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Preterm Infants: Neonatal Behavior and Later Attachment to the Mother

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PRETERM INFANTS:
NEONATAL BEHAVIOR
AND
LATER ATTACHMENT TO THE MOTHER

by

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VITA

The author, Nancy Ann Ruble, is the daughter of John Martin Ruble and Ann (Petro) Ruble. She was born on July 24, 1956, in Rensselaer, Indiana.

Her elementary education was obtained in the Catholic schools of Peoria, Illinois, and secondary education at the Academy of Our Lady High School in Peoria, Illinois, where she graduated in 1974.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

The term attachment refers to the affective tie that develops over time between an infant and mother or other primary caregiver. The development of attachment assumes an ability on the part of the infant to discriminate the caregiver from other adults, to display preference for and differential behavior toward the caregiver and a negative response to separation from the caregiver. Attachment can be inferred from certain behaviors (e.g., locomotion toward the caregiver or crying behavior in response to separation) but it is more than a set of particular behaviors. Attachment has been called an "organizational construct" (Stroufe & Waters, 1977) which acts to integrate various behavioral systems (e.g., locomotion) to achieve certain goals (e.g., proximity to the caregiver). Therefore, the term attachment is reserved to refer to the emotional bond between infant and caregiver while the phrase "attachment behaviors" refers to discrete behaviors that are related to attachment.

The development of caregiver-infant attachment figures in many psychological theories, although each explains it in a somewhat different way. Attachment is central to such divergent theories as learning, psychoanalysis, and ethology, not only in relation to normal social development but

also in relation to the genesis of psychopathological behavior. In all of these theories, it is assumed that the infant's attachment to the mother or other caregiver is the prototypic relationship, on which all later relationships are based. It is suggested that this relationship is of utmost importance because it is the first, and, therefore, the most influential. What the infant experiences or learns in this first relationship will be the basis upon which the adult will perceive and behave in further social relationships.

For example, according to traditional learning theorists, attachment develops as a learned association. In an optimal situation, the presence of the caregiver is consistently paired with such unconditioned positive stimuli as food, warmth and dryness. The absence of the caregiver is associated with noxious stimuli such as hunger, coldness and wetness. The caregiver soon becomes a conditioned stimulus and the infant begins to respond positively to his or her presence alone. Or, in operant terms, being in the presence of the caregiver is usually followed by positive reinforcement in the form of food, warmth and comfort and, as a result, the infant learns to maintain proximity to the caregiver. Thus, the mother becomes a reinforcer in her own right, her presence is rewarding, and she is actively sought by the child. Similarly, the absence of the mother is associated with aversive events and hence comes to be negatively

reinforcing. As a result, the mother's absence is actively avoided. These associations are eventually generalized from the mother to include other people and the individual continues to perceive people in a positive way. Conversely, an infant who learns to associate negative outcomes with the presence of the mother, or who forms no consistent associations, would be expected to develop interpersonal problems (Dollard & Miller, 1950).

The psychoanalytic view is similar to the learning perspective in the sense that it also involves an association of the caregiver with the satisfaction of basic needs, especially feeding. According to psychoanalytic theory, the infant first becomes cathected to the breast as the source of the reduction of tension arising from hunger. Gradually, the infant begins to associate this drive reduction with the mother herself and becomes cathected to her. Because the infant recognizes mother as necessary to the continued satisfaction of his or her basic needs (and, thus, the preservation of life), her presence becomes of utmost concern to him or her. When the mother is absent, the infant experiences anxiety because he or she fears that basic needs will not be satisfied. As a result of these experiences around feeding, mother is for the infant "unique, without parallel, established unalterably for a whole lifetime as the first and strongest love-object and as the prototype of all later love relations" (Freud, 1938;

Ainsworth, 1969).

Like these two theories, ethological theory sees attachment as fundamental to development. However, unlike the two theories just described, ethological theory does not conceive of attachment as deriving from an association of the mother on the one hand and pleasurable feelings and satisfaction of needs on the other. Rather, according to the ethological perspective, attachment results from a set of instinctual behaviors on the parts of both the infant and adult caregivers. For example, Lorenz (1971) has suggested that the infant has a number of physical characteristics that are perceived as "babyish" and that evoke nurturant behavior in adult humans. These characteristics include heavy, short limbs, proportionally large heads, high and protruding foreheads, large eyes placed in the middle of the face, small noses and mouths, and fat cheeks (Maier, Holmes, Slaymaker and Reich, in press). These physical traits, combined with certain types of behavior (e.g., uncoordinated movements) and specific reflexes (e.g., Moro) serve to ensure the maintainance of proximity of the caregiver to the infant. This in turn, ensures the survival of the individual infant and, ultimately, the species as a whole.

In sum, these three theories share the view that attachment to the mother (or other primary caregiver) in

infancy is critical to normal development, although they differ in the mechanisms involved. However, the theories outlined above share, to a greater or lesser degree, at least two limitations. First, they conceive of attachment as something that develops in the infant alone. Secondly, they portray the infant as a more or less passive recipient of caregiving, although this is less true of ethological theory than of the other two. By focusing on the child and seeing him or her as something of a "blank slate," these explanations ignore much of the dynamic process of the development of attachment.

Current views of attachment begin by acknowledging that attachment of the child to the caregiver does not take place in a vacuum or by the simple presence of the mothering figure when changes occur in the infant's environment. Rather, the caregiver is seen as actively interacting with the infant in effecting these changes in the environment and the infant is seen as actively interacting with the caregiver in ways that alter the environment. Attachment is the result of the interaction between the caregiver and the infant, an interaction that affects caregiver as well as infant. Both the infant and the caregiver are changed by the interaction. Inevitably, the interaction between these two changed individuals also changes. This new interaction further changes the two and so the interaction is again

altered and so on (Bell & Harper, 1977; Lewis & Rosenblum, 1974).

This type of dyadic process just described assumes an interaction between two active participants, not one active and one passive participant. Rather than simply being acted upon, the infant is an active participant in the interaction, one who affects as well as being affected. Just as the caregiver's behavior affects the infant's behavior, the infant's behavior influences the behavior of the caregiver, eliciting some responses and reducing the probability of occurrence of others. By affecting the behavior of the caregiver, the infant influences the interactions and so contributes to the development of attachment between caregiver and infant.

Given the complexity of the issue of relative contributions of individual constitution and the caregiving environment to developmental outcome, it is not surprising that several approaches to its investigation have been employed. There are a number of studies that have examined the ways in which infants affect adult caregiving, as well as many that have focused on the caregiver's contribution to the interaction. Lewis and Rosenblum (1974), concluding that it is evident that infants affect caregiving, believe that several strategies exist to measure these effects. These include varying dimensions such as visual communica-

tion and observing the effects on caregiving, and investigating the impact of such infant characteristics as sex, state or physical size on caregiving.

The fact that the quality of caregiving affects the mother-infant relationship has been well demonstrated. Approaches to investigating what the mother brings to the relationship have ranged from studying the effects of maternal deprivation to examining the impact of such variables as socioeconomic status (SES), education and obstetric experience on the development of infants. The following studies are representative of the many which attempt to assess the relative contributions of infant and caregiver characteristics in the development of infant-caregiver interaction.

The infant brings several characteristics into the mother-infant relationship, one of the most obvious being physical appearance. As noted above, ethologists have suggested that particular infant characteristics evoke certain behavioral responses in adults. In a recent study (Maier et al, in press), composite drawings were made from photographs of three groups of infants: young preterms (31-34 weeks conceptional age), older preterms (35-37 weeks conceptional age) and full-terms (40 weeks conceptional age). From the original photographs it was determined that the preterm infants differed significantly from full-term in the location and width of the eyes and the roundness of the

face. In general, full-terms had wider, rounder faces with larger eyes and with their eyes closer to the middle of the face. Since these characteristics correspond closely with the "babyish" features that Lorenz (1971) suggested evoke nurturant behavior in adults, one would expect that the full-terms would be more successful in eliciting such behaviors. This view was supported by the further finding that when these drawings were shown to college students, with no other information, they rated the composite drawing depicting full-term infants as more likeable, attractive, cute and normal. Moreover, the preterms depicted were judged to "function" more poorly: they were believed to cause their parents more worry, to be less fun to be with, to be more irritating, to have more eating problems and to be less able to make people happy. In addition, subjects reported that, on the basis of the appearance of these infants alone, they would be less inclined to interact with the preterms (i.e., take them home, babysit for them, be close to them or take care of them) than with the full-term infants. It is evident that, with no other information available, the appearance of these infants influenced the reactions of adult raters. It seems likely that the parents might have some of the same reactions, resulting in problematic interaction with less attractive infants, especially preterms.

Given the complexity of this dyadic relationship, and the complex chains of effects, it is usually difficult to determine in any particular instance outside laboratory situations such as that just described whether environmental factors are influencing infant behavior or whether infant behavior is influencing the environment (including caregiving). For example, if the mother appears cold and rejecting in her interactions with her infant, it could be the case that the mother is in fact cold and rejecting, has always been cold and rejecting and can be expected to continue to be cold and rejecting. Or, the mother's cold and rejecting behavior could be secondary to physical or behavioral abnormalities in the child, as in the example just described.

Perhaps the clearest discussion of the complexities of causation can be seen in the work of Sameroff. For example, Sameroff and Chandler (1975) have challenged the retrospective approach to explaining deviancy, claiming that it overemphasizes the contributions of early experience, and sees the infant as a steady-state organism, while ignoring the complex dyadic interactions that can occur. As Sameroff and Chandler report, early retrospective studies found a clear relationship between anoxia at birth and later brain damage. However, when asphyxiated infants were followed prospectively, only a few were found to be affected; for

most, the effects of the early trauma were not observable.

Sameroff and Chandler proposed a transactional model to explain these findings. In this model, the relationships among constitution, environment, and developmental outcome are all considered, including the plasticity of the environment and the fact that the child is "an active participant in its own growth" (p. 235). Thus, behavioral disorder is seen as the result of an ongoing dysfunction in the transaction between individual and environment rather than the result of a single traumatic event. Specifically, then, if one finds retrospectively a high incidence of behavior disorder in anoxic infants, it is impossible to determine whether this is due primarily to the anoxia or to changes in caregiving behavior that occur when parents have a high risk infant.

In a similar vein, Clarke and Clarke (1976) suggest that the ongoing dysfunction itself is mediated by both the child and the environment. For instance, on the basis of some perceived constitutional deficit (e.g., mental retardation) a child in an inadequate institutional environment may be considered to be unadoptable. As a result of being maintained in an inadequate environment, he becomes even more retarded, thereby confirming the notion that he was unadoptable. It is very difficult in such a case to determine how much constitutional and environmental factors each

contribute to developmental outcome.

Preterm birth also affects the health and integrity of the infant, which, in turn, affects adult reactions to him or her. DiVitto and Goldberg (1979) suggest that a preterm birth results in an infant who is socially less competent than a full-term infant combined with parents who are less confident (because of the perception of having failed to produce a normal infant). This combination can produce parent-infant interactions that are more problematic and less rewarding for both parent and infant. DiVitto and Goldberg studied the neonatal behavior and later feeding interactions of healthy full-terms, healthy preterms, sick preterms and the infants of diabetic mothers. They administered the Brazelton Neonatal Behavioral Assessment Scale (BNBAS) at birth and again after the infant had been at home for 10 days. It was found that full-term infants were more alert and less irritable at birth and they became even more alert and less irritable after 10 days at home. The three high risk groups were found to be less alert and more irritable at birth. After the preterm infants had been home for 10 days, they were even more irritable, suggesting that these infants were more difficult to interact with than healthy full-terms. When observing during feeding interactions, significant group differences were found both at the first feeding and at the feeding

observed in the home after 10 days. Differences were found in the percentage of time infants were held in the lap: sick preterms were held in the lap more than infants of diabetics, who were so held more than healthy preterms, who were so held more than healthy full-terms. Conversely, healthy full-terms and infants of diabetic mothers were cuddled in the arms during feeding more than were the preterm infants. At four months feedings, group differences were no longer significant but some infant neonatal behaviors were significantly related to maternal behaviors (e.g., infants response to voice during the pre-discharge BNBAS was significantly and positively correlated with percentage of time the infant was cuddled in the mother's arms at the four month feeding session). These findings indicate that parental behavior is affected by the birth status of their infants and by specific neonatal behavior. DiVitto and Goldberg note, however, that these infant variables, while significant, accounted for only a small percentage of the variance in maternal behavior, suggesting that while infant variables affect maternal behavior they do not determine it.

The preceeding study suggested that when infant functioning is impaired, the quality of the mother-infant interaction may be compromised. One of the most important communicative channels between mother and infant is the visual one (Stern, 1974). When this channel is closed (i.e.,

the infant is blind) the consequences for the development of the mother-infant relationship are enormous. As Selma Fraiberg (1974) points out, sighted people are conditioned to expect certain responses in interactions with infants such as eye-to-eye contact, orientation toward the voice, and smiling in response to the voice. Blind infants do not produce these responses and the absence of these behaviors "feels curiously like a rebuff" (p. 220). Fraiberg's observations of blind infants reveal that they behave very differently from sighted infants. In addition to the absence of the eye language, the smile language and differentiated facial signs, there are behaviors that are present in blind infants but not in sighted ones. Blind infants use their hands to communicate and explore and use motor movements to express affective states. It took Fraiberg and her associates a great deal of time and contact with many blind infants to become adept at reading this type of communication. A naive parent is unlikely to notice his or her blind baby's hand and motor movements. He or she is quite likely to interpret the absence of visual communication as a rejection and experience the infant as unresponsive and unfriendly. Fraiberg suggests that this situation poses "extraordinary problems" in the formation of the mother-infant relationship, which in turn, according to Fraiberg, results in "grave impairment" in the human relationships of blind individuals. The mothers in Fraiberg's

experimental treatment group were taught to read the behavior of and communicate with their blind infants, resulting in the development of attachment in their relationships which, at one and two years, was comparable to that of sighted children and their mothers.

Another important infant characteristic that may facilitate or inhibit interaction between mother and infant is the infant's state pattern. The infant's state at any given time is the major behavioral cue he or she presents to the mother and it influences how successful her attempts at interaction will be (Thomah, 1975). For instance, mother's interventions may have very different effects depending upon the state of the infant. Korner and Thoman (1970) found that holding an infant was extremely effective in producing alertness in (and soothing) a crying infant but only moderately effective in changing the state of a sleeping infant. The state of alert inactivity, when the infant is awake, with eyes bright and actively looking, and relatively little motor activity, is the optimal state for learning and for fixating visually (Korner, 1972). A mother who chooses to interact with her infant when he or she is in this state is more likely to be rewarded with the infant's attentive gaze than if the infant is in any other state category. Because there are individual differences in the amount of time spent in the various state categories, an infant who spends rela-

tively less time in the alert inactive state may be a generally less rewarding infant with whom to interact and may in fact be interacted with less than other infants. Similarly, an infant who fusses and cries a great deal may be more aversive to interact with and may evoke avoidance in caregivers (Bell and Ainsworth, 1972). Similarly, an infant who sleeps a lot may simply be unstimulating and receive less attention than a more alert infant.

Some researchers have suggested that it may not be discrete behaviors alone which evoke positive or negative responses in caregivers (e.g., Korner, 1972). Overall competence in organizing his or her own behavior and responding to stimulation may affect caregiving responses. An infant who is not well organized or whose states are indistinct fails to give clear signals to which a caregiver can respond (Thoman, 1975). The result is that caregivers intervene in ways which are inappropriate for the infant and experience a great deal of frustration themselves.

A state variable that has received considerable attention is crying. Crying behavior is one of the most potent forms of communication that the infant has, especially at first. Bell and Ainsworth (1972) studied crying behavior in infants in the first year of life. They observed infants and their mothers in the home for approximately four hours every three weeks during the first year. The number and

duration of infant crying episodes were recorded, as was the mother's response (i.e., whether or not she ignored the cry). They found several interesting relationships between the frequency and duration of infant crying and maternal responsiveness. In terms of frequency of crying, there was a tendency for babies whose mothers ignored their cries to cry more frequently after the first quarter of the year. The frequency of infant crying did not, however, seem to affect maternal responsiveness. The effects of maternal responsiveness on duration of infant crying were similar: infants whose mothers ignored their cries tended to cry for longer periods after the first quarter. Unlike the frequency of crying, however, duration of crying did seem to influence maternal responsiveness in the second half of the year. The already unresponsive mother became even more unresponsive to her infant's persistent crying, creating what Bell and Ainsworth call a "vicious spiral." The mother's unresponsive behavior induces the infant to continue crying, producing even more reluctances on the mother's part to respond, which results in even more irritability in the infant. These findings clearly illustrate the mutual influence the infant and the caregiver have on each other.

The sensitivity-insensitivity dimension of maternal behavior consistently appears as a crucial variable in mother-infant interaction (Ainsworth, Bell and Stayton, 1974;

Ainsworth, 1982). Ainsworth and her associates (1974) found that quality of mother-infant attachment was significantly related to ratings of maternal behavior along the following dimensions: sensitivity-insensitivity, acceptance-rejection, cooperation-interference, and accessibility-ignoring. Maternal behavior was measured by nine-point rating scales devised by the authors. The first scale (sensitivity-insensitivity) proved to be of particular significance since mothers who rated high on this scale were also rated high on the other three scales, while those who were rated low on any one of the other three scales were also rated low in sensitivity. The mother's sensitivity to her infant's signals was found to be consistent across several situations, including signals relevant to feeding, responsiveness to crying, pacing in face-to-face interaction contingent on infant behavioral cues, and responsiveness to infant signals during close bodily contact (Ainsworth, 1982).

Another maternal variable related to the nature of mother-infant interaction is difficulty during pregnancy. Complicated pregnancies are related to high levels of maternal anxiety about the pregnancy itself, as well as generally higher levels of life stress (Sameroff and Chandler, 1975). A difficult pregnancy may negatively alter a mother's feelings about childbearing and about her infant in particular. It may also increase her fear of having a

defective baby, which in turn may influence her expectations and treatment of her infant, at least at first. Finally, a mother who has had a physically difficult pregnancy may simply be too tired to interact positively with her infant (Hubert, 1974).

There are several other maternal characteristics that appear to be relevant in the development of attachment between mother and infant. A crucial factor is the socioeconomic status (SES) of the mother. Indeed, SES consistently appears as an important determinant in almost any type of research on children. It has been found that low SES is associated with increased prenatal risk factors, pre-term birth, low birthweight, motor and verbal deficits, steadily decreasing school-age IQ's, and learning disabilities (Sameroff and Chandler, 1975). A closely related variable is mother's educational level. Higher levels of education are associated with increased verbal ability and scholastic achievement in children, as well as such factors as parenting style and how attentive the mother is to the young infant (Clarke-Stewart and Koch, 1983).

As can be seen, theories about the development of the caregiver-infant relationship have moved from an emphasis on the caregiver's contribution to a more recent consideration of the infant's role and of the interaction of caregiver and infant contributions to the development of attach-

ment. The more recent theories call for a prospective rather than a retrospective approach in research design. Out of this type of design has come some empirical evidence that suggests that such infant characteristics as appearance, state behavior and visual impairment have considerable impace on the developing relationship between caregiver and infant.

The purpose of the present study is to examine prospectively how characteristics of the mother and the infant in the neonatal period might affect later attachment. In order to pursue this goal, infant and maternal characteristics were studied at birth and then these characteristics were used to predict quality of attachment at 12 months. The study was designed to control several possibly relevant variables by setting them at optimal levels while other relevant variables were allowed to vary and were measured as possible predictors. For instance, since maternal SES and educational level are clearly related to developmental outcome, we chose to control for these factors by setting them at optimal levels. SES was controlled by selecting mothers who lived in similar upper-middle-class communities in a relatively small suburban area outside of Chicago, Illinois. All mothers had completed high school and many have college and graduate degrees. Obstetric complications, however, were not considered in the selection process. Therefore,

pregnancy complications were allowed to vary and entered into the analysis, unconfounded by SES.

Assessments of several of the infant variables were included in the design of the study. State behavior was assessed directly through behavioral observations and with the Brazelton Neonatal Behavioral Assessment Scale (BNBAS), which also provided information about the infants' ability to organize his or her behavior. Health and appearance were controlled to some extent by including only infants who had five-minute Apgar scores of seven or more. Length of gestation varied, however, producing differences in size and in perinatal experience (i.e., length of hospitalization).

The design was chosen so that we could evaluate the influence of infant characteristics and perinatal events on the mother-infant relationship, unconfounded by such important intervening variables as SES. We are also interested in whether individual differences among infants at birth continue to exert influence on mother-infant interaction as late as 12 months. If the influence of these variables does persist as long as 12 months, then the notion that infants as well as mothers affect the development of attachment would be supported. If these influences do not persist, it is more unlikely that infant variables play as large a role in the mother-infant relationship as would be

predicted by the current interactional theories.

CHAPTER II

METHODS

Subjects

The subjects of this study are 25 infants, 12 female and 13 male, who were born at Evanston Hospital in Evanston, Illinois. Twelve of the infants (6 male and 6 female) were classified as pre-term (less than 36 weeks gestational age at birth) and 13 infants (6 females and 7 males) were classified as full-term (38 to 42 weeks gestational age at birth). All subjects were recruited immediately after birth, during their stay in the hospital.[1] The infants all had five-minutes Apgar scores of at least seven and were first-born children of intact families. Two of the infants were black, 23 were white, and all were of upper middle socio-economic status.

Procedure

PERINATAL ASSESSMENT The infants were assessed along several dimensions during the perinatal period. These included length of gestation, length of hospitalization, obstetric

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[1]These subjects are a subset of a group of medically-at-risk infants who were recruited as part of an ongoing long-term study of the effects of perinatal experience on development. Co-principal investigators are Deborah L. Holmes, Ph.D. and Jill N. Reich, Ph.D. of Loyola University of Chicago and Evanston Hospital.

risk factors, postnatal medical complications, sex, state behavior and behavioral organization.

Perinatal risk factors were obtained with the Parmelee Obstetric Complications Scale (OCS). This scale evaluates the extent of obstetric and perinatal risk in terms of 41 conditions that are frequently associated with problematic pregnancies and the birth of sick and/or premature infants. The items on this scale pertain to the general history and health of the mother, events during this pregnancy, events surrounding labor and delivery and the condition of the infant. The percentage of nonoptimal conditions is converted to a score from 160 to 0, with lower scores indicative of greater obstetric and perinatal risk.

Postnatal medical status was measured with the Parmelee Postnatal Scale (PCS), which is a 10-item scale similar in its administration and scoring to the OCS. The conditions evaluated with the PCS are respiratory distress, infection, ventilatory assistance, non-infectious illness or anomaly, metabolic disturbance, convulsion, hyperbilirubemia or exchange transfusion, temperature disturbance, no feeding within 48 hours and surgery. The number of nonoptimal conditions are summed and converted to a score from 160 to 0, with lower scores indicative of greater incidence of postnatal complications. In addition, one- and five-minute Apgar scores were obtained and used as an index of perinatal

stress. Sex, gestational age and length of hospitalization were also recorded for each infant and included in the analysis.

The Brazelton Neonatal Behavioral Assessment Scale (BNBAS) was administered to all but three of the infants. The BNBAS is a clinical assessment tool that yields four cluster scores: interactive processes; motoric processes; organizational processes, state control; and organizational processes, physiological response stress. The cluster scores are based on the infant's responses to stimulation across several dimensions. The dimensions assessed by the BNBAS include infant activity, state and state changes, general style, social responsiveness and reactions to visual, auditory and tactile stimulation. The physiological response to stress scores were not included in this analysis because all subjects received optimal scores on this dimension.

The infants' behavioral states were monitored and recorded for periods of four to nine hours within 72 hours of discharge (with a mean of 5.7 hours of recording). The state categories used in this study were defined solely on the basis of directly observable behavioral criteria. Every ten seconds an observer recorded which of the following states was predominant in the preceeding interval: quiet sleep, active sleep without REM, REM sleep, drowsiness, alert inactivity, alert activity, and crying. (For a more

precise description of the categories used, see Holmes, Reich, Slaymaker and Sosnowski, unpublished manuscript). For the purposes of this study, active, quiet, and REM sleep were combined to indicate overall percentage of time in sleep. The percentage of time spent in sleeping, crying and alert inactivity were included in the analysis.

TWELVE MONTH ASSESSMENT When the infants were 12 months old (corrected for gestational age), they were videotaped (along with their mothers) as they experienced the Strange Situation devised by M.D.S. Ainsworth and her associates (Ainsworth et al, 1978). The Strange Situation is designed to assess the infant's response to separation from his or her mother and the quality of his or her attachment to the mother. It consists of a series of three minute episodes with differing degrees of separation of mother and infant:

1. The mother is seated in a chair while the baby plays nearby on the floor.
2. A female stranger enters and sits quietly for one minute, talks with the mother for one minute and interacts with the infant for one minutes.
3. The mother leaves and the stranger sits in a chair while the infant plays on the floor.
4. The mother returns, comforts the baby if necessary, and re-engages him or her in the toys.

5. The mother leaves the room and the baby seems to be alone. (Actually, a camera operator is hidden behind a screen and watches the baby to ensure his or her safety.)
6. The stranger returns to the room and, if necessary, attempts to comfort the baby and re-interest him or her in the toys.
7. The mother returns and the stranger leaves. The mother comforts and plays with her infant.

The videotapes were scored according to the system developed by Ainsworth and her associates (Ainsworth et al, 1978). Each episode is viewed in 15 second intervals and a record of the frequency of such behaviors as locomotion, hand movements (e.g., touching, grapsing or reaching for toys), orientation of visual regard, vocalization, oral behavior (e.g., sucking thumb or toy) and smiling is obtained. The infant's level of activity and initiative in interactive behavior in each episode is then rated along six dimensions: proximity- and contact-seeking, contact maintaining, avoidant behavior, resistant behavior, search (for the mother in separation episodes) behavior, and distance interaction. The ratings were made by comparing the infants' behavior to behavioral descriptions provided by Ainsworth and her associates (Ainsworth et al, 1978), in which the greater the activity and initiative in a par-

ticular type of interactive behavior, the higher the numerical rating is for that type of interaction in an episode. Finally, the infant was classified into one of three groups, again by comparing his or her reaction to the strange situation to the standard provided by Ainsworth. The classifications reflect the following patterns of behavior: Group A: avoidant attachment; Group B: secure attachment; Group C: ambivalent attachment. The subjects were also more broadly classified as being either securely (Group B) or anxiously (Groups A and C) attached to the mother. The videotapes were scored by one of two observers, who was blind to the infants' perinatal group and who each scored about half of the preterm and half of the full-term infants.

DATA ANALYSIS Stepwise discriminant analyses were performed among the three patterns (i.e., avoidant, secure, ambivalent), and between the securely and anxiously attached groups. Discriminating variables included length of gestation, length of hospitalization, Parmelee Obstetric Complications Scale, Parmelee Postnatal Complications Scale, one- and five-minute Apgar scores, sex, Brazelton Neonatal Behavioral Assessment Scale interactive, motoric, and organizational processes scores and percentage of time spent in alert inactivity, crying and sleeping during state observations. The three infants who did not receive the Brazelton assessment were all pre-term. Because these data were missing

on these infants, the analysis was done both with and without the Brazelton scores. An additional direct discriminant analysis was also performed using only the Obstetric Complications Scale score and crying behavior as the discriminating variables.

CHAPTER III

RESULTS

Three separate discriminant analyses were completed on these data. The first was a stepwise discriminant analysis of the three attachment groups. A second stepwise discriminant analysis was then performed using only two groups, the secure group and a combination of the avoidant and ambivalent groups, which was termed the "anxious" group. This second analysis was done for several reasons. First, the number of subjects in the avoidant and ambivalent groups was rather small (N=3 and N=7, respectively), especially in comparison to the secure group (N=17). Secondly the first discriminant analysis revealed significant differences between the secure and avoidant groups and between the secure and ambivalent groups but the difference between the avoidant and ambivalent groups was nonsignificant. This finding, as well as the relative numbers of subjects in the three groups is consistent with other research (e.g., Ainsworth et al, 1978). As a result, and as has been done by other researchers, the data from the avoidant and ambivalent groups were collapsed and a second stepwise discriminant analysis was performed on the two broader classifications, secure and anxious. Finally, a direct discriminant analysis was done using only two variables to predict

membership in the two attachment groups. This third analysis was done because, although seven of the fourteen predictors were used in the first stepwise discriminant analysis and six variables in the second, the most important variables in both analyses appeared to be the Obstetric Complications Scale (OCS) scores and crying behavior. Many of the other variables measured overlapping constructs and so suppression effects made it difficult to determine exactly how each variable contributed to the prediction of attachment pattern. The direct discriminant analysis was done in an attempt to determine how much of the prediction could actually be accomplished using only the two most important variables.

First I will discuss the results of the first stepwise discriminant analysis, involving the three attachment patterns. When three attachment patterns were used in the discriminant analysis, two functions were produced. The first of these proved to be significant in separating the groups (see Table 1). Seven variables entered this function in the following order: crying, OCS score, one-minute Apgar score, Brazelton interactive processes score,[1] Brazelton motoric

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[1]Although two of the Brazelton scores entered the function, they did not significantly improve the function's ability to classify subjects into the attachment groups. Because of this fact and because excluding the Brazelton data from the analysis did not substantially change the function, it was concluded that the missing data did not alter the analysis. Therefore, the analysis excluding the Brazelton data will not be specifically reported or included in the discussion.

Table 1

Canonical Discriminant Functions

Stepwise Discriminant Analysis,

3 Groups

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation
1	3.5904	87.43	87.43	0.8844
2	0.5164	12.57	100.00	0.5836

After Function	Wilks' Lambda	Chi-Squares	Degrees of Freedom	Significance
0	0.1437	29.105	14	0.0101
1	0.6594	6.2452	6	0.3963

processes score, sex, and Postnatal Complications Scale (PCS) score. This first function was responsible for more than 87 percent of the variance accounted for in the analysis. As can be seen in Table 2, using this function it was possible to successfully classify 100% of the subjects into the three attachment patterns (avoidant, secure and ambivalent). In Table 3 it can be seen that the first function consists mainly of OCS scores, crying behavior and BNBAS motoric processes scores, with BNBAS interactive processes socres, one-minute Apgar scores and sex contributing somewhat and PCS contributing very slightly.

In the three-group analysis, the best single discriminating variable was crying behavior. The discriminating power of the function was not significant at this point, as can be seen in Table 4. The Wilks' Lambda was fairly high, indicating that the separation of the groups was not very clear. When the OCS score was included in the function, its ability to discriminate the groups became significant. The addition of the one-minute Apgar scores improved the function's discriminating power but adding the BNBAS interactive processes scores lessened it slightly. When the BNBAS motoric processes scores and sex entered the function its power to discriminate was again enhanced. The last variable, the Postnatal Complications score, hindered the function's ability to discriminate the groups. This rela-

Table 2

Classification Results,

Stepwise Discriminant

Analysis, 3 Groups

Actual Group	N of Cases	Predicted Group Membership		
		Avoidant	Secure	Ambivalent
Avoidant	3	3 100%	0 0.0%	0 0.0%
Secure	17	0 0.0%	17 100%	0 0.0%
Ambivalent	4	0 0.0%	0 0.0%	4 100%

Percent of "grouped" cases correctly classified: 100%

Table 3

Standardized Canonical Discriminant Function Coefficients

Variable	Stepwise Discriminant Analysis, 3 Groups		Stepwise Discriminant Analysis, 2 Groups	Direct Discriminant Analysis, 2 Groups
	Function 1	Function 2		
Obstetric Complications Scale	-1.2427	0.9747	-1.4263	-0.8799
Postnatal Complications Scale	-0.2979	-1.1052		
One-Minute Apgar Score	0.8575	-0.4778	0.9262	
Sex	0.7702	0.3281	0.6534	
Brazelton Motoric Processes Score	1.4267	0.9769	1.1490	
Brazelton Interactive Processes Score	-0.9478	-0.0002	-0.8992	
Crying	1.3102	1.1876	0.9705	0.9105

Table 4

Summary, Stepwise Discriminant Analysis, 3 Groups

Variable Entered	Wilks' Lambda	Significance
1. Crying	0.783753	0.1116
2. Obstetric Complications Scale	0.570051	0.0435
3. One-Minute Apgar Score	0.418708	0.0223
4. Brazelton Interactive Processes Score	0.340699	0.0240
5. Brazelton Motoric Processes Score	0.240202	0.0125
6. Sex	0.179795	0.0103
7. Postnatal Complications Scale	0.143658	0.0127

tive waxing and waning of the function's discriminating power can be attributed to the fact that many of the measures assess overlapping constructs, producing suppression effects in the function which make it extremely difficult to determine how each particular variable is contributing to the discrimination.

Table 5 shows how different the groups appeared to be as the variables entered the discriminating function. Crying behavior alone discriminated the avoidant and secure groups at a level approaching significance. The additions of OCS, Apgar and BNBAS interactive processes scores actually made it slightly harder for the function to discriminate these two groups, although the functions discriminating power on the whole was improved. It was not until the BNBAS motoric processes scores were included that the groups appeared to be significantly different. The secure and ambivalent groups were found to be significantly different when both crying behavior and OCS scores were included in the function and the difference between these two groups remained significant throughout. The avoidant and ambivalent groups were not found to be significantly different at all.

The second stepwise discriminant analysis, in which the avoidant and ambivalent group data were collapsed, yielded a very similar discriminant function to that produced in the

Table 5

Level of Significance of Differences Between Attachment Groups as Each Variable Enters the Function

Variable	Avoidant vs. Secure	Secure vs. Ambivalent	Avoidant vs. Ambivalent	Anxious vs. Secure
Crying	0.0654	0.1932	0.4189	0.0506
Obstetric Complications Scale	0.0741	0.0376	0.7036	0.0092
One-Minute Apgar Score	0.0897	0.0100	0.7803	0.0028
Brazelton Interactive Processes Score	0.0982	0.0071	0.8835	0.0020
Brazelton Motoric Processes Score	0.0244	0.0102	0.6674	0.0013
Sex	0.0114	0.0096	0.6606	0.0010
Postnatal Complications Scale	0.0151	0.0227	0.4134	

three-group analysis. The first six variables (crying, OCS, one-minute Apgar scores, BNBAS interactive processes scores, BNBAS motoric processes scores, and sex) entered the function in the same order. The PCS, however, was not included at all in the two-group function. The discriminating power of this function was significant (see Table 6). Using this function it was possible to classify 100% of the subjects into either the secure or anxious group (see Table 7). The relative contributions of the variables were similar to those in the three-group function, with OCS scores, BNBAS motoric processes scores and crying behavior contributing heavily, followed by one-minute Apgar, BNBAS interactive processes scores and sex.

As can be seen in Table 8, crying behavior was, once again, the single best discriminating variable. When the function consisted only of this one variable, its discriminating power was very nearly significant. When OCS scores entered the function, its discriminating power became highly significant. The inclusion of the other variables (Apgar score, BNBAS interactive and motoric processes scores and sex) continued to improve the significance of the function's discriminating power. Table 5 indicates the level of significance of the difference between the secure and anxious groups. Crying alone discriminated the groups at level approaching significance. The addition of OCS

Table 6

Canonical Discriminant Function

Stepwise Discriminant Analysis,

2 Groups

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation
1	3.2158	100.00	100.00	0.8734

After Function	Wilks' Lambda	Chi-Squares	Degrees of Freedom	Significance
0	0.2372	23.021	6	0.0008

Table 7

Classification Results

Stepwise Discriminant

Analysis, 2 Groups

		Predicted Group Membership	
Actual Group	N of Cases	Anxious	Secure
Anxious	7	7 100%	0 0.0%
Secure	17	0 0.0%	17 100%

Percent of "grouped" cases correctly classified: 100%

Table 8

Summary, Stepwise Discriminant Analysis, 2 Groups

Variable Entered	Wilks' Lambda	Significance
1. Crying	0.813553	0.0506
2. Obstetric Complications Score	0.594119	0.0092
3. One-Minute Apgar Score	0.447235	0.0028
4. Brazelton Interactive Processes Score	0.366539	0.0020
5. Brazelton Motoric Processes Score	0.295830	0.0013
6. Sex	0.237203	0.0010

scores made possible a discrimination of the two groups at a significant level. Inclusion of the other variables continued to increase the significance of the difference.

In both the three-group and the two-group stepwise discriminant analyses crying behavior and OCS scores clearly emerged as the most influential predictors of attachment group membership. While the other variables increased the significance of the discriminating power of the functions somewhat, it was highly significant when it consisted of only OCS and crying. When several variables were included, the function was capable of classifying all of the subjects correctly. It was impossible to determine how successful the two major variables alone would be in classifying the subjects. Therefore, a direct discriminant analysis was done which allowed only OCS scores and crying behavior to enter the function.

The final direct analysis involved only OCS scores and crying behavior as predictors of membership in either the anxious or secure groups. The discriminating power of the function composed of these two variables is very significant, as shown in Table 9. The two variables contribute about equally, with crying behavior making a positive contribution and OCS a negative one, as can be seen by the relative sizes of their standardized canonical discriminant function coefficients in Table 3. Using this function it

Table 9

Canonical Discriminant Functions

Direct Discriminant Analysis

2 Groups

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation
1	0.6832	100.00	100.00	0.6371

After Function	Wilks' Lambda	Chi-Squares	Degrees of Freedom	Significance
0	0.5941	9.3722	2	0.0092

was possible to correctly classify about 80 percent of the subjects (see Table 10).

Table 11 shows the actual OCS scores and percentages of time spent in crying during the neonatal state observations for all the subjects by group, as well as overall and group means. Table 12 shows that in the anxious group, 71% of the subjects were below the mean in OCS scores, indicating that there were more perinatal risk factors for those subjects. In the secure group, 47% of the subjects scored below the mean on OCS. Eighty-six percent of the subjects in the anxious group spent more than the mean percentage of their time crying while 29% in the secure group cried more than average. Fifty-seven percent of the anxious group scored below the mean on OCS and above the mean in crying while none of the secure group fell into both categories.

Table 10

Classification Results

Direct Discriminant

Analysis, 2 Groups

		Predicted Group Membership	
Actual Group	N of Cases	Anxious	Secure
Anxious	7	4 57.1%	3 42.9%
Secure	17	2 11.8%	15 88.2%

Percent of "grouped" cases correctly classified: 79.17%

Table 11

Overall and Group Means and Individual Scores: Obstetric Complications Scale (OCS) and Crying

Overall Means

OCS	Crying
$\bar{x}$ = 100.75	$\bar{x}$ = .073
SD = 28.53	SD = .061

Group Means

Anxious

OCS	Crying
$\bar{x}$ = 82.14	$\bar{x}$ = .115
SD = 20.44	SD = .051

Secure

OCS	Crying
$\bar{x}$ = 108.41	$\bar{x}$ = .056
SD = 28.28	SD = .057

Individual Scores

	Anxious			Secure	
	OCS	Crying		OCS	Crying
1	112	.123	1	89	.005
2	103	.164	2	135	.148
3	81	.131	3	160	.012
4	50	.169	4	115	.010
5	80	.112	5	98	.054
6	71	.020	6	92	.022
7	78	.085	7	103	.006
			8	131	.042
(continued)			9	50	.046

	Secure	
	OCS	Crying
10	131	.198
11	80	.036
12	76	.035
13	98	.031
14	115	.099
15	93	.000
16	146	.128
17	131	.089

Table 12

Percentages of Subjects Scoring Below the OCS Mean and Above the Crying Mean, by Group

	Below OCS Means	Above Crying Mean	Below OCS Mean and Above Crying Mean
Secure	47%	29%	0%
Anxious	71%	86%	57%

CHAPTER IV

DISCUSSION

The present study was designed to address the question of whether neonatal behavior has an effect on the mother-infant relationship that persists into the development of attachment as measured at 12 months. Twenty-four full- and preterm infants from intact middle-class families were assessed along several dimensions during the neonatal period and then again at 12 months. Data collected in the neonatal period included pre- and postnatal risk factors, Apgar scores, Brazelton Neonatal Behavioral Assessment Scale (BNBAS) scores, and behavioral state observations, as well as sex, length of hospitalization and gestational age. At the 12-month follow-up, the infants and their mothers experienced Ainsworth's Strange Situation (Ainsworth et al, 1978), which is designed to assess the infant's response to separation from and the quality of his or her attachment to the mother. On the basis of his or her response to this strange situation, the quality of the infant's attachment was classified as anxious (with two subtypes, avoidant and ambivalent) or secure.

The results of this analysis indicated that quality of attachment at 12 months is most successfully predicted by a combination of obstetric complications and crying

behavior in the neonatal period. Secure attachment seems to have been preceeded by lower perinatal risk factors and lower amounts of crying after birth. Avoidant and ambivalent attachment seem to be related to increased perinatal risk factors combined with more crying in the neonatal period.

Before discussing the relationship between infant and maternal variables in predicting quality of attachment, the fact that crying behavior alone was nearly sufficient to discriminate the groups warrants some attention. Crying alone discriminated the avoidant and secure groups and the secure and anxious groups at a level very near significance. In addition, 87% of the anxious infants were above the mean in crying while only 29% of the securely attached infants cried more than average. These findings support those reported by other researchers (e.g., Ainsworth et al., 1978). Ainsworth and her associates found that anxious babies cried more frequently than securely attached infants had in the first year of life and that the duration of their cries was almost twice as long as that of securely attached infants during that period.

Ainsworth argues that these findings cannot be interpreted as a reflection of the infant's contribution to the development of attachment since another study (Bell and Ainsworth, 1972) found that infant crying behavior is highly

related to maternal responsiveness. The relationship between the duration of infant crying and maternal responsiveness is particularly strong. However, they also found that infant crying was not affected by maternal responsiveness until after the infant was three months old. The present results suggest somewhat more strongly that individual differences in the amount of infant crying may be present from birth and may have more influence on the development of the mother-infant relationship than Ainsworth's results indicated.

Differences in the way the data were collected in the Bell and Ainsworth study and in the present one may have implications for the issue of the relative contributions of the mother and the infant to the development of attachment. The data Bell and Ainsworth reported were averaged from observations in the home every three weeks for each of the four quarters of the first year. Since our data were obtained only during the neonatal period, before the infants left the hospital, it is more difficult to argue that the differences found here in infant crying are attributable to the mother's responsiveness. Although the experiences of the preterm and full-term infants during hospitalization were different, neither length of gestation nor length of hospitalization (which were confounded in this sample) was a significant variable in discriminating the attachment

groups, while amount of crying was very significant. The fact that length of gestation and length of hospitalization were only moderately correlated with crying behavior ($r = 0.54$ and $r = -0.38$, respectively) suggests that responsiveness of hospital personnel was also not the determinant of individual differences in amount of crying. Our findings suggest that the individual differences in crying behavior that are related to later attachment may have been present from birth. These differences may be related to differences in temperament, which has been implicated in some research on differences between securely and anxiously attached infants (e.g., Goldsmith and Campos, 1982). A future study will include temperament data in the analysis, which perhaps will provide some more indication of the influence of infant differences to the development of attachment.

The above considerations are not meant to imply, however, that infant crying behavior alone determined the quality of attachment, since it was necessary to include what is a primarily maternal factor (although it is affected by infant variables as well), the obstetric complications score, to reliably differentiate the groups. When the amount of infant crying was combined with the obstetric risk factors in the analysis, discrimination of the attachment groups was very clear. Because this was the only maternal factor included in the analysis, however, we cannot assume there

were no other maternal factors involved in the development of attachment. The absence of other maternal variables may account for the failure to correctly classify about 20% of the subjects using only these variables. However, it is clear that increased amounts of infant crying in the neonatal period and a complicated pregnancy do at least set the stage for problems in the mother-infant relationship.

An additional noteworthy finding is the fact that no significant differences were found between the avoidant and ambivalent groups. This finding is consistent with some research that suggests that more differences exist between anxiously and securely attached infants than between the two types of anxious attachments. However, given the relatively small numbers of subjects in these two groups, it is not possible to consider these findings conclusive. An additional study is planned which will include more infants with other types of perinatal experience, as well as data concerning the period between birth and 12 months. It is hoped that this next study will clarify somewhat whether real differences exist between these two groups.

It appears that the combination of a complicated pregnancy and what could be termed a "difficult" infant interferes with the development of attachment. These results lend support to the argument that both maternal and infant

characteristics determine the type of relationship that will develop. The fact that neither a difficult pregnancy nor a fussy baby alone were sufficient to predict quality of attachment, and the fact that the two variables were only moderately correlated (r = .48) underscores the importance of the interaction between maternal and infant variables in determining mother-infant interaction and attachment.

It is important to note that neither length of gestation nor length of hospitalization was important in discriminating attachment patterns. This finding argues against the notion that preterm birth and the ensuing separation of mother and infant during hospitalization has lasting effects on the development of the mother-infant relationship, at least for this sample. Preterm birth is often associated with lower SES, poor prenatal care, and unplanned pregnancy. These factors are also related to problems in the mother-infant relationship. Much of the research on the effects of early separation of mothers and infants has been done with mothers from lower SES groups who were also often unmarried teenagers (e.g., Klaus and Kennell, 1976). Because these factors were controlled for with this sample, these results reflect only the effect of preterm birth and separation per se, suggesting that these factors alone are not sufficient to affect the development of attachment.

In summary, these results are consistent with previous

research which relates early crying with later quality of attachment. These findings are also consistent with an interactional or transactional model of development, which considers both the infant's and the caregiver's contributions to the developing relationship. In addition, these data replicate the findings of other studies which found differences between securely and anxiously attached infants but few or no significant differences between the two anxious groups, avoidant and ambivalent. Finally, these results do not support the hypothesis that preterm birth or early separation from the mother have irreversible consequences for the development of mother-infant attachment.

REFERENCES

Ainsworth, M.D.S. (1969) Object relations, dependency and attachment: A theoretical review of the infant mother relationship. Child Development, 40, 969-1025.

Ainsworth, M.D.S., Bell, S.M. & Stayton, D.F. (1974) Infant-mother attachment and social development: Socialisation as a product of reciprocal responsiveness to signals. In M.P.M. Richards (Ed.), The integration of a child into a social world. London: Cambridge University Press.

Ainsworth, M.D.S., Blehar, M.C., Waters, E., & Wall, S. (1978) Patterns of attachment: A psychological study of the strange situation, Hillsdale, N.J.: Lawrence Erlbaum.

Ainsworth, M.D.S. (1982) Attachment: Retrospect and prospect. In C.M. Parkes and J. Stevenson-Hinde (Eds.), The place of attachment in human behavior. New York: Basic Books.

Bell, R.Q. & Harper, L.V. (1977) Child effects on adults. New York: John Wiley & Sons.

Bell, S.M. & Ainsworth, M.D.S. (1972) Infant crying and maternal responsiveness. Child Development, 43, 1171-1190.

Clarke, A.M. & Clarke, A.D.B. (1976) (Eds.) Early experience: Myth and evidence. London: Open Books.

Clarke-Stewart, A. & Koch, J.B. (1983) Children: Development through adolescence. New York: John Wiley & Sons.

Dollard, J. & Miller, N.E. (1950) Personality and psychotherapy. New York: McGraw-Hill.

DiVitto, B. & Goldberg, S. (1979) The effects of newborn medical status on early parent-infant interaction. In T.M. F.eld, A.M. Sostek, S. Goldberg and H.H. Schuman (Eds.) Infants born at risk. New York: S.P.

Frailberg, S. (1974) Blind infants and their mothers: An examination of the sign system. In M. Lewis and L.A. Rosenblum (Eds.), The effect of the infant on its caregiver. New York: John Wiley & Sons.

Freud, S. (1938) An outline of psychoanalysis. London: Hogarth.

Goldsmith, H.H. & Campos, J.J. (1982) Toward a theory of infant temperament. In R.N. Emde and R.J. Harmon (Eds.), The development of attachment and affiliative systems. New York: Plenum Press, 1982.

Holmes, D.L., Reich, J.N., Slaymaker, F.L. & Sosnowski, R.J. Perinatal determinants of neonatal state organization, unpublished manuscript.

Hubert, J. (1974) Belief and reality: Social factors in pregnancy and childbirth. In M.P.M. Richards (Ed.), The integration of a child into a social world. London: Cambridge University Press.

Klaus, M.H. & Kennell, J.H. (1976) Maternal-infant bonding. St. Louis: Mosby.

Korner, A.F. (1972) State as variable, as obstacle and as mediator of infant stimulation in infant research. Merrill-Palmer Quarterly, 18, 77-94.

Korner, A.F. & Thomas, E.B. (1970) Visual alertness in neonates as evoked by maternal care. Journal of Experimental Child Psychology, 10, 67-78.

Lewis, M. & Rosenblum, L.A. (1974) The effect of the infant on its caregiver. New York: John Wiley & Sons.

Lorenz, K. (1971) Studies in animal and human behavior, volume 1. Cambridge, Mass.: Harvard University Press.

Maier, R.A., Holmes, D.L., Slaymaker, F.L. & Reich, J.N. The perceived attractiveness of preterm infants, submitted.

Sameroff, A.J. & Chandler, M.J. (1975) Reproductive risk and the continuum of caretaking casualty. In F.D. Horowitz, M. Hetherington, S. Scarr-Salapatek and G. Siegel, (Eds.), Review of child development research, volume 4. Chicago: University of Chicago Press.

Sroufe, L.A. & Waters, E. (1977) Attachment as an organizational construct. Child Development, 48, 1184-1199.

Stern, D.N. (1974) Mother and infant at play: The dyadic interaction involving facial, vocal and gaze behaviors. In M. Lewis and L.A. Rosenblum (Eds.) The effect of the infant on its caregiver. New York: John Wiley & Sons.

Thomas, E.B. (1975) Sleep and wake behaviors in neonates: Consistencies and consequences. Merrill-Palmer Quarterly, 21, 295-314.

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The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore in partial fulfillment of the requirements for the degree of Master of Arts.

Dec. 6, 1983
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