure 2 Here

Analyses of Gaze Avert Duration. A one-way repeated-measures, analysis of variance was conducted on the mean durations of infant eye-gaze avert. Statistically significant differences were found for episode, $F(1, 35) = 53.541$, $p < .001$. Following the

Face-to-Face baseline condition, duration of gaze avert increased significantly in both the Profile and the Still-Face/Eyes-Closed condition, but decreased to baseline level in the Face-to-Face/Eyes-Closed condition. The longest duration of gaze avert occurred during the Profile condition (Figure 3).

Again, in conditions where mother was able to interact with her infant (touching, talking, or making visual gestures), the infant looked at the mother longer, whether her eyes were closed or not.

Figure 3 here

Analyses of Infant Temperament.

Inter-item correlations were conducted on the overall means of the nine categories of the Carey Infant Questionnaire. Due to the low alphas, the validity and reliability of the data was questionable and was not analyzed further. Table 3 lists the means, standard deviations and inter-item correlations.

Table 3 here

Analyses of Maternal Behaviors.

The frequencies of maternal behaviors (vocal, tactile, visual, or waiting) during two conditions of Face-to-Face interactions (Baseline and Eyes-Closed) were totaled for each mother in the dyad, and the overall means and standard deviations were calculated. Because of the low incidence of occurrence (M=.92 per 2 minutes), the maternal behavior of Waiting was eliminated from the rest of the analyses.

A 2 (Episodes) X 3 (Behaviors) repeated-measures ANOVA was conducted on the mean data.

Main effects of maternal behavior. Main effects were found for maternal behavior, $F(1.538, 70) = 53.087$, $p < .001$. Mothers used touch significantly more often than other behaviors when interacting with their infant. Mothers also vocalized to their infants significantly more often than they used visual activities like finger games.

Main effects for episodes. Analyses conducted on the mean frequencies of maternal behaviors revealed main effects for episodes, $F(1, 35) = 6.628$, $p < .014$. During face-to-face interactions, mothers whose eyes were closed were significantly less active with their infant (Figure 4).

Insert Table 4

Episode by behavior interaction. Analyses also revealed an episode X behavior interaction, $F(2,70) = 62.304$, $p < .001$. Fifteen Post hoc paired-sample t tests were conducted, with the family-wise error rate $\alpha < .01$. Analyses revealed 2-tailed statistically significant differences in 6 of the 11 comparisons; $p < .001$. (See Appendix C2 for complete detailed pair-wise statistics for significant individual pairs.) Although mothers used significantly less touch, vocalization and visual behaviors when they had their eyes closed, their patterns of behaviors followed those of the baseline episode (i.e., touch was most frequent compared to other behaviors, and maternal vocalizations were more frequent than visual strategies).

Insert Figure 4

Analyses of Maternal Behaviors During Two Patterns of Infant Gaze

The frequencies of maternal behaviors (vocal, tactile, visual) in response to two patterns of infant gaze (*look away from* or *look at* mother) during two Face-to-Face interactions (Baseline and Eyes-Closed) were totaled for each mother in the dyad (see Table 4). The means and standard deviations according to infant eye-gaze patterns (*look away from* or *look at mother*) were totaled for each mother in each dyad. Overall means and standard deviations were then computed for maternal behaviors in each interactive episode, according to whether the infant was looking at the mother or not.

Main effects for maternal behavior and episode. A repeated-measures episode X infant gaze pattern X maternal behaviors ANOVA was conducted on the mean data. Tests of sphericity were statistically significant. Using the Greenhouse-Geisser adjustment, main effects were found for maternal behaviors and for episode, [$F(1, 35) = 8.529$, $p < .006$] and [$F(1.679, 105) = 109.090$, $p < .000$] respectively. Main effects of behavior indicated that mothers used vocalization and touch more often than visual strategies, like finger play, in both the Eyes-Open or Eyes-Closed condition regardless of the pattern of infant eye gaze. Moreover, touch was used significantly more often regardless, whether the infant looked at her or not. Main effects of episode revealed that mothers were more active in episodes when their eyes were open, independent of infant eye-gaze patterns.

Behavior X episode interactions. Analyses also revealed an episode X infant eye-gaze interaction, $F(1,35) = 9.587$, $p < .004$, and an episode X infant eye-gaze X maternal behavior interaction, $F(1.685,105) = 5.740$, $p < .008$.

Post hoc t tests were conducted on the mean data pairs of the two interactions. Twelve paired-sample t tests were conducted for the episode X infant eye-gaze interaction, with the family-wise error rate of $\alpha < .01$. Analyses revealed 2-tailed statistically significant differences in 6 of 12 comparisons; $p < .01$. (See Appendix C3 for significant individual pairs). Overall, mothers were more active in Face-to-Face Baseline episode when the infant was *looking at her* than when the infant was looking away. Mothers were the least active in the Face-to-Face/Eyes-Closed episode when *the infant looked at* her, compared to when the *infant looked away* from her (Figure 5).

Sixty-six post hoc paired-sample t tests were conducted to further analyze the episode X infant eye-gaze X maternal behaviors interaction, with the family-wise error rate of $p < .01$. Analyses revealed 2-tailed significant differences in 71% (47 of 66) comparisons. (See Appendix C4 for significant individual pairs.) Results indicated that mothers used the fewest behaviors overall when their eyes were closed and their infant was looking at them. Conversely, mothers used the most behaviors during episodes when mother's eyes were open and their infants were *looking at* them.

Touch was used significantly more often by mothers during the Face-to-Face Baseline episode when the infant looked at her. But, when mothers closed their eyes, and the infant was looking at them, maternal touch was significantly less frequent than in any other condition. The same pattern follows for vocalization and visual strategies.

Figure 5 here

Analyses were conducted on the data to determine if there were any gender or order effects for infant or maternal behaviors. No significant differences were found, therefore no discussion of gender or order will follow.

CHAPTER 4: DISCUSSION

This study examined the contribution of maternal eye-gaze to early infant social interactions. Many studies previously conducted have demonstrated that infants under 5-months of age are sensitive to the presence of eye-stimuli, including adult eye-gaze direction, and that they respond more to the eyes than to any other part of the human face (Freedman, 1974; Gomez, 1994; Rutter, 1984; Hains & Muir, 1996; Symons, Hains & Muir, 1996). Lavelli and Fogel (2002) and others found that infants focus on mother's faces until about 4 months, when they begin to change their focus to objects (Toda & Fogel, 1983). The regulation of face-to-face interactions is one of the functions of eye-gaze in infants according to Hains and Muir (1996). Infants have been shown to increase their amount of time looking-away when arousal increases or information overload occurs. Field (1981) said that infants use their gaze to modulate their arousal states and to process information about distressful events.

One situation that can create a distressful event for an infant occurs when mother and infant behaviors do not fit together. That is, a non-positive interaction for an infant takes place when there is a disrupted state of social harmony brought about by a failure of "mutuality" or reciprocity within a dyadic exchange. Empirical studies have suggested that it is the "interdependency," sensitivity, and reciprocity between infant and caregiver that lies at the heart of attachment and communication (Ainsworth, Blehar, Waters, & Wall, 1978; Brazelton, Koslowski, & Main, 1974, Gianino & Tronick, 1988; Isabella & Belsky, 1991; Kopp, 1989; Symons & Moran, 1987; Tronick et al., 1978; Tronick, 1989).

The main goal of this study was to examine the effects of maternal eye-gaze deprivation within dyadic interactions between mothers and their 3-month-old infants. Many studies have examined infant sensitivity to a variety of aspects of eye gaze. However, no studies were found that deprived the infant of maternal eye gaze during face-to-face interactions. Tronick's (1978) Still Face has been used with a variety of manipulations, eliminating various aspects of maternal behavior from dyadic interactions, but none were found to remove eye gaze alone. Elimination of maternal eye gaze in any variation of interaction was not found. Therefore, the goal of this study was to examine interactions in which maternal eye-gaze was the only behavior that was eliminated. It was also important to examine infant reactions to elimination of eye gaze during Tronick's Still Face procedure. The typical response to the Still-Face episode includes decreases in smiling and eye gaze at mother, and increases in self-comforting behaviors, or rhythmic motor movements. Additionally, increases in negative affective facial or vocal displays have typically been observed.

Based on previous interactional studies involving 3-month-old infants and their caregivers, differences were expected in infant behaviors in terms of gaze aversion, affect, rhythmic behaviors and use of self-comforting behaviors when comparing conditions of interaction. The results demonstrated that infants looked away from their mothers more frequently during all conditions of the study following the initial Face-to-Face Baseline interaction. However, infants only looked away significantly longer during episodes where mother was not interacting in any other way (i.e. touching or talking).

Infants were also expected to display increases in self-comforting behaviors, rhythmic movements, and vocalizations during maternal eye-gaze deprivation as well as during a Profile-Face condition. Following the Face-to-Face episode, instead of increases in self-comforting, rhythmic behaviors, or vocalization as expected, self comforting remained stable while the latter two behaviors decreased to significantly lower levels. Overall, infants were the most active in the Face-to-Face Baseline episode. Although rhythmic behavior (waving arms, legs, and rocking) was the most frequent infant behavior in all episodes, those episodes where the mother's eyes were closed had the least amount of this infant activity. Because rhythmic behaviors are also signaling behaviors used in communication, it is possible that rhythmic activity occurred primarily when the mother's eyes were open because the infants had already learned that when the mother's eyes are closed, signals like arm movement are not successful in attracting her attention. If true, it may be that infants infer from mother's eye-gaze that when "mother looks at me she is ready to communicate with me." Conversely, if the mother's eyes are closed, then she could be "not available" to the infant.

Infant vocalizations have been associated with both communication bids and affect. Infants vocalized more during the normal Face-to-Face play than during modified conditions. However, unlike the rhythmic behavior which stabilized "when mothers eyes were closed," infants' vocalizations to their mothers remained stable following normal play Face-to-Face. It may be that infants have not yet learned that vocal strategies may be as successful in attracting mother's attention as the larger motor movements of the arms or legs.

Generally, increases in self-comforting behaviors are associated with increased distress for the infant. Self-comforting is one of an infant's strategies to regulate internal arousal that may be caused by a mismatch of the interaction. During this study, instead of the typical increase in self-comforting behaviors as expected, infants used self-comforting the least amount of any behavior during every episode. Because the results of this study did not follow the typical pattern of increased self-comforting by infants, it may be that the infants were not sufficiently distressed during either of the Eyes-Closed conditions to use self-comforting behaviors. The infant may not become as distressed as when eye gaze is eliminated because "no eyes are looking at me or are visible" may tell the infant that mother is not available, even potentially Because some studies have demonstrated that touching during the Still-Face attenuates the Still-Face effect, touching and vocalizing by mothers during the Eyes-Closed condition may have been sufficient to compensate for the lack of contingency by the mother.

It is possible that even when depriving infants of their mother's eye-gaze during a play interaction, infants were not disturbed sufficiently to elevate negative affect. The results of analyses clearly demonstrated that positive and neutral affect were both high when the mother was touching, vocalizing and using visual stimulation, regardless of whether her eyes were open or not. Infants became more negative when their mothers became still or stopped interacting with them. The infants were expected to respond more negatively during episodes when maternal eye gaze was absent. Additionally, affect was predicted to be the most negative during the Face-to-Face/Closed-Eyes episode, based on the assumption that maternal

contingency responding would decrease during this time when the mother is unable to see the infant's behaviors. However, mothers closing their eyes did not seem to disturb the infants as much as cessation of other kinds of interaction such as touching or talking.

Additional goals of this study were to compare the behaviors of mothers when their eyes were open or closed during play with their infants. Of equal interest was information about which behavior mothers employed when their infants looked at them compared to when infants looked away.

When there was no consideration for whether the infant was looking at mother or not, maternal touch was the most frequent maternal behavior in the dyadic interactions. Overall, whether their eyes were open or closed, mothers touched their infants more than talking or using finger play (or other visual stimulation). It was expected that mothers would increase their use of vocalization, touching and visual play during the Face-to-Face/Closed-Eyes episode. Instead, mothers touched, used visuals like finger play, or talked more when they could see their baby, than when they could not. Interestingly, it was during the same Face-to-Face Baseline interaction that infants were most active. However, infants did not seem to differ in behaviors when their mothers were still, or interacting with Eyes-Closed. It appeared that infants interpreted that mothers were equally unavailable to them if mother's eyes were not open, whether there was other kinds of interaction or not. Perhaps by 3-months-of age infants have learned to rely on maternal eye-gaze over tactile or vocal behaviors as cues for an available mother.

Differences in maternal behaviors were found when compared during either infant gaze avert or when infant looked at mother's face. Mothers, whose eyes were open, touched, talked and played more finger games when their infants looked at them than when their infants looked away. In other words, the most activity occurred when both mother and infant engaged in face-to-face eye-gaze. However, when mothers' eyes were closed, touch, talking and visual finger play occurred more often when infants were not looking at their mothers than when they were. Mothers, whose eyes were closed, may have used some subtle cues to detect when their infants were looking away because they increased touch, vocal and visual strategies more often than when their infants looked at them. Infants looked away about the same length of time whether mother had her eyes open or not, although they did look away more often when her eyes were closed.

These results demonstrate the impact of maternal eye-gaze on infant-caregiver interactions and early infant communication development. It appears that 3-month-old infants may interpret Eyes-Closed from their caregivers as indication of unavailability for communication. Although, the infants demonstrated increased negative affect, and eye-gaze aversion, they did not appear to be overly distressed. During the Still-Face/Eyes-Closed, infants did not demonstrate a true "still-face" effect as discussed in the literature (Tronick et al., 1978). Moreover, the results of the Still-Face/Eyes-Closed condition was so similar to the Face-to-Face/Eyes-Closed, that the two conditions seem to have been interpreted by the infant as if they were the same interaction. In addition, the infant behavior during the Profile or turn-away (which has traditionally been used as a transition

between the Face-to-Face interaction and the standard Still-Face procedure) was not markedly different from either Eyes-Closed conditions in terms of infant response.

It appears that the infants may have interpreted all episodes following the Face-to-Face Baseline as "mother is unavailable, because she is not looking at me." For example, gaze may attenuate reactions to an otherwise stressful situation for young infants, if the eyes (the dark-white contrast discussed previously) provide some information to the infant that the mother is potentially available for interaction. Infants frequently experience a maternal profile beginning at birth, for example when nursing. It is not unusual for mothers to turned profile to their infants while on the phone or otherwise unavailable to communicate with their babies, although there may be some attempts by the infant to engage her. The results would be consistent with this reasoning, that is, mother's eyes could be seen during the Profile and mother was therefore potentially available. Increased levels in the rhythmic behaviors support the idea that the infants may have attempted to engage their mothers by using large motor movements.

Because infants did not demonstrate the expected differences in distress (increased self-comforting, longer durations of gaze averts) between the Eyes-Closed episodes, it may be that the elimination of eye gaze (even with potential mismatches during the interactions) presents less stress than the "eyes looking at me" during the Still-Face. Some have suggested that the "Still-Face response" may be a reaction to the "staring eyes," and the infant may interpret the "look" as an aggressive or intense look that causes arousal. It is possible that obscuring or closing of the eyes may eliminate or attenuate the normal Still-Face effect, because the source of arousal

(M=15.13, SD 2.15) and maternal age (M=29.80, SD=5.23), the results may reflect differences in parenting styles that might be found in groups located in small rural states as compared to large urban centers. This study's population was relative low-middle class (63% less than $40,000) so some differences could be attributed to SES. A follow-up study might explore this possibility by sampling a population from a large urban center and comparing differences with this sample.

Inclusion of a different cultural sample of mothers who use eye-gaze and other non-verbal behaviors for communication may demonstrate differences in terms of infant behaviors in the absence of mother's eye-gaze. Thomas (1999, 2000) found that Native American 9-month-old infants use eye-gaze differently than an Anglo sample. Inclusion of a sample that has been demonstrated to use eye-gaze as a primarily communicative process rather than a regulatory one is warranted. However, it is important to note that a study should examine younger Native American infants (< 5 months) due to the occurrence of a shift in attention from face to object around 4 to 5 months (Lavelli & Fogel, 2002; Toda & Fogel, 1983). Studies have not revealed the extent to which younger (<5 months) Native American infants may use eye-gaze for regulatory strategies.

Although there was a sufficient sample size, and the results were robust, a larger sample size would assess the consistency of these findings. Because of the developmental trend for infants to switch attention from faces to objects about the fourth month of life, a longitudinal follow-up to examine the stability of these results as infants develop is also a logical extension of this study. It would be important to know if infants use mother's eye-gaze as cues for communication in early life, and

later begin to rely on some other behaviors that may promote development of social interaction skills for the infant.

Finally, studies such as this one can extend our understanding of infant regulation and about how infants come to understand non-verbal behaviors, including eye-gaze on the part of their caregivers. Perhaps eye-gaze behaviors are just part of the total package of parenting skills that can assist an infant to better learn to regulate emotions. Is it possible that "just looking" (i.e. non-responsive staring by the mother) may stress an infant more than no talking or touching? It appears that infants during this study were not overly distressed when deprived of their mothers' eye-gaze. The present findings indicate there is importance of maternal eye-gaze to 3-month-old infants, but that deprivation of it is not tremendously stress-invoking. Instead, maternal eye-gaze appears to act as a cue telling the infant whether mother is available or not. In this study, as long as the mother was interacting in some way, infants appeared to respond less negatively than expected. Mothers used their behaviors differently than expected when their eyes were closed. Perhaps through intuitive parenting skills, mothers were able to adjust their behaviors when their infants were looking away. All mothers (when their eyes were closed) depressed their activity when infants looked at them even though they could not see the infant. What is unclear is whether the infants looked away from their mothers because mothers were interacting less contingently (distressing to infant), or looked at their mothers in attempts to engage mothers through eye-gaze (which was missing), looking away when they found mother's eyes were "still closed." Because of the increased frequency of gaze-averts, it would appear as if infants were "checking in"

with their mothers for a cue to re-establish communication. A follow-up study should examine this dynamic of mother-infant Face-to-Face interaction. Studies such as those suggested could provide further evidence of the sensitivity of the young infant to the quality of the caregiver's communication. Further, they could provide information about the infant's contribution to early mutual exchanges, although longitudinal studies are still needed to further explore the developing mother-infant communication system. Since some of the same dyads participating in this study were observed at infant age 6 months, it will be possible to begin investigating the dynamics of this emerging communicative system a bit further by expanding the scope of the current study.

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APPENDIX A

Tables and Figures

Table 1

Demographical data of participants.

Infant Information				
Age in Weeks	**11.90**	**0.99**		
Gender				
Males			**20**	**55.60%**
Females			**16**	**44.40%**
Birth Order				
First			**16**	**44%**
Second			**12**	**33%**
Third			**6**	**17%**
Forth			**2**	**6%**
Infant Delivery Status				
Normal			**27**	**75.00%**
Difficult			**6**	**16.70%**
Premature			**3**	**8.30%**
Hours in DaycarePer day				
None			**27**	**75.00%**
1 to 3 hours			**5**	**14.00%**
>3 hours			**4**	**11.00%**
Parent Information				
Age				
Maternal Age	**29.80**	**5.23**		
Father's Age	**32.17**	**6.50**		
Education Level				
Mother	**15.13**	**2.16**		
Father	**15.69**	**2.60**		
Two Parent Home			**33**	**91.70%**
Post Delivery Depression			**7**	**19.40%**
Family Income				
$0-10K			**2**	**5.60%**
$11-20K			**4**	**11.10%**
$21-30K			**5**	**13.90%**
$31-40K			**12**	**33.30%**
> $40K			**13**	**36.10%**

Table 2

Mean frequencies of infant behaviors during 4 periods of interactions with their mothers.

	Episode			
Infant Behaviors	Face to Face	Profile	Face to Face Eyes Closed	Still Face Eyes Closed
Gaze Avert				
Frequency	4.14 (3.37)	6.61 (5.45)	5.50 (4.73)	5.47 (5.02)
Duration	34.48 (31.43)	84.54 (35.43)	36.61 (31.88)	66.98 (32.81)
Self Comforting				
Frequency	2.03 (4.17)	2.56 (4.35)	1.75 (3.71)	2.22 (3.63)
Rhythmic				
Frequency	14.42 (5.60)	13.11 (5.69)	10.81 (4.45)	11.44 (5.18)
Positive Affect				
Frequency	3.25 (2.61)	1.22 (1.61)	1.97 (1.87)	1.33 (1.57)
Neutral Affect				
Frequency	2.86 (3.09)	2.39 (1.90)	2.08 (2.17)	2.52 (2.36)
Negative Affect				
Frequency	1.83 (1.50)	2.11(1.91)	1.75 (1.40)	2.14 (1.78)
Vocalization				
Frequency	9.11 (9.49)	5.06 (5.44)	5.75 (4.79)	5.83 (7.45)

Note: Numbers in parentheses indicate standard deviations.

[a] Durations are in seconds

Figure Caption

Figure 1. Mean frequencies of Infant behaviors during 4 periods of face to face interactions with their mothers.

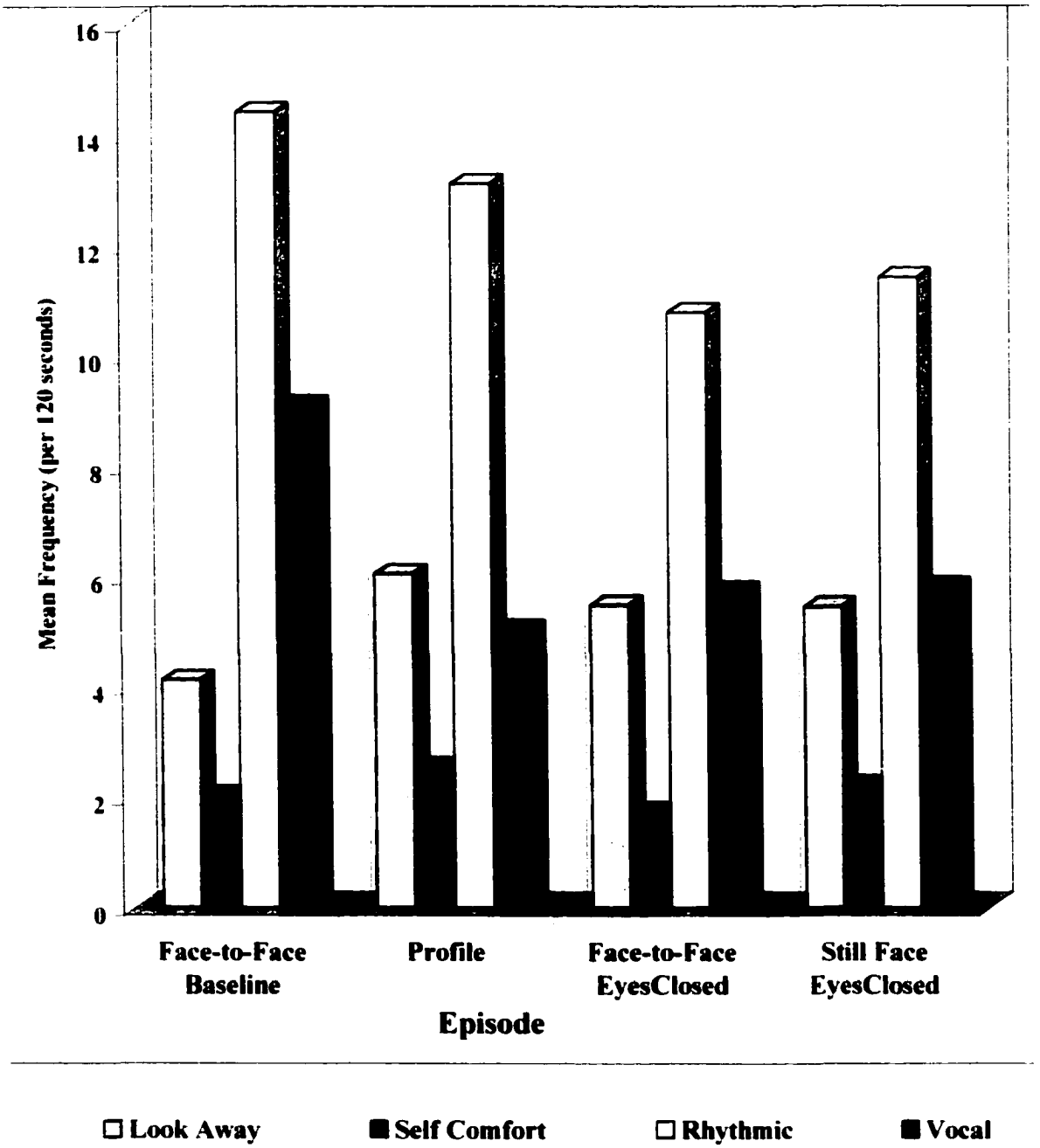


Figure Caption

Figure 2. Mean frequencies of infant affect during 4 periods of interactions with their mothers.

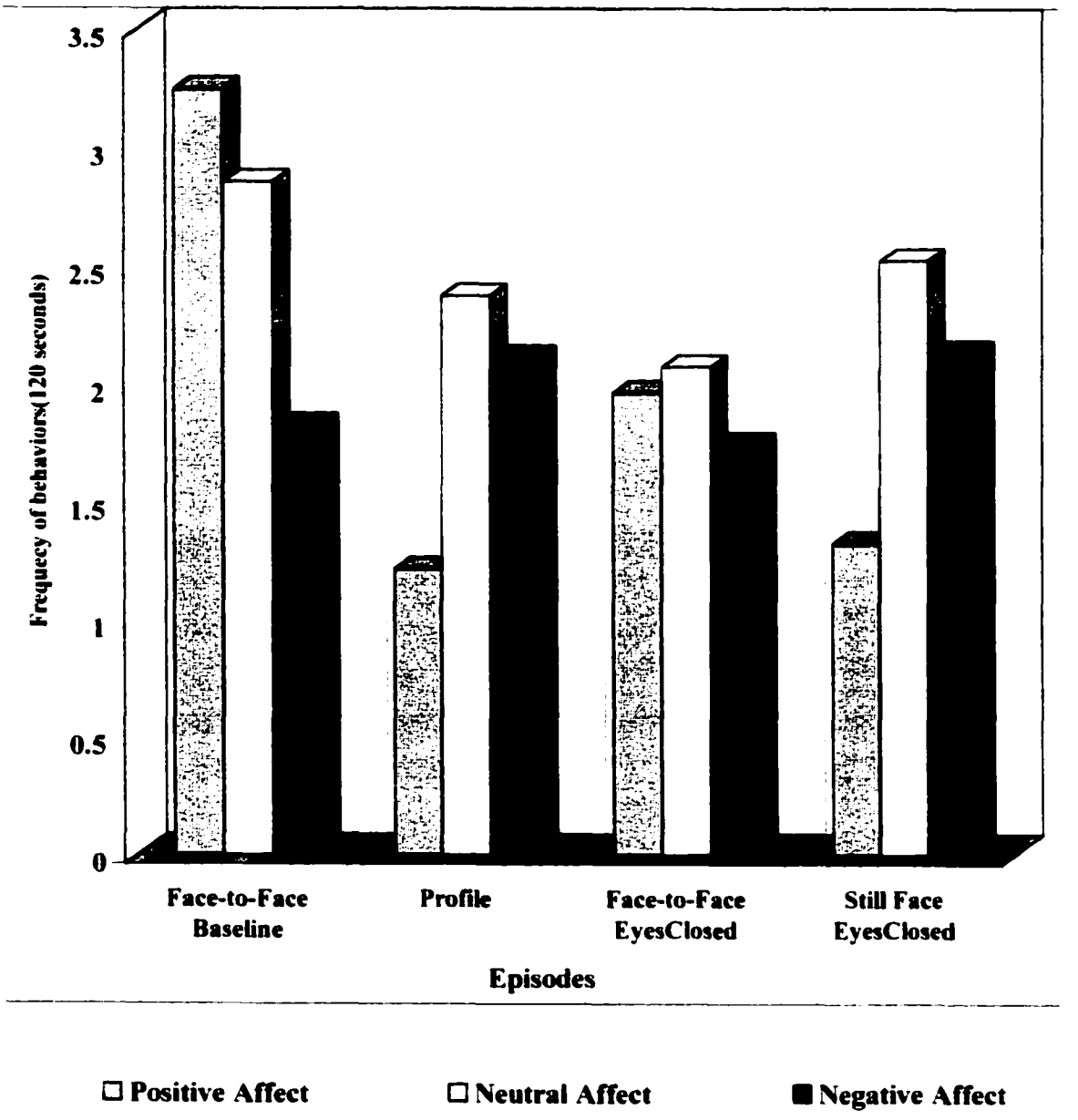


Figure Caption

Figure 3. Mean frequencies of infant gaze avert duration during 4 periods of interaction with their mothers.

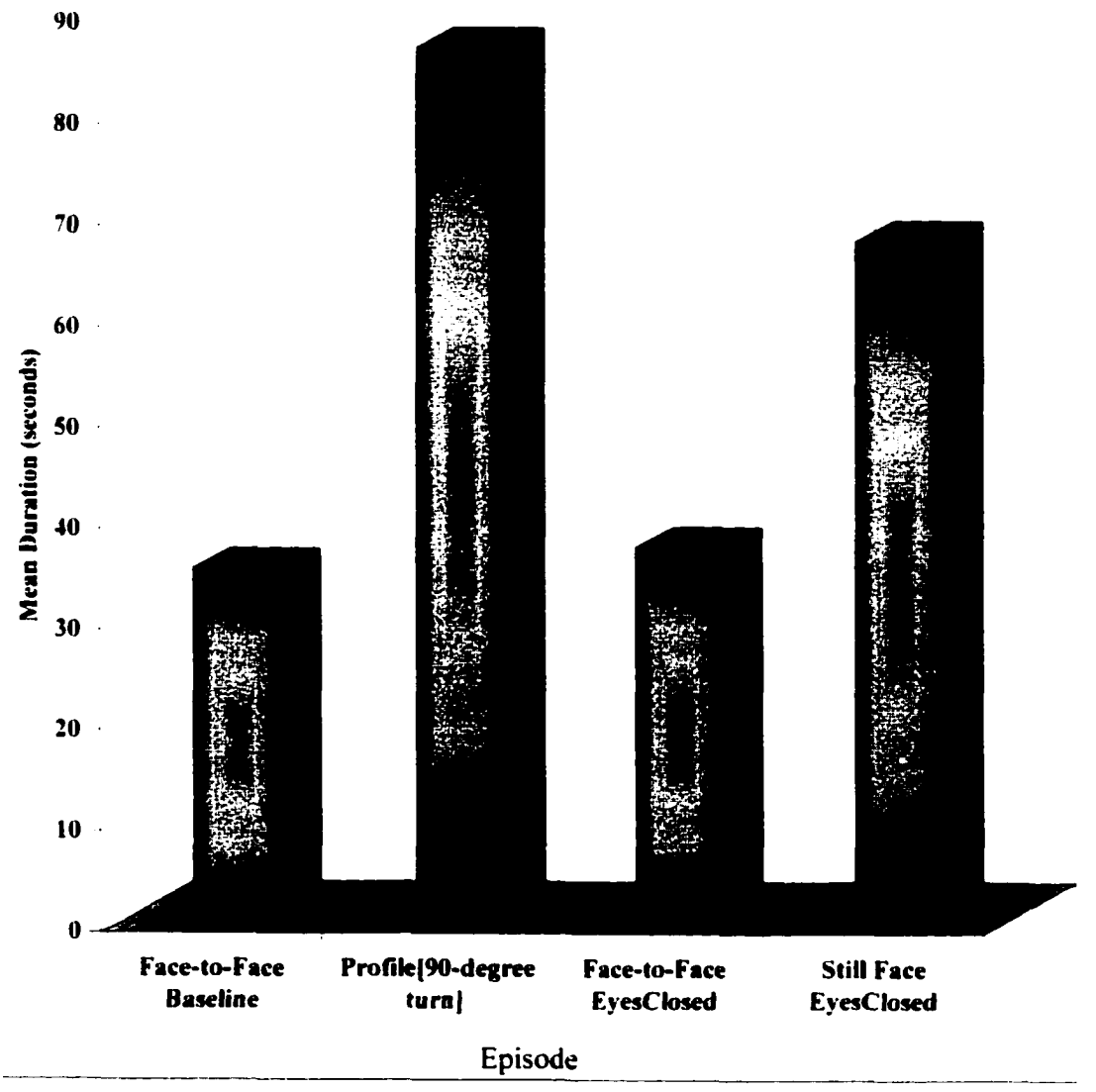


Table 3

Descriptive statistics for 9-domains of temperament on Carey Infant Temperament Questionnaire completed by participants.

Variable	Mean	Standard Deviation	Reliability Coefficients r
Activity	**3.89**	**0.69**	**0.0962**
Rhythmicity	**3.04**	**0.77**	**-0.0002**
Approachability	**2.83**	**1.50**	**0.3792**
Adaptability	**1.80**	**1.70**	**0.4446**
Intensity	**3.34**	**1.83**	**0.2918**
Mood	**2.55**	**1.63**	**0.3177**
Persistence	**2.62**	**1.38**	**0.1890**
Distractibility	**3.80**	**1.00**	**0.1940**
Threshold	**3.30**	**2.00**	**0.4424**

Table 4

Mean frequencies of maternal behaviors (overall), when their eyes are open or closed, and mean frequencies when infant is looking either at or away from them.

		Episode	
Maternal Responses	Infant Eye-Gaze Pattern	Face to Face Baseline	Face to Face Eyes Closed
Vocal	All (Eye-gaze Not considered)	41.92 (25.34)	30.19 (15.78)
	Look Away From Mom	19.69 (13.23)	17.56 (11.03)
	Look AT Mom	22.22 (15.89)	12.64 (8.31)
Tactile	All (Eye-gaze Not considered)	45.42 (30.74)	37.56 (20.71)
	Look Away From Mom	20.17 (15.31)	20.89 (13.21)
	Look AT Mom	25.25 (19.22)	16.67 (12.67)
Visual	All (Eye-gaze Not considered)	15.69 (14.31)	8.72 (7.73)
	Look Away From Mom	7.50 (7.83)	5.67 (5.93)
	Look AT Mom	8.19 (7.89)	3.06 (3.62)

Note: Numbers in parentheses indicate standard deviations.

[a] Durations are in seconds

Figure Caption

Figure 4. Mean frequencies of maternal behaviors during two Face-to-Face interactions, when their eyes are open or closed.

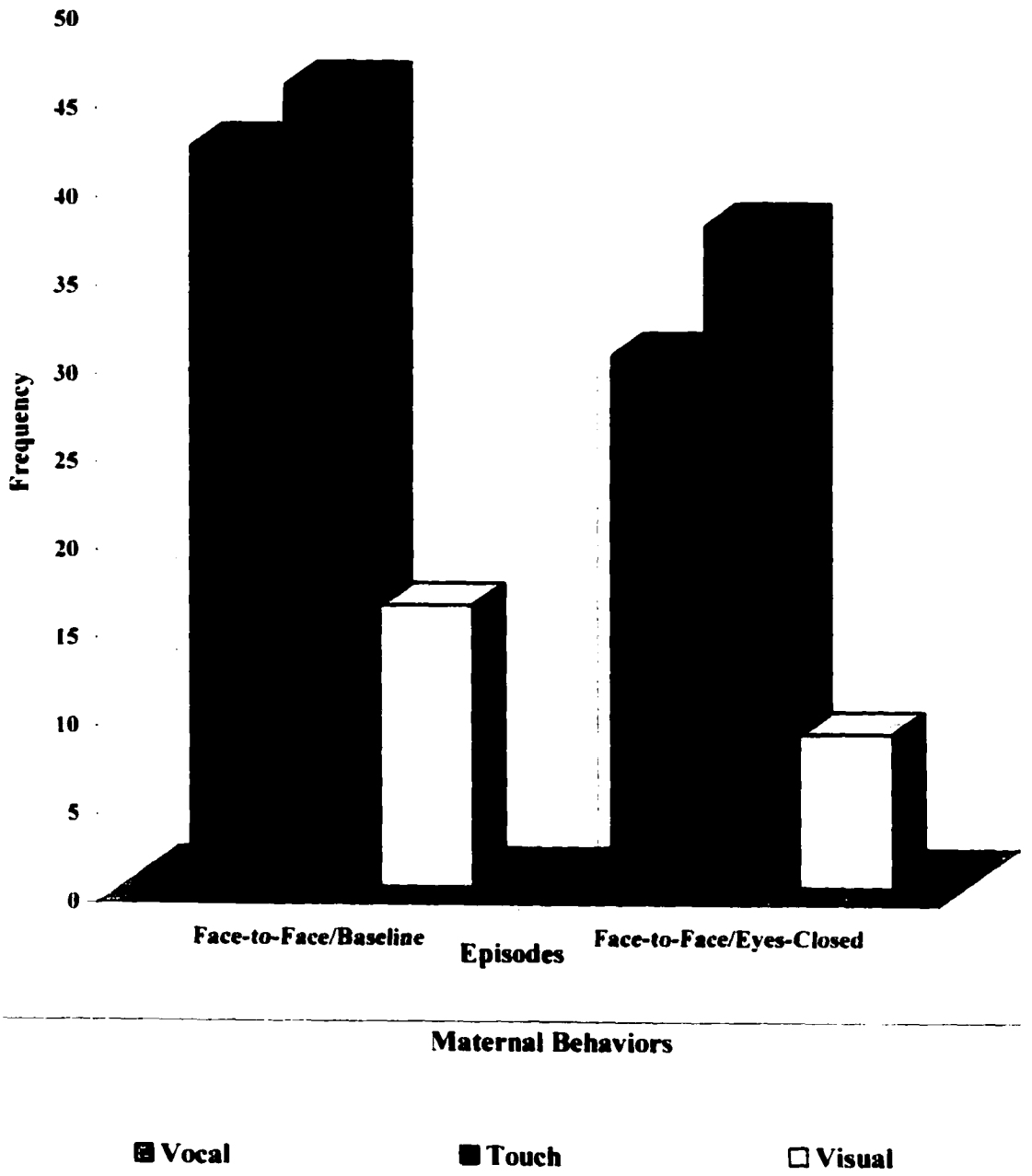
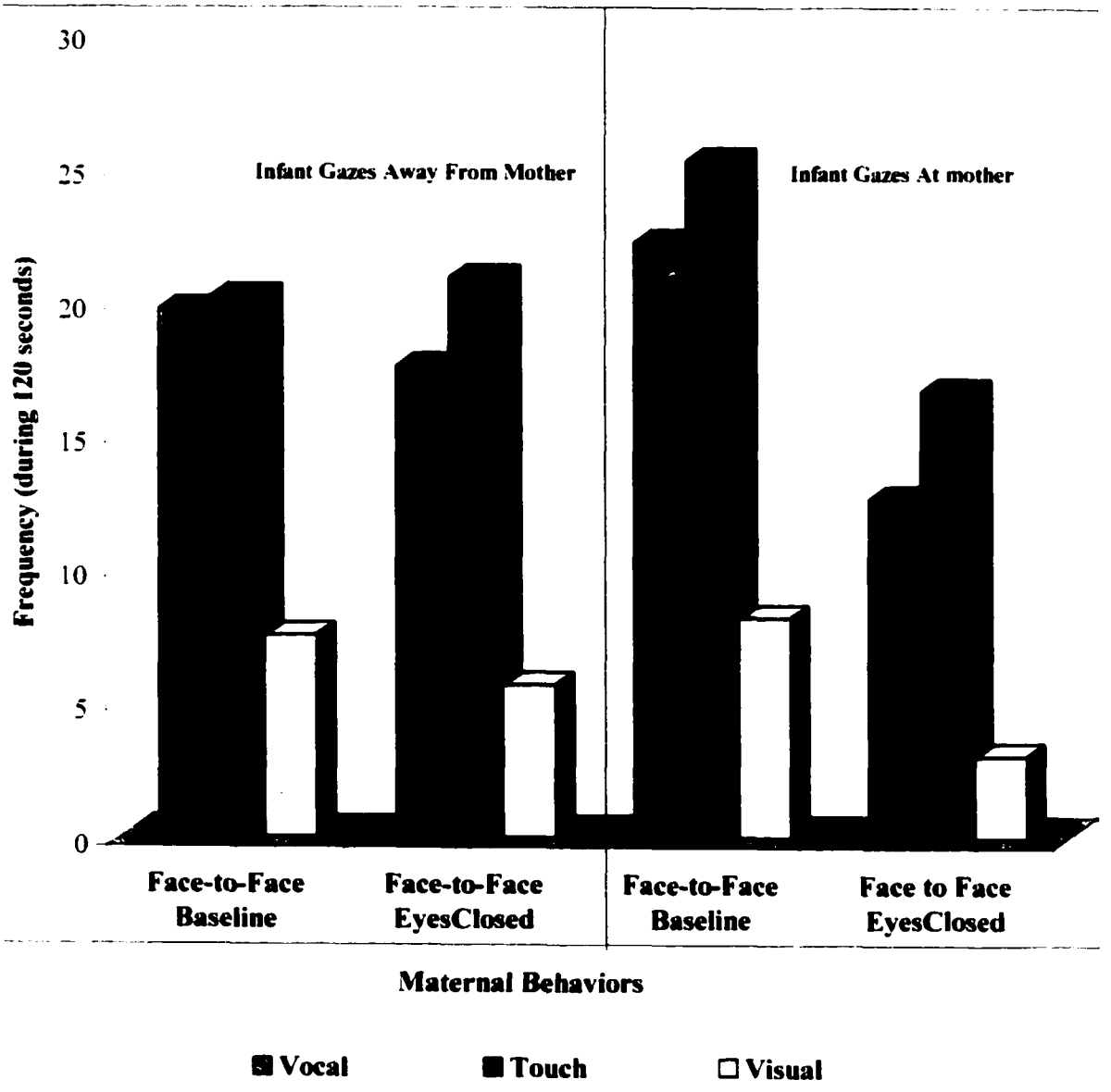


Figure Caption

Figure 5. Mean frequencies of maternal behaviors during two Face-to-Face interactions, when mother's eyes are open or closed, compared in two infant eye-gaze pattern conditions (infant looks at mother or infant looks away from mother).



APPENDIX B

Consent forms, Instructions &Measurement Instruments

Statement of Consent To Participate In Research

I,_____(parent/legal guardian) have read the description of the research project entitled " Comparisons of Maternal Eye-Gaze Deprivation: Responses of 3-month-old Infants to Three Episodes of Maternal Unavailability" to be run under the direction of Linda EagleHeart Thomas, M. A., and Lynne Sanford Koester, Ph.D., and consent to participate with my infant in the study. You may contact me at the following phone number to arrange for appointments.

Phone: _____; Preferred days or times to telephone:_____

Parent/Guardian's Signature

_____Date_____

The University of Montana requires that the following statement be included in the description of all research that uses a consent form:
In the event the you or your child or injured as a result of this research you should individually seek appropriate medical treatment. If the injury is caused by the negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M. C. A., Chapter 9. In the event of a claim for such injury, further information may be obtained from the University's Claims Representative or University Legal Counsel.

Statement Of Consent To Show Videotaped
Infant Behaviors And Parent-Child Interactions

The information collected as part of the research project entitled " Comparisons of Maternal Eye-Gaze Deprivation: Responses of 3-month-old Infants to Three Episodes of Maternal Unavailability" includes videotaped records of infant behaviors and parent-child interactions. In order to train other researchers, instruct students, and disseminate results of the study we request your permission to allow students, faculty and researchers to observe these videotapes. Neither you nor your child will be identified by name on these tapes or by the researchers who show them. Please sign below, indicating whether you do or do not give your permission to researchers to show the videotaped records of you and your infant.

I, _____(parent/legal guardian), **Do or Do not (circle one)** give my permission for researchers involved in the above project to use videotaped records of myself and my infant for educational and training purposes.

Parent/Guardian Signature_____

Date_____

Parent Information Letter For Recruitment

Dear Parent or guardian:

We request your consent to participate in a study through the Psychology Department at the University of Montana. This project has been reviewed and approved by the Institutional Review Board at the University.

The purpose of this study is to examine the development of infants, with a careful look at their interactions with caregivers. We plan to identify relationships between parental interactional styles and infant responses. The results will be useful in identifying the ways in which service providers can better meet the developmental needs of young infants.

This project will involve interviewing caregivers and videotaping them with their infants in a play setting at the University in order to assess each infant's behavior and developmental level, determine family and medical and biographical history, and characterize infant and parent interactions. Because we are interested in the ways in which caregivers and infants change during early development, we will need to interview you and videotape you and your infant when your infant is between 10 and 14 weeks of age, about 3 months old. We estimate that this time will require about 1 hour of your time.

Neither your name or your child's will be recorded on any interview or response materials. Instead, all information which describes you and the infant will be identified only by a numerical code. We will keep a list which includes your name, address and phone number only to contact you for appointments. All of our research results will be used to characterize groups, not individuals.

Although we ask for your commitment to participate in all three phases of the study, we recognize that unforeseeable events occur. If at any time during the study you decide you do not want to participate, we will honor that decision.

By way of a thank you and in order to compensate you for your time, each parent or guardian who participates will receive a small gratuity. We will pay each family $10 for the interview and observation.

If you agree to participate in this study, please complete and sign the consent forms which accompany this letter and return to: Linda Eagle Heart Thomas in the enclosed envelope. If you have any questions or comments about this study or your possible participation in it, we would be happy to discuss them with you. Feel free to contact us at the phone number below.

Thank you for your help!
Sincerely,

Linda Eagle Heart Thomas, M. A.
Lynne Sanford Koester, Ph.D.

DEMOGRAPHICS QUESTIONNAIRE

Parent Information

Name_____ Age_____

Level of education completed (1-20)_____ (#years) Is this a 2-parent home? _____ Y/N

Father Age_____ Education Level completed (# years completed 1-20) _____

Address_____ City _____

State____ Zip_____ Length of time in area _____

Phone Number_____ (best time to contact you) _____

Approximate Family Income _____ ($0-10,000; 11,000-20,000; 21,000-30,000; 31,000-40,000; over 40,000) [Please circle one]

# of adults living in house hold? _____

children living in household_____

Total All people in home (including infant) _____

INFANT INFORMATION

Infant Name_____

Gender _____ (Male/Female)

Date of Birth _____ Age _____

Delivery: Normal___Difficult___ Premature?

Birth Weight _____

Birth Size _____

Multiple birth or single? _____ (a twin?)

Birth order of infant _____ (#1, #2, #3, etc.)

Breast fed? _____

hours in day care outside own home per day _____ (approximate)

hours in day care at own home (someone comes to your home to watch your child) _____

Do you consider your infant (circle one): EASY DIFFICULT SLOW-TO-WARM UP

Does your infant cry a lot? Y/N_____

Does your infant spit up a lot? Y/N_____

Any health problems?

_____

_____

Did you have any post delivery depression? Y/N _____ Were you treated for it? Y/N ____

Other information you feel we should know regarding your infant that may be important in understanding his/her development?

_____

_____

Is there any information that you would like from us about infant and child development?

Instructions [A]-Mother-infant Study

1 Normal Play interaction

Play with your baby as you would normally do at home–
3 minutes

2 Transition—Profile

Turn 90 degrees in your chair—
1 minute

3 Play interaction/Eyes Closed

Play with your baby as you would normally do, but keep your eyes closed-
2 minutes

BREAK—Up to 5 minutes
During this time you may remove your baby from the infant seat, change diapers or what ever you feel you need to do to make baby more comfortable

4 Still Face/Eyes Closed

Face your baby with eyes closed and do not interact with him in any way–
2 minutes

5 Normal Play Interaction

You may return to playing with your baby as you would do at home—

THANK YOU FOR YOUR PARTICIPATION!!

Following #5 our project is complete however, if you feel that your baby is too distressed you may stop at any time

Are you the Mother of an Infant Between 8 and 16 Weeks Old?

If so, developmental psychologists at The University of Montana would like your help for their study of mother-infant relationships.

For this study, moms and their infants will be videotaped while playing and interacting with one another. The study will take place on the campus of The University of Montana. There will be free guest parking, and bus stops are close by. The study will take about one hour of your time. To thank you for your participation, you will receive $10. So, if you are interested and wish to schedule an appointment for you and your baby, please contact:

Linda Thomas, M. A. :626-4271
lindat@selway.umt.edu

For more information about the study, please contact:
Lynne Koester, Ph.D.,
The Department of Psychology, The University of Montana
243-4521 : email: lkoester@selway.umt.edu

The Carey Temperament Scales

Early Infancy
Temperament Questionnaire

for 1 to 4 month old infants

by Barbara Medoff-Cooper, Ph.D., William B. Carey, M.D., and Sean C. McDevitt, Ph.D.

Infant's Name _____ **Gender** _____

Infant's Date of Birth ____/____/____ **Present Age** _____
Month Day Year

Rater's Name _____

Rater's Relationship to Infant _____

Date of Rating ____/____/____
Month Day Year

Instructions

1. There are no right or wrong or good or bad answers, only descriptions of your infant.
2. Please base your rating on your infant's recent and current behavior (the last four to six weeks).
3. Rate each question separately. Some items may seem alike but are not the same. Do not purposely try to present a consistent picture of your infant.
4. Use extreme ratings where appropriate. Try to avoid rating only near the middle of each scale.
5. Rate each item quickly. If you cannot decide, skip the item and come back to it later.
6. Rate every item. Please skip any item that you are unable to answer due to lack of information or any item that does not apply to your infant.
7. Consider only your own impressions and observations of the infant.

Distributed by: ***Behavioral/Developmental Initiatives***
Suite 210, 1240 West Chester Pike, West Chester, PA 19382
Phone: 1-800-BDI-6303 Fax: (610) 429-3160

Using the scale below, please darken the circle in the space that tells how often the infant's recent and current behavior has been like the behavior described by each item.

1 = ALMOST NEVER 2 = RARELY 3 = VARIABLE, USUALLY DOES NOT 4 = VARIABLE, USUALLY DOES 5 = FREQUENTLY 6 = ALMOST ALWAYS

		ALMOST NEVER					ALMOST ALWAYS
1. The infant lies still (little squirming) when held in mother's arms between feedings.	1	①	②	③	④	⑤	⑥
2. The infant's fussy period occurs at about the same time of day (morning afternoon, night).	2	①	②	③	④	⑤	⑥
3. For the first few minutes in a new place or situation (new store or home) the infant is fretful.	3	①	②	③	④	⑤	⑥
4. The infant accepts face washing at any time without protest.	4	①	②	③	④	⑤	⑥
5. The infant's hungry cry is a scream rather than a whimper.	5	①	②	③	④	⑤	⑥
6. The infant cries when awake and left alone.	6	①	②	③	④	⑤	⑥
7. The infant repeats vocalization (coos, babbles) for several minutes.	7	①	②	③	④	⑤	⑥
8. The infant continues to fuss during diaper change in spite of efforts to distract him/her with patting or singing.	8	①	②	③	④	⑤	⑥
9. The infant indicates discomfort (fusses or squirms) when diaper is soiled with bowel movement.	9	①	②	③	④	⑤	⑥
10. The infant lies still (little squirming) during hair brushing.	10	①	②	③	④	⑤	⑥
11. The infant gets sleepy about the same time each evening (within 1/2 hour).	11	①	②	③	④	⑤	⑥
12. The infant appears bothered (cries, squirms) when first put down to sleep in a different place than usual.	12	①	②	③	④	⑤	⑥
13. The infant resists (squirms, pulls away) hair brushing.	13	①	②	③	④	⑤	⑥
14. The infant vigorously cries when sleepy.	14	①	②	③	④	⑤	⑥
15. The infant is pleasant (coos, smiles) during face washing.	15	①	②	③	④	⑤	⑥
16. The infant will continuously look at mobile or toy in crib for 5 minutes or more.	16	①	②	③	④	⑤	⑥
17. The infant continues to resist when getting dressed and undressed despite efforts to distract him/her (singing, talking).	17	①	②	③	④	⑤	⑥
18. The infant reacts even to gentle touch (startles, laughs, wiggles).	18	①	②	③	④	⑤	⑥
19. The infant moves about much (kicks, waves arms, squirms) during dressing and undressing.	19	①	②	③	④	⑤	⑥
20. The infant wants and takes milk feedings at about the same times (within one hour) from day to day.	20	①	②	③	④	⑤	⑥
21. The infant objects (cries, frets) if someone other than main caregiver gives care.	21	①	②	③	④	⑤	⑥
22. The infant adjusts to change in sleep time within 2-3 days.	22	①	②	③	④	⑤	⑥
23. The infant displays much feeling (vigorous smile or cry), when dressing and undressing.	23	①	②	③	④	⑤	⑥
24. The infant is fussy during a bath (cries, frowns).	24	①	②	③	④	⑤	⑥
25. The infant will continuously watch parents during diaper changing.	25	①	②	③	④	⑤	⑥
26. If fussing in bath, infant will continue to protest despite efforts to quiet him (talking, singing to him/her).	26	①	②	③	④	⑤	⑥
27. The infant reacts (startles, stares) to sudden change in lighting (turning on light).	27	①	②	③	④	⑤	⑥
28. The infant lies still (little kicking, splashing) in bath.	28	①	②	③	④	⑤	⑥
29. The infant's time of waking in the morning varies greatly (by 1 hour or more) from day to day.	29	①	②	③	④	⑤	⑥
30. The infant turns head away and looks for mother when held by new person.	30	①	②	③	④	⑤	⑥
31. The infant adjusts to change in place of sleeping within 2 or 3 days.	31	①	②	③	④	⑤	⑥
32. The infant displays much feeling (vigorous smile or cry) during diapering.	32	①	②	③	④	⑤	⑥
33. The infant is fussy when put down for sleep (cries, frets).	33	①	②	③	④	⑤	⑥
34. The infant continuously watches parents during changing of clothes.	34	①	②	③	④	⑤	⑥
35. The infant's hunger cry can be stopped for over a minute by picking up or giving pacifier.	35	①	②	③	④	⑤	⑥

1 = ALMOST NEVER 2 = RARELY 3 = VARIABLE, USUALLY DOES NOT 4 = VARIABLE, USUALLY DOES 5 = FREQUENTLY 6 = ALMOST ALWAYS		ALMOST NEVER					ALMOST ALWAYS
36. The infant reacts (startles, cries) to sudden loud noises.	36	①	②	③	④	⑤	⑥
37. The infant moves much (squirms, bounces, kicks) when lying awake in crib.	37	①	②	③	④	⑤	⑥
38. The infant takes daytime naps at different times (over 1 hour difference) from day to day.	38	①	②	③	④	⑤	⑥
39. The infant does not feed well (fusses) when in new situation.	39	①	②	③	④	⑤	⑥
40. The infant objects (fusses, squirms) to being bathed by a different person even after 2 or 3 tries.	40	①	②	③	④	⑤	⑥
41. The infant is noisy (vocalizing loudly) on waking up.	41	①	②	③	④	⑤	⑥
42. The infant is fussy when burped (cries, fusses) during feeding.	42	①	②	③	④	⑤	⑥
43. The infant persistently (over 5 minutes) watches parent's face while parent is talking or singing.	43	①	②	③	④	⑤	⑥
44. The infant can be distracted (singing, patting) from fussing or squirming during hair brushing.	44	①	②	③	④	⑤	⑥
45. The infant notices (quiets, turns head) to music or voices in the next room.	45	①	②	③	④	⑤	⑥
46. The infant moves about much (kicks, waves arms, squirms) during diapering.	46	①	②	③	④	⑤	⑥
47. The infant wants an extra feeding at a different time each day (over one hour difference).	47	①	②	③	④	⑤	⑥
48. The infant accepts right away a change in time of feeding.	48	①	②	③	④	⑤	⑥
49. The infant resists changes in feeding schedule (1 hour or more) even after 2 tries.	49	①	②	③	④	⑤	⑥
50. The infant cries loudly when diaper is soiled with bowel movement.	50	①	②	③	④	⑤	⑥
51. The infant lies quietly, making happy noises upon waking up.	51	①	②	③	④	⑤	⑥
52. The infant continuously turns head toward the sound of a person talking (for 5 minutes or more).	52	①	②	③	④	⑤	⑥
53. The infant can be soothed (patted, rocked) when sleepy.	53	①	②	③	④	⑤	⑥
54. The infant notices (reacts differently) to a change in person giving care.	54	①	②	③	④	⑤	⑥
55. The infant moves much during feeding (squirms, kicks, waves arms).	55	①	②	③	④	⑤	⑥
56. The infant sucks for the same amount of time during a feeding (within 10 minutes).	56	①	②	③	④	⑤	⑥
57. The infant accepts his/her bath any time of day without resisting.	57	①	②	③	④	⑤	⑥
58. The infant cries during a bowel movement.	58	①	②	③	④	⑤	⑥
59. The infant watches parent's face for less than a minute during parent-child play activity.	59	①	②	③	④	⑤	⑥
60. The infant continues to cry when frightened despite several minutes of soothing (picked up, patted).	60	①	②	③	④	⑤	⑥
61. The infant turns away from parents to look at noise or movements in the room.	61	①	②	③	④	⑤	⑥
62. The infant lies still during nail cutting.	62	①	②	③	④	⑤	⑥
63. The infant's period of greatest physical activity comes at different times of the day (morning, afternoon, evening).	63	①	②	③	④	⑤	⑥
64. The infant resists (squirms, fusses) regular nail cutting.	64	①	②	③	④	⑤	⑥
65. The infant smiles, or coos during nail cutting.	65	①	②	③	④	⑤	⑥
66. The infant amuses self for 15 minutes or more in crib (looking at doll or toy).	66	①	②	③	④	⑤	⑥
67. The infant notices (startles) sudden movements or bumps when in stroller or carriage.	67	①	②	③	④	⑤	⑥
68. The infant's day time naps are varied in length from day to day (more than 1 hour difference).	68	①	②	③	④	⑤	⑥
69. The infant resists (squirms, fusses) during routine dressing or undressing.	69	①	②	③	④	⑤	⑥
70. The infant smiles or coos during hair washing.	70	①	②	③	④	⑤	⑥
71. The infant acts the same when the diaper is wet or dry.	71	①	②	③	④	⑤	⑥
72. The infant's bowel movements are the same time each day (within 1 hour).	72	①	②	③	④	⑤	⑥

APPENDIX C

Supportive Statistical Analyses

C1-Paired Sample t tests Infant Interaction

Paired Samples Test

		df	Sig. (2-tailed)
Pair 69	Positive Affect Behaviors infant f2f-EC - Neutral Affect Behaviors infant f2f EC	35	.639
Pair 70	Positive Affect Behaviors infant f2f-EC - NegativeAffect Behaviors infant f2f EC	35	.571
Pair 71	Positive Affect Behaviors infant f2f-EC - Infant VocalBehaviors infant-f2f EClosed	35	.000
Pair 72	Positive Affect Behaviors infant Still Faceeyes closed - NeutralAffect Behaviors infant sf eyes closed	35	.006
Pair 73	Positive Affect Behaviors infant Still Faceeyes closed - Negative Affect Behaviors infant SF eyes closed	35	.073
Pair 74	Positive Affect Behaviors infant Still Faceeyes closed - Infant Vocal Behaviors infant SF/Eyes closed	35	.002
Pair 75	Neutral Affect Behaviors infant 1 - negative Affect Behaviors infant 1	35	.062
Pair 76	Neutral Affect Behaviors infant 1 - Infant Vocal Behaviors infant 1	35	.000
Pair 77	NeutralAffectBehaviors infant turn profile - Negative AffectBehaviors infant turn profile	35	.419
Pair 78	NeutralAffectBehaviors infant turn profile - Infant vocal Behaviors infant turn	35	.006
Pair 79	Neutral Affect Behaviors infant f2f EC - NegativeAffect Behaviors infant f2f EC	35	.404
Pair 80	Neutral Affect Behaviors infant f2f EC - Infant VocalBehaviors infant-f2f EClosed	35	.000
Pair 81	NeutralAffect Behaviors infant sf eyes closed - Negative Affect Behaviors infant SF eyes closed	35	.295
Pair 82	NeutralAffect Behaviors infant sf eyes closed - Infant Vocal Behaviors infant SF/Eyes closed	35	.011
Pair 83	negative Affect Behaviors infant 1 - Infant Vocal Behaviors infant 1	35	.000
Pair 84	Negative AffectBehaviors infant turn profile - Infant vocal Behaviors infant turn	35	.003
Pair 85	NegativeAffect Behaviors infant f2f EC - Infant VocalBehaviors infant-f2f EClosed	35	.000
Pair 86	Negative Affect Behaviors infant SF eyes closed - Infant Vocal Behaviors infant SF/Eyes closed	35	.004

Paired Samples Test

		df	Sig. (2-tailed)
Pair 46	Self Comforting Behaviors infant stillface - Infant Vocal Behaviors infant SF/Eyes closed	35	.001
Pair 47	Rhythmis Behaviors infant 1 - Positive Affect Behaviors infant 1	35	000
Pair 48	Rhythmis Behaviors infant 1 - Neutral Affect Behaviors infant 1	35	.000
Pair 49	Rhythmis Behaviors infant 1 - negative Affect Behaviors infant 1	35	.000
Pair 50	Rhythmis Behaviors infant 1 - Infant Vocal Behaviors infant 1	35	.001
Pair 51	Rhythmic Behaviors infant turn profile - Positive AffectBehaviors infant turn profile	35	.000
Pair 52	Rhythmic Behaviors infant turn profile - NeutralAffectBehaviors infant turn profile	35	.000
Pair 53	Rhythmic Behaviors infant turn profile - Negative AffectBehaviors infant turn profile	35	000
Pair 54	Rhythmic Behaviors infant turn profile - Infant vocal Behaviors infant turn	35	.000
Pair 55	Rhythmic Behaviors infant F2F ec - Positive Affect Behaviors infant f2f-EC	35	000
Pair 56	Rhythmic Behaviors infant F2F ec - Neutral Affect Behaviors infant f2f EC	35	000
Pair 57	Rhythmic Behaviors infant F2F ec - NegativeAffect Behaviors infant f2f EC	35	000
Pair 58	Rhythmic Behaviors infant F2F ec - Infant VocalBehaviors infant-f2f ECIosed	35	000
Pair 59	Rhythmic Behaviors infant stillface - Positive Affect Behaviors infant Still Faceeyes closed	35	000
Pair 60	Rhythmic Behaviors infant F2F ec - NeutralAffect Behaviors infant sf eyes closed	35	000
Pair 61	Rhythmic Behaviors infant stillface - Negative Affect Behaviors infant SF eyes closed	35	000
Pair 62	Rhythmic Behaviors infant stillface - Infant Vocal Behaviors infant SF/Eyes closed	35	.000
Pair 63	Positive Affect Behaviors infant 1 - Neutral Affect Behaviors infant 1	35	.252
Pair 64	Positive Affect Behaviors infant 1 - negative Affect Behaviors infant 1	35	.003
Pair 65	Positive Affect Behaviors infant 1 - Infant Vocal Behaviors infant 1	35	000
Pair 66	Positive AffectBehaviors infant turn profile - NeutralAffectBehaviors infant turn profile	35	.009
Pair 67	Positive Affect Behaviors infant 1 - Negative AffectBehaviors infant turn profile	35	.062
Pair 68	Positive AffectBehaviors infant turn profile - Infant vocal Behaviors infant turn	35	.000

Paired Samples Test

		df	Sig. (2-tailed)
Pair 23	Frequency Gaze Avert All, still face - Negative Affect Behaviors infant SF eyes closed	35	.001
Pair 24	Frequency Gaze Avert All, still face - Infant Vocal Behaviors infant SF/Eyes closed	35	.828
Pair 25	Self Comforting Behaviors infant 1 - Rhythmia Behaviors infant 1	35	.000
Pair 26	Self Comforting Behaviors infant 1 - Positive Affect Behaviors infant 1	35	.118
Pair 27	Self Comforting Behaviors infant 1 - Neutral Affect Behaviors infant 1	35	.287
Pair 28	Self Comforting Behaviors infant 1 - Neutral Affect Behaviors infant 1	35	.287
Pair 29	Self Comforting Behaviors infant 1 - negative Affect Behaviors infant 1	35	.800
Pair 30	Self Comforting Behaviors infant 1 - Infant Vocal Behaviors infant 1	35	.000
Pair 31	Self Comforting Behaviors infant turn profile - Rhythmic Behaviors infant turn profile	35	000
Pair 32	Self Comforting Behaviors infant 1 - Positive AffectBehaviors infant turn profile	35	.286
Pair 33	Self Comforting Behaviors infant turn profile - Positive AffectBehaviors infant turn profile	35	081
Pair 34	Self Comforting Behaviors infant turn profile - NeutralAffectBehaviors infant turn profile	35	.815
Pair 35	Self Comforting Behaviors infant turn profile - Negative AffectBehaviors infant turn profile	35	.598
Pair 36	Self Comforting Behaviors infant turn profile - Infant vocal Behaviors infant turn	35	.031
Pair 37	Self Comforting Behaviors infant EC - Rhythmic Behaviors infant F2F ec	35	.000
Pair 38	Self Comforting Behaviors infant EC - Positive Affect Behaviors infant f2f-EC	35	.729
Pair 39	Self Comforting Behaviors infant EC - Neutral Affect Behaviors infant f2f EC	35	.614
Pair 40	Self Comforting Behaviors infant EC - NegativeAffect Behaviors infant f2f EC	35	1.000
Pair 41	Self Comforting Behaviors infant EC - Infant VocalBehaviors infant-f2f ECloseed	35	.000
Pair 42	Self Comforting Behaviors infant stillface - Rhythmic Behaviors infant stillface	35	.000
Pair 43	Self Comforting Behaviors infant stillface - Positive Affect Behaviors infant Still Faceeyes closed	35	.201
Pair 44	Self Comforting Behaviors infant stillface - NeutralAffect Behaviors infant sf eyes closed	35	.627
Pair 45	Self Comforting Behaviors infant stillface - Negative Affect Behaviors infant SF eyes closed	35	.891

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	Freq-Gaze Avert All, episode 1 - Self Comforting Behaviors infant 1	35	.015
Pair 2	Freq-Gaze Avert All, episode 1 - Rhythmic Behaviors infant 1	35	.000
Pair 3	Freq-Gaze Avert All, episode 1 - Positive Affect Behaviors infant 1	35	.210
Pair 4	Freq-Gaze Avert All, episode 1 - Neutral Affect Behaviors infant 1	35	.084
Pair 5	Freq-Gaze Avert All, episode 1 - negative Affect Behaviors infant 1	35	.000
Pair 6	Freq-Gaze Avert All, episode 1 - Infant Vocal Behaviors infant 1	35	.006
Pair 7	Frequency Gaze Avert All, turn - Self Comforting Behaviors infant turn profile	35	.005
Pair 8	Frequency Gaze Avert All, turn - Rhythmic Behaviors infant turn profile	35	.000
Pair 9	Frequency Gaze Avert All, turn - Positive AffectBehaviors infant turn profile	35	.000
Pair 10	Frequency Gaze Avert All, turn - NeutralAffectBehaviors infant turn profile	35	.001
Pair 11	Frequency Gaze Avert All, turn - Negative AffectBehaviors infant turn profile	35	.000
Pair 12	Frequency Gaze Avert All, turn - Infant vocal Behaviors infant turn	35	.272
Pair 13	Frequency Gaze Avert All, f2f no EC - Self Comforting Behaviors infant EC	35	.000
Pair 14	Frequency Gaze Avert All, f2f no EC - Rhythmic Behaviors infant F2F ec	35	.000
Pair 15	Frequency Gaze Avert All, f2f no EC - Positive Affect Behaviors infant f2f-EC	35	.000
Pair 16	Frequency Gaze Avert face, noeyecontact f2f - Neutral Affect Behaviors infant f2f EC	35	.007
Pair 17	Frequency Gaze Avert All, f2f no EC - NegativeAffect Behaviors infant f2f EC	35	.000
Pair 18	Frequency Gaze Avert All, f2f no EC - Infant VocalBehaviors infant-f2f ECloaed	35	.793
Pair 19	Frequency Gaze Avert All, still face - Self Comforting Behaviors infant stillface	35	.010
Pair 20	Frequency Gaze Avert All, still face - Rhythmic Behaviors infant stillface	35	.000
Pair 21	Frequency Gaze Avert All, still face - Positive Affect Behaviors infant Still Faceeyes closed	35	.000
Pair 22	Frequency Gaze Avert All, still face - NeutralAffect Behaviors infant sf eyes closed	35	.006

Paired Samples Test

		Paired Differences					t
					.99% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 69	Positive Affect Behaviors infant f2f-EC - Neutral Affect Behaviors infant f2f EC	-.1111	1.4097	.2350	-.1140	-.1082	-.473
Pair 70	Positive Affect Behaviors infant f2f-EC - NegativeAffect Behaviors infant f2f EC	.2222	2.3313	.3885	.2174	.2271	.572
Pair 71	Positive Affect Behaviors infant f2f-EC - Infant VocalBehaviors infant-f2f ECloseд	-3.7778	4.9229	.8205	-3.7880	-3.7675	-4.604
Pair 72	Positive Affect Behaviors infant Still Faceeyes closed - NeutralAffect Behaviors infant sf eyes closed	-1.1944	2.4590	.4098	-1.1996	-1.1893	-2.914
Pair 73	Positive Affect Behaviors infant Still Faceeyes closed - Negative Affect Behaviors infant SF eyes closed	-.8056	2.6166	.4361	-.8110	-.8001	-1.847
Pair 74	Positive Affect Behaviors infant Still Faceeyes closed - Infant Vocal Behaviors infant SF/Eyes closed	-4.5000	7.9264	1.3211	-4.5165	-4.4835	-3.406
Pair 75	Neutral Affect Behaviors infant 1 - negative Affect Behaviors infant 1	1.0278	3.1936	.5323	1.0211	1.0344	1.931
Pair 76	Neutral Affect Behaviors infant 1 - infant Vocal Behaviors infant 1	-6.2500	8.7648	1.4608	-6.2683	-6.2317	-4.278
Pair 77	NeutralAffectBehaviors infant turn profile - Negative AffectBehaviors infant turn profile	.2778	2.0370	.3395	.2735	.2820	.818
Pair 78	NeutralAffectBehaviors infant turn profile - Infant vocal Behaviors infant turn	-2.6667	5.5136	.9189	-2.6782	-2.6552	-2.902
Pair 79	Neutral Affect Behaviors infant f2f EC - NegativeAffect Behaviors infant f2f EC	.3333	2.3664	.3944	.3284	.3383	.845
Pair 80	Neutral Affect Behaviors infant f2f EC - Infant VocalBehaviors infant-f2f ECloseд	-3.6667	4.8462	.8077	-3.6788	-3.6566	-4.540
Pair 81	NeutralAffect Behaviors infant sf eyes closed - Negative Affect Behaviors infant SF eyes closed	.3889	2.1945	.3658	.3843	.3935	1.063
Pair 82	NeutralAffect Behaviors infant sf eyes closed - Infant Vocal Behaviors infant SF/Eyes closed	-3.3056	7.3788	1.2298	-3.3209	-3.2902	-2.688
Pair 83	negative Affect Behaviors infant 1 - infant Vocal Behaviors infant 1	-7.2778	9.7442	1.6240	-7.2981	-7.2575	-4.481
Pair 84	Negative AffectBehaviors infant turn profile - Infant vocal Behaviors infant turn	-2.9444	5.4403	.9067	-2.9558	-2.9331	-3.247
Pair 85	NegativeAffect Behaviors infant f2f EC - Infant VocalBehaviors infant-f2f ECloseд	-4.0000	4.6476	.7746	-4.0097	-3.9903	-5.164
Pair 86	Negative Affect Behaviors infant SF eyes closed - Infant Vocal Behaviors infant SF/Eyes closed	-3.6944	7.2538	1.2090	-3.7096	-3.6793	-3.056

Paired Samples Test

		Paired Differences					t
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper	
Pair 46	Self Comforting Behaviors infant stillface - Infant Vocal Behaviors infant SF/Eyes closed	-3.6111	6.2486	1.0414	-3.6241	-3.5981	-3.467
Pair 47	Rhythmis Behaviors infant 1 - Positive Affect Behaviors infant 1	11.1667	5.1297	.8550	11.1560	11.1774	13.061
Pair 48	Rhythmis Behaviors infant 1 - Neutral Affect Behaviors infant 1	11.5556	5.1350	.8558	11.5449	11.5663	13.502
Pair 49	Rhythmis Behaviors infant 1 - negative Affect Behaviors infant 1	12.5833	5.4426	.9071	12.5720	12.5947	13.872
Pair 50	Rhythmis Behaviors infant 1 - infant Vocal Behaviors infant 1	5.3056	8.4611	1.4102	5.2879	5.3232	3.762
Pair 51	Rhythmic Behaviors infant turn profile - Positive AffectBehaviors infant turn profile	11.8889	5.6960	.9493	11.8770	11.9008	12.523
Pair 52	Rhythmic Behaviors infant turn profile - NeutralAffectBehaviors infant turn profile	10.7222	5.3698	.8950	10.7110	10.7334	11.981
Pair 53	Rhythmic Behaviors infant turn profile - Negative AffectBehaviors infant turn profile	11.0000	5.6669	.9445	10.9882	11.0118	11.646
Pair 54	Rhythmic Behaviors infant turn profile - infant vocal Behaviors infant turn	8.0556	5.7864	.9644	8.0435	8.0676	8.353
Pair 55	Rhythmic Behaviors infant F2F ec - Positive Affect Behaviors infant f2f-EC	8.8333	3.8060	.6343	8.8254	8.8413	13.925
Pair 56	Rhythmic Behaviors infant F2F ec - Neutral Affect Behaviors infant f2f EC	8.7222	3.4443	.5741	8.7150	8.7294	15.194
Pair 57	Rhythmic Behaviors infant F2F ec - NegativeAffect Behaviors infant f2f EC	9.0556	4.5478	.7580	9.0461	9.0650	11.947
Pair 58	Rhythmic Behaviors infant F2F ec - Infant VocalBehaviors infant-f2f ECloesd	5.0556	5.2041	.8673	5.0447	5.0664	5.829
Pair 59	Rhythmic Behaviors infant stillface - Positive Affect Behaviors infant Still Faceeyes closed	10.1111	5.2741	.8790	10.1001	10.1221	11.503
Pair 60	Rhythmic Behaviors infant F2F ec - NeutralAffect Behaviors infant sf eyes closed	8.2778	3.7993	.6332	8.2699	8.2857	13.072
Pair 61	Rhythmic Behaviors infant stillface - Negative Affect Behaviors infant SF eyes closed	9.3056	5.1537	.8590	9.2948	9.3163	10.834
Pair 62	Rhythmic Behaviors infant stillface - Infant Vocal Behaviors infant SF/Eyes closed	5.6111	7.2359	1.2060	5.5960	5.6262	4.653
Pair 63	Positive Affect Behaviors infant 1 - Neutral Affect Behaviors infant 1	.3889	2.0040	.3340	.3847	.3931	1.164
Pair 64	Positive Affect Behaviors infant 1 - negative Affect Behaviors infant 1	1.4167	2.6766	.4461	1.4111	1.4222	3.176
Pair 65	Positive Affect Behaviors infant 1 - Infant Vocal Behaviors infant 1	-5.8611	8.7998	1.4666	-5.8794	-5.8428	-3.996
Pair 66	Positive AffectBehaviors infant turn profile - NeutralAffectBehaviors infant turn profile	-1.1667	2.5467	.4245	-1.1720	-1.1614	-2.749
Pair 67	Positive Affect Behaviors infant 1 - Negative AffectBehaviors infant turn profile	1.1389	3.5469	.5911	1.1315	1.1463	1.927
Pair 68	Positive AffectBehaviors infant turn profile - infant vocal Behaviors infant turn	-3.8333	5.9016	.9836	-3.8456	-3.8210	-3.897

Paired Samples Test

		Paired Differences					t
					.99% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 23	Frequency Gaze Avert All, still face - Negative Affect Behaviors infant SF eyes closed	3.3333	5.6619	.9437	3.3215	3.3451	3.532
Pair 24	Frequency Gaze Avert All, still face - Infant Vocal Behaviors infant SF/Eyes closed	-.3611	9.8797	1.6466	-.3817	-.3405	-.219
Pair 25	Self Comforting Behaviors infant 1 - Rhythmic Behaviors infant 1	-12.3889	5.5202	.9200	-12.4004	-12.3774	-13.466
Pair 26	Self Comforting Behaviors infant 1 - Positive Affect Behaviors infant 1	-1.2222	4.5739	.7623	-1.2317	-1.2127	-1.603
Pair 27	Self Comforting Behaviors infant 1 - Neutral Affect Behaviors infant 1	-.8333	4.6260	.7710	-.8430	-.8237	-1.081
Pair 28	Self Comforting Behaviors infant 1 - Neutral Affect Behaviors infant 1	-.8333	4.6260	.7710	-.8430	-.8237	-1.081
Pair 29	Self Comforting Behaviors infant 1 - negative Affect Behaviors infant 1	.1944	4.5658	.7610	.1849	.2040	.256
Pair 30	Self Comforting Behaviors infant 1 - Infant Vocal Behaviors infant 1	-7.0833	9.2779	1.5463	-7.1027	-7.0640	-4.581
Pair 31	Self Comforting Behaviors infant turn profile - Rhythmic Behaviors infant turn profile	-10.5556	5.1406	.8568	-10.5663	-10.5448	-12.320
Pair 32	Self Comforting Behaviors infant 1 - Positive AffectBehaviors infant turn profile	.8056	4.4646	.7441	.7963	.8149	1.083
Pair 33	Self Comforting Behaviors infant turn profile - Positive AffectBehaviors infant turn profile	1.3333	4.4593	.7432	1.3240	1.3426	1.794
Pair 34	Self Comforting Behaviors infant turn profile - NeutralAffectBehaviors infant turn profile	.1667	4.2325	.7054	.1579	.1755	.236
Pair 35	Self Comforting Behaviors infant turn profile - Negative AffectBehaviors infant turn profile	.4444	5.0168	.8361	.4340	.4549	.532
Pair 36	Self Comforting Behaviors infant turn profile - Infant vocal Behaviors infant turn	-2.5000	6.6655	1.1109	-2.5139	-2.4861	-2.250
Pair 37	Self Comforting Behaviors infant EC - Rhythmic Behaviors infant F2F ec	-9.0556	5.1655	.8609	-9.0663	-9.0448	-10.518
Pair 38	Self Comforting Behaviors infant EC - Positive Affect Behaviors infant f2f-EC	-.2222	3.8106	.6351	-.2302	-.2143	-.350
Pair 39	Self Comforting Behaviors infant EC - Neutral Affect Behaviors infant f2f EC	-.3333	3.9279	.6547	-.3415	-.3252	-.509
Pair 40	Self Comforting Behaviors infant EC - NegativeAffect Behaviors infant f2f EC	.0000	4.3161	.7193	-8.9697E-03	8.990E-03	.000
Pair 41	Self Comforting Behaviors infant EC - Infant VocalBehaviors infant-f2f ECclosed	-4.0000	6.0238	1.0040	-4.0125	-3.9875	-3.984
Pair 42	Self Comforting Behaviors infant stillface - Rhythmic Behaviors infant stillface	-9.2222	3.9069	.6511	-9.2304	-9.2141	-14.163
Pair 43	Self Comforting Behaviors infant stillface - Positive Affect Behaviors infant Still Faceeyes closed	.8889	4.0903	.6817	.8804	.8974	1.304
Pair 44	Self Comforting Behaviors infant stillface - NeutralAffect Behaviors infant sf eyes closed	-.3056	3.7403	.6234	-.3133	-.2978	-.490
Pair 45	Self Comforting Behaviors infant stillface - Negative Affect Behaviors infant SF eyes closed	8.333E-02	3.6283	.6047	7.578E-02	9.089E-02	.138

Paired Samples Test

		Paired Differences					t
					.99% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	Freq-Gaze Avert All, episode 1 - Self Comforting Behaviors infant 1	2.1111	4.9268	.8211	2.1008	2.1214	2.571
Pair 2	Freq-Gaze Avert All, episode 1 - Rhythmic Behaviors infant 1	-10.2778	6.9225	1.1537	-10.2922	-10.2634	-8.908
Pair 3	Freq-Gaze Avert All, episode 1 - Positive Affect Behaviors infant 1	.8889	4.1732	.6955	.8802	.8976	1.278
Pair 4	Freq-Gaze Avert All, episode 1 - Neutral Affect Behaviors infant 1	1.2778	4.3069	.7178	1.2688	1.2867	1.780
Pair 5	Freq-Gaze Avert All, episode 1 - negative Affect Behaviors infant 1	2.3056	3.5683	.5947	2.2981	2.3130	3.877
Pair 6	Freq-Gaze Avert All, episode 1 - Infant Vocal Behaviors infant 1	-4.9722	10.2190	1.7032	-4.9935	-4.9509	-2.919
Pair 7	Frequency Gaze Avert All, turn - Self Comforting Behaviors infant turn profile	4.0556	8.1203	1.3534	4.0386	4.0725	2.997
Pair 8	Frequency Gaze Avert All, turn - Rhythmic Behaviors infant turn profile	-6.5000	8.1609	1.3601	-6.5170	-6.4830	-4.779
Pair 9	Frequency Gaze Avert All, turn - Positive AffectBehaviors infant turn profile	5.3889	5.4473	.9079	5.3775	5.4002	5.936
Pair 10	Frequency Gaze Avert All, turn - NeutralAffectBehaviors infant turn profile	4.2222	6.6552	1.1092	4.2084	4.2361	3.807
Pair 11	Frequency Gaze Avert All, turn - Negative AffectBehaviors infant turn profile	4.5000	5.5831	.9305	4.4884	4.5116	4.836
Pair 12	Frequency Gaze Avert All, turn - infant vocal Behaviors infant turn	1.5556	8.3647	1.3941	1.5381	1.5730	1.116
Pair 13	Frequency Gaze Avert All, f2f no EC - Self Comforting Behaviors infant EC	3.7500	5.1067	.8511	3.7394	3.7606	4.406
Pair 14	Frequency Gaze Avert All, f2f no EC - Rhythmic Behaviors infant F2F ec	-5.3056	5.5488	.9248	-5.3171	-5.2940	-5.737
Pair 15	Frequency Gaze Avert All, f2f no EC - Positive Affect Behaviors infant f2f-EC	3.5278	4.7719	.7953	3.5178	3.5377	4.436
Pair 16	Frequency Gaze Avert face, noeyecontact f2f - Neutral Affect Behaviors infant f2f EC	1.9444	4.0844	.6807	1.9359	1.9530	2.856
Pair 17	Frequency Gaze Avert All, f2f no EC - NegativeAffect Behaviors infant f2f EC	3.7500	5.0335	.8389	3.7395	3.7605	4.470
Pair 18	Frequency Gaze Avert All, f2f no EC - Infant VocalBehaviors infant-f2f EClosed	-.2500	5.6638	.9440	-.2618	-.2382	-.265
Pair 19	Frequency Gaze Avert All, still face - Self Comforting Behaviors infant stillface	3.2500	7.1369	1.1895	3.2351	3.2649	2.732
Pair 20	Frequency Gaze Avert All, still face - Rhythmic Behaviors infant stillface	-5.9722	8.4091	1.4015	-5.9897	-5.9547	-4.261
Pair 21	Frequency Gaze Avert All, still face - Positive Affect Behaviors infant Still Faceeyes closed	4.1389	5.2598	.8766	4.1279	4.1498	4.721
Pair 22	Frequency Gaze Avert All, still face - NeutralAffect Behaviors infant sf eyes closed	2.9444	5.9902	.9984	2.9320	2.9569	2.949

C2-Paired Sample t tests Maternal Overall Behaviors X Episode interaction

Paired Samples Statistics

		Mean	N	Std. Deviation
Pair 1	maternal behaviors vocalization episode 1 F-T-F	19.69	36	13.23
	Maternal Behavior,TOUCH Episode F-T-F	20.17	36	15.31
Pair 2	maternal behaviors vocalization episode 1 F-T-F	19.69	36	13.23
	maternal behaviors visualization episode Face-To-Face	7.50	36	7.83
Pair 3	maternal behaviors vocalization episode 1 F-T-F	19.69	36	13.23
	maternal behaviors vocalization episode eyes-close play	17.56	36	11.03
Pair 4	maternal behaviors vocalization episode 1 F-T-F	19.69	36	13.23
	maternal behaviors Touch episode No Eye-Contact	20.89	36	13.21
Pair 5	maternal behaviors vocalization episode 1 F-T-F	19.69	36	13.23
	maternal behaviors visualization episode EyesClosed	5.67	36	5.93
Pair 6	Maternal Behavior,TOUCH Episode F-T-F	20.17	36	15.31
	maternal behaviors Touch episode No Eye-Contact	20.89	36	13.21
Pair 7	Maternal Behavior,TOUCH Episode F-T-F	20.17	36	15.31
	maternal behaviors visualization episode Face-To-Face	7.50	36	7.83
Pair 8	Maternal Behavior,TOUCH Episode F-T-F	20.17	36	15.31
	maternal behaviors visualization episode EyesClosed	5.67	36	5.93
Pair 9	maternal behaviors Touch episode No Eye-Contact	20.89	36	13.21
	maternal behaviors visualization episode Face-To-Face	7.50	36	7.83
Pair 10	maternal behaviors Touch episode No Eye-Contact	20.89	36	13.21
	maternal behaviors visualization episode EyesClosed	5.67	36	5.93
Pair 11	maternal behaviors visualization episode Face-To-Face	7.50	36	7.83
	maternal behaviors visualization episode EyesClosed	5.67	36	5.93

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 1	maternal behaviors vocalization episode 1 F-T-F - Maternal Behavior,TOUCH Episode F-T-F	-.47	8.11	1.35	-4.15	3.21	-.349	35	.729
Pair 2	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors visualization episode Face-To-Face	12.19	9.45	1.58	7.90	16.48	7.742	35	.000
Pair 3	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors vocalization episode eyes-close play	2.14	12.27	2.04	-3.43	7.71	1.046	35	.303
Pair 4	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors Touch episode No Eye-Contact	-1.19	13.74	2.29	-7.43	5.04	-.522	35	.605
Pair 5	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors visualization episode EyesClosed	14.03	12.31	2.05	8.44	19.62	6.838	35	.000
Pair 6	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors Touch episode No Eye-Contact	-.72	14.79	2.47	-7.44	5.99	-.293	35	.771
Pair 7	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors visualization episode Face-To-Face	12.67	10.85	1.81	7.74	17.59	7.007	35	.000
Pair 8	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors visualization episode EyesClosed	14.50	12.89	2.15	8.65	20.35	6.750	35	.000
Pair 9	maternal behaviors Touch episode No Eye-Contact - maternal behaviors visualization episode Face-To-Face	13.39	14.30	2.38	6.90	19.88	5.616	35	.000
Pair 10	maternal behaviors Touch episode No Eye-Contact - maternal behaviors visualization episode EyesClosed	15.22	10.41	1.74	10.49	19.95	8.770	35	.000
Pair 11	maternal behaviors visualization episode Face-To-Face - maternal behaviors visualization episode EyesClosed	1.83	7.31	1.22	-1.49	5.15	1.504	35	.141

C3- Paired Sample t tests Maternal Behaviors 2-way interaction

Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors vocalization episode eyes-close play	35	.303
Pair 2	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode 1 F-T-F	35	.306
Pair 3	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	35	.012
Pair 4	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	35	.001
Pair 5	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors Touch episode No Eye-Contact	35	.771
Pair 6	Maternal Behavior,TOUCH Episode F-T-F - Contingentent Maternal Behavior,TOUCH Episode F-T-F	35	.068
Pair 7	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	35	.016
Pair 8	Contingentent Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors Touch episode No Eye-Contact	35	.017
Pair 9	maternal behaviors visualization episode Face-To-Face - maternal behaviors visualization episode EyesClosed	35	.141
Pair 10	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors visualization episode Face-To-Face	35	.527
Pair 11	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors Touch episode No Eye-Contact	35	.001
Pair 12	Contingent maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors visualization episode EyesClosed	35	.000

Paired Samples Test

		Paired Differences					t
					99% Confidence Interval of the Difference		
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pair 1	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors vocalization episode eyes-close play	2.14	12.27	2.04	-3.43	7.71	1.046
Pair 2	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode 1 F-T-F	-2.53	14.60	2.43	-9.16	4.10	-1.039
Pair 3	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	7.06	15.90	2.65	-.16	14.27	2.663
Pair 4	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	9.58	16.33	2.72	2.17	17.00	3.521
Pair 5	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors Touch episode No Eye-Contact	-.72	14.79	2.47	-7.44	5.99	-.293
Pair 6	Maternal Behavior,TOUCH Episode F-T-F - Contingentent Maternal Behavior,TOUCH Episode F-T-F	-5.08	16.20	2.70	-12.44	2.27	-1.882
Pair 7	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	7.53	17.87	2.98	-.58	15.64	2.527
Pair 8	Contingentent Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors Touch episode No Eye-Contact	8.58	20.63	3.44	-.78	17.95	2.496
Pair 9	maternal behaviors visualization episode Face-To-Face - maternal behaviors visualization episode EyesClosed	1.83	7.31	1.22	-1.49	5.15	1.504
Pair 10	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors visualization episode Face-To-Face	-.69	6.52	1.09	-3.65	2.27	-.639
Pair 11	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors Touch episode No Eye-Contact	-9.17	15.88	2.65	-16.38	-1.96	-3.463
Pair 12	Contingent maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors visualization episode EyesClosed	5.14	7.11	1.19	1.91	8.37	4.335

C4- Paired Sample t tests Maternal Behavior 3-way Interaction

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 65	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors Touch episode No Eye-Contact	-11.00	13.25	2.21	-17.02	-4.98	-4.981	35	.000
Pair 66	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors visualization episode EyesClosed	2.61	6.06	1.01	-.14	5.36	2.584	35	.014

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 50	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors visualization episode EyesClosed	19.17	15.75	2.62	12.02	26.32	7.302	35	.000
Pair 51	Contingentent Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors visualization episode Face-To-Face	17.06	16.90	2.82	9.39	24.73	6.057	35	.000
Pair 52	Contingent maternal behaviors vocalization episode eyes-close play - Contingentent Maternal Behavior,TOUCH Episode F-T-F	-12.61	19.96	3.33	-21.67	-3.55	-3.791	35	.001
Pair 53	Contingentent Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors Touch episode No Eye-Contact	8.58	20.63	3.44	-.78	17.95	2.496	35	017
Pair 54	Contingentent Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors visualization episode EyesClosed	22.19	18.96	3.16	13.58	30.81	7.015	35	.000
Pair 55	Contingent maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors visualization episode Face-To-Face	4.44	11.81	1.97	-.92	9.81	2.258	35	.030
Pair 56	Contingent maternal behaviors Touch episode No Eye-Contact - Contingent maternal behaviors visualization episode Face-To-Face	8.47	15.37	2.56	1.50	15.45	3.308	35	002
Pair 57	Contingent maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors visualization episode EyesClosed	5.14	7.11	1.19	1.91	8.37	4.335	35	000
Pair 58	Contingent maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors Touch episode No Eye-Contact	-4.03	6.07	1.01	-6.78	-1.27	-3.982	35	.000
Pair 59	Contingent maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors visualization episode EyesClosed	9.58	7.33	1.22	6.25	12.91	7.840	35	.000
Pair 60	Contingent maternal behaviors Touch episode No Eye-Contact - Contingent maternal behaviors visualization episode EyesClosed	13.61	11.85	1.98	8.23	18.99	6.889	35	.000
Pair 61	maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors vocalization episode eyes-close play	4.92	11.50	1.92	-.31	10.14	2.564	35	.015
Pair 62	maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors Touch episode No Eye-Contact	.89	14.92	2.49	-5.89	7.66	.357	35	.723
Pair 63	maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors visualization episode EyesClosed	14.50	11.27	1.88	9.39	19.61	7.722	35	.000
Pair 64	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors vocalization episode eyes-close play	-5.14	12.05	2.01	-10.61	.33	-2.559	35	.015

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 33	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors vocalization episode eyes-close play	-6.97	9.61	1.60	-11.34	-2.61	-4.351	35	.000
Pair 34	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors Touch episode No Eye-Contact	-11.00	13.25	2.21	-17.02	-4.98	-4.981	35	.000
Pair 35	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors visualization episode EyesClosed	2.61	6.06	1.01	-.14	5.36	2.584	35	.014
Pair 36	maternal behaviors Touch episode No Eye-Contact - maternal behaviors visualization episode EyesClosed	15.22	10.41	1.74	10.49	19.95	8.770	35	000
Pair 37	maternal behaviors Touch episode No Eye-Contact - Contingent maternal behaviors vocalization episode 1 F-T-F	-1.33	16.33	2.72	-8.75	6.08	-.490	35	627
Pair 38	maternal behaviors Touch episode No Eye-Contact - Contingentant Maternal Behavior.TOUCH Episode F-T-F	-4.36	20.27	3.38	-13.56	4.84	-1.291	35	.205
Pair 39	maternal behaviors Touch episode No Eye-Contact - Contingent maternal behaviors visualization episode EyesClosed	17.83	13.65	2.27	11.64	24.03	7.840	35	.000
Pair 40	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors vocalization episode 1 F-T-F	-16.56	14.19	2.36	-23.00	-10.11	-7.002	35	.000
Pair 41	maternal behaviors visualization episode EyesClosed - Contingentant Maternal Behavior.TOUCH Episode F-T-F	-19.58	16.78	2.80	-27.20	-11.96	-7.000	35	.000
Pair 42	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors visualization episode Face-To-Face	-2.53	8.39	1.40	-6.33	1.28	-1.809	35	079
Pair 43	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors vocalization episode eyes-close play	-6.97	9.61	1.60	-11.34	-2.61	-4.351	35	.000
Pair 44	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors Touch episode No Eye-Contact	-11.00	13.25	2.21	-17.02	-4.98	-4.981	35	.000
Pair 45	maternal behaviors visualization episode EyesClosed - Contingent maternal behaviors visualization episode EyesClosed	2.61	6.06	1.01	-.14	5.36	2.584	35	014
Pair 46	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingentant Maternal Behavior.TOUCH Episode F-T-F	-3.03	8.77	1.46	-7.01	.95	-2.072	35	.046
Pair 47	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors visualization episode Face-To-Face	14.03	14.39	2.40	7.49	20.56	5.848	35	.000
Pair 48	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	9.58	16.33	2.72	2.17	17.00	3.521	35	.001
Pair 49	Contingent maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors Touch episode No Eye-Contact	5.56	17.82	2.97	-2.53	13.65	1.871	35	.070

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 16	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors vocalization episode 1 F-T-F	-2.06	15.29	2.55	-9.00	4.89	-.807	35	.425
Pair 17	Maternal Behavior,TOUCH Episode F-T-F - Contingentant Maternal Behavior,TOUCH Episode F-T-F	-5.06	16.20	2.70	-12.44	2.27	-1.882	35	.068
Pair 18	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors visualization episode Face-To-Face	11.97	14.55	2.42	5.37	18.58	4.937	35	.000
Pair 19	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	7.53	17.87	2.98	-.58	15.64	2.527	35	.016
Pair 20	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors Touch episode No Eye-Contact	3.50	20.09	3.35	-5.62	12.62	1.045	35	.303
Pair 21	Maternal Behavior,TOUCH Episode F-T-F - Contingent maternal behaviors visualization episode EyesClosed	17.11	15.63	2.60	10.02	24.20	6.570	35	.000
Pair 22	maternal behaviors vocalization episode eyes-close play - maternal behaviors visualization episode Face-To-Face	10.06	11.82	1.97	4.69	15.42	5.103	35	.000
Pair 23	maternal behaviors Touch episode No Eye-Contact - maternal behaviors visualization episode Face-To-Face	13.39	14.30	2.38	6.90	19.88	5.616	35	.000
Pair 24	maternal behaviors visualization episode Face-To-Face - maternal behaviors visualization episode EyesClosed	1.83	7.31	1.22	-1.49	5.15	1.504	35	.141
Pair 25	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors vocalization episode 1 F-T-F	-14.72	14.10	2.35	-21.13	-8.32	-6.283	35	.000
Pair 26	maternal behaviors visualization episode Face-To-Face - Contingentant Maternal Behavior,TOUCH Episode F-T-F	-17.75	16.56	2.76	-25.27	-10.23	-6.432	35	.000
Pair 27	maternal behaviors visualization episode Face-To-Face - Contingent maternal behaviors visualization episode Face-To-Face	-.89	6.52	1.09	-3.85	2.27	-.839	35	.527
Pair 28	maternal behaviors vocalization episode eyes-close play - maternal behaviors Touch episode No Eye-Contact	-3.33	5.53	.92	-5.85	-.82	-3.614	35	.001
Pair 29	maternal behaviors vocalization episode eyes-close play - maternal behaviors visualization episode EyesClosed	11.89	8.05	1.34	8.23	15.54	8.858	35	.000
Pair 30	maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors vocalization episode 1 F-T-F	-4.67	15.73	2.62	-11.81	2.47	-1.780	35	.084
Pair 31	maternal behaviors vocalization episode eyes-close play - Contingentant Maternal Behavior,TOUCH Episode F-T-F	-7.68	19.57	3.26	-16.58	1.19	-2.359	35	.024
Pair 32	maternal behaviors vocalization episode eyes-close play - Contingent maternal behaviors visualization episode Face-To-Face	9.36	13.77	2.29	3.11	15.61	4.080	35	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 1	maternal behaviors vocalization episode 1 F-T-F - Maternal Behavior,TOUCH Episode F-T-F	-.47	8.11	1.35	-4.15	3.21	-.349	35	.729
Pair 2	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors visualization episode Face-To-Face	12.19	9.45	1.58	7.90	16.48	7.742	35	.000
Pair 3	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors vocalization episode eyes-close play	2.14	12.27	2.04	-3.43	7.71	1.046	35	.303
Pair 4	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors Touch episode No Eye-Contact	-1.19	13.74	2.29	-7.43	5.04	-.522	35	.605
Pair 5	maternal behaviors vocalization episode 1 F-T-F - maternal behaviors visualization episode EyesClosed	14.03	12.31	2.05	8.44	19.62	6.838	35	.000
Pair 6	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode 1 F-T-F	-2.53	14.60	2.43	-9.16	4.10	-1.039	35	.306
Pair 7	maternal behaviors vocalization episode 1 F-T-F - Contingentant Maternal Behavior,TOUCH Episode F-T-F	-5.56	17.56	2.93	-13.53	2.41	-1.899	35	.066
Pair 8	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors visualization episode Face-To-Face	11.50	13.53	2.26	5.36	17.64	5.098	35	.000
Pair 9	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors vocalization episode eyes-close play	7.06	15.90	2.65	-.16	14.27	2.663	35	.012
Pair 10	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors Touch episode No Eye-Contact	3.03	18.90	3.15	-5.55	11.61	.961	35	.343
Pair 11	maternal behaviors vocalization episode 1 F-T-F - Contingent maternal behaviors visualization episode EyesClosed	16.64	13.78	2.30	10.38	22.89	7.245	35	.000
Pair 12	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors visualization episode Face-To-Face	12.67	10.85	1.81	7.74	17.59	7.007	35	.000
Pair 13	maternal behaviors vocalization episode eyes-close play - Maternal Behavior,TOUCH Episode F-T-F	-2.61	13.74	2.29	-8.85	3.62	-1.140	35	.262
Pair 14	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors Touch episode No Eye-Contact	-.72	14.79	2.47	-7.44	5.99	-.293	35	.771
Pair 15	Maternal Behavior,TOUCH Episode F-T-F - maternal behaviors visualization episode EyesClosed	14.50	12.89	2.15	8.65	20.35	6.750	35	.000