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NEONATAL BEHAVIOR PREDICTORS OF SECURITY OF ATTACHMENT

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INTRODUCTION

It is commonly thought that insensitive mothers produce anxious attachments in their infants. However, the question posed by a transactional and cotextual perspective is how the prior characteristics of the infant and mother, as well as the latter's situation, may have worked together to produce these attachments. Fortunately, in recent years, evidence has appeared from longitudinal studies in three different countries that infants who show these deviant attachment patterns differ, on the average, as newborns. Furthermore, we now have the first inklings of the relative importance of neonatal contributors compared to the mother's own characteristics, and how the mother's situation affects her contribution to the infant's attachment.

INCLUDING THE INFANT IN THE PROCESS

Most psychologists recognize that the infant, the mother, and their situation are intricately involved in the process by which secure or anxious attachments develop. In response to the possibility that the infant's temperament plays a strong role, Sroufe (1985) reviewed the attachment literature for logical and empirical evidence bearing on the infant's versus the mother's contribution and concluded that the mother was far more important. Isabella, Belsky and von Eye (1989) point out, however, that the strongest evidence for the role of maternal sensitivity comes from studies using global ratings. These ratings are likely to be influenced by the predominant culture of scientific thought. It is difficult to even conceptualize the nature of the infant's contribution unless it was been measured well in a sufficient number of studies, to provide hypotheses. Until this has occurred empirical reviews cannot be persuasive because they lack basic information on a key participant in the interaction, the infant. Even assuming a weak role for the infant's own characteristics Sroufe sees the need for "... process studies of how caregivers typically adjust their behavior to accommodate to the particular needs and nature of a given child" (p. 12). Thus we are still left with the question of how to determine the needs and nature of the child. The fact that these interact and mesh with those of the parents in no sense precludes isolating and identifying the contributing elements. The discipline of social psychology and behavior genetics have taught that these complex interactions can be teased apart. Seventeen

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research strategies that permit isolation of parent and child influences have been described (Bell & Harper, 1977, Ch. 5), and cosiderable evidence has accumulated that these techniques can both isolate influences and produce generalizable results (Bell & Chapman, 1986).

Unfortunately, most investigators have turned to longitudinal studies based on maternal reports of the child's temperament, which contain a substantial admixture of the mother's personality attributes, and are usually obtained at 1 month or later when they also contain unidentified effects of caregiving. So far, they have not provided any clear evidence of relevance to attachment security as meaured by reunion behavior (Bates, Maslin, & Frankel, 1985; Belsky, Rovine, & Taylor, 1984; Vaughn, Lefever, Seifer, & Barglow, 1989). Accordingly, investigators have more recently advocated longitudinal studies starting with neonatal behavior to index the role of the infant in the interaction process (Belsky *et al.*, 1984; Goldsmith, Bradshaw, & Rieser-Danner, 1986; Isabella *et al.*, 1989; and Sroufe, 1985). However, there has been no review of reseach attempting prediction of security of attachment from neonatal behavior that has taken into consideration the import of all studies carried out to date in the context of the technical problems involved in neonatal assessment. Although evidence to date is only available from 4 major projects, it would be worthwhile to study their findings in detail before pursuing this particular research strategy.

EARLY RESEARCH ON NEONATAL CONTRIBUTORS

In the 1960's, speculation about later implications of individual differences in neonatal behavior sparked many studies, but produced few findings. In the author's longitudinal study (Bell, Weller, & Waldrop, 1971) as well as in other studies, it became apparent that wide individual differences in infant behavior seen one day in a nursery too often do not involve the same infants the next day. The individual differences are not sufficiently stable to be seen from day to day, let alone in the form of later development. A review by the present author (Bell, 1975) was only able to point to one replicated relationship between carefully collected data from experimental procedures on neonates and later behavior. A later review by Sameroff (1978) confirmed the same general trend in results from many applications of Brazelton's *Neonatal Behavioral Assessment Scale* (*NBAS*), a clinically derived test that offered promise of measuring the infant's ability to form relationships (Brazelton, 1973). Even the most promising cluster of measures from the Brazelton needs to be repeated for several days before it can be said to characterize individuals. This test will be described in more detail later.

These studies pointed to the possibility that very rapid growth in the neonate made forecasting from that period extremely difficult unless special arrangements for sustained measurement were possible, and the latter, is ruled out in most American maternity hospitals because of the practice of discharging infants on the second day after birth. The home situation was thought to be too chaotic to permit neonatal examinations in the period immediately following the mother and infant's discharge from the hospital, but investigators have now found ways of doing this in the period up to 10 days post-partum. Even if the neonate's behaviors were measured reliably,

Sameroff (1978) has pointed to a possibility that " The developmental changes which will occur during the first 2 months may be relatively independent of environmental influences as long as the physical needs of the infant are guaranteed. With time, the initial endogenous control of emotional systems passes to the environment as the child's increased wakefulness permits greater sensory-motor involvement " (p. 117). In other words, the infants' early characteristic may not interact with maternal behavior except in the extremes of physical condition and type of mother.

The Brazelton examination is useful in assessing the infant's current capability for interaction with a caregiver, but failed to show any consistent relations to later development up to 1978 (Sameroff, op. cit.) and in a more recent large scale application (Egeland & Farber, 1984). There are at least two exceptions to this generally negative outcome, and these are indeed interesting because they suggest that part of the problem of establishing links between neonatal and later behavior lies in the nature of the follow-up measures. Studies using the Brazelton as well as other measurement systems have now demonstrated promising cosistency and interpretability of links to later attachment at 12 months. Since enigmatic relations of newborn behavior to later development have characterized some of the few findings in the past (Bell, Weller, & Waldrop, 1971) the conceptual meaningfulness of the current results, though based on a small number of studies with small samples, is at least deserving of attention. Apparently, the attachment process, infant to mother, is so basic to this early period of development that it will reflect deviations in earlier neonatal behavior, imperfectly recorded as they are.

RECENT STUDIES OF NEONATAL CONTRIBUTORS

It was mentioned earlier that there was one relation between neonatal behavior and later behavior that had been replicated. Four studies have found that a quick initial reaction and extensive crying in reaction to interruption of non-nutritive sucking is associated with low levels of smiling and pleasurable affect in laboratory studies and home observations at 3 and 8 months, and with low levels of exuberant affect in a play situation at the early preschool period. The four studies have been summarized in a Ciba Foundation Symposium (Bell, 1975). One additional effort to replicate resulted in consistent but non-significant correlations (Yang & Halverson, 1976).

The Japanese Study

None of the studies just mentioned measured attachment in the strange situation, but in a study of Japanese infants reported by Miyake, Chen, and Campos (1985), it was found that newborns who showed high levels of crying in reaction to interruption of sucking were more irritable (cried and fussed) during later observation in the home, and were likely to have an insecure attachment at 12 months. The speed of the initial response, whether movement or crying, was not related to insecure attachment, but a slow increase in crying (long rise time) *after* the initial crying, a new facet measured in the Japanese infants, was associated with an insecure attachment. The link between the reaction to interruption of sucking and later insecure attachment may consist in the infant's fussy, irritable behavior being too demanding for a mother. It is also possible

that high irritability is associated with lack of attention to the mother's social overtures. Low levels of smiling and positive affect are unrewarding to mothers. Moss' (1974) studies of sex differences in early infancy support these interpretations, since mothers spent more time in social interaction with their three-month-old females and more time hovering over or in caretaking with their male infants who were more fussy and irritable. The implications for later attachment of a long rise time after initial response to interruption of sucking are not apparent at the present time and need further study.

The Minneapolis Study

The next question is whether there is direct evidence that difficult caregiving leads to insecure attachments. A large scale study of low SES mothers, most of them single, from pregnancy through to early childhood (Egeland & Farber, 1984), uncovered a relationship between nurses' ratings of " difficult to care for ", " less socially engaging " during feeding in the newborn period and later insecure attachment at 12 months. The neonatal ratings were associated with both avoidant and resistant attachments, but infants with the latter classification were more often rated in the newborn period as " less alert and active ". These findings were also developmentally meaningful, since at 9 and 12 months of age the insecure resistant infants were behind the avoidant and secure developmentally. The same relationship did not exist between nurses' ratings and insecure attachments at 18 months, but the latter attachments would be affected by the onset of walking in the infants, and changes in the mother's situation in this stressed, poverty level population. Some indication of the relative contribution of congenital contributors and prenatal personality to attachment can be seen in the fact that not one of several questionnaire measures of prenatal personality predicted attachment at 12 months, while the nurses ratings from the newborn period did. The questionnaire measures were not defective; this is shown in the fact that they showed meaningful relations to *changes* in attachment between 12 and 18 months, most of these reflecting the interaction of stressful changes in the mother's situation with her personality, and resultant shifts in the security of her infant's attachment. Only relations that were similar in both sexes have been summarized in the foregoing, since findings specific to one sex are too complex and not sufficiently useful to review in the present context.

On the basis of the foregoing, in this low-income population there is some reason to question whether sensitive caregiving is a property of the mother-infant dyad or a contribution of the mother herself. If the latter, some feature of the prenatal personality should have shown a relationship to security of attachment. Only measures of sensitive caregiving in the 6-month home observation showed a relation to 12-month attachment in both sexes, a point late enough in development that the mother's ratings of sensitivity could be considered a reaction to how easy the infant was to care for.

The California Study

The foregoing studies indicate that the infant's own characteristics made a contribution to the security of attachment, and that in a low-income population this contribution may be more easily traced than the contribution of the mother. The next question

is whether these findings could be corraborated on a sample of mothers living in less stressful circumstances. Crockenberg (1981) studied a sample of intact middle and lower income families, obtaining prenatal questionnaires from the mothers, Brazelton examinations at 5 and 10 days in the home, home observations of mother-infant interaction at 3 months, and assessment of attachment at 12 months. Just as in the Minneapolis study, the prenatal information was obtained by self-report questionnaires, but in this study the questionnaires were more directly relevant to later mother-infant interaction, since they measured the expectant mother's attitudes toward responding to daytime crying, night crying, and toward being flexible in caregiving. The Brazelton examination was used to assess infant characteristics. In this procedure the examiner stimulates the infant in different sensory modalities to determine ability to orient and rate of habituation or "shutting out" of the stimuli, holds and handles the infant to determine cuddliness, and elicits a number of reflexes considered likely to indicate whether the central nervous system is intact. Irritability is one of the most reliable measures to emerge from the Brazelton, reflecting general irritability, rapidity of build-up, and peak of excitement in reaction to repeated stimulation.

First of all, as in the previous study, it was found that irritability in the neonate was associated with later insecure attachment. Eighty percent of the insecure/avoidant infants were in the high irritable group, while 73% of the insecure/anxious infants were in this neonatal group. However significance of these relationships to later attachment could only be established in the sub-sample involving mothers with low social support, since 11 out of the 14 insecure infants were in this group. In this group there was a clear indication that newborns who showed low irritability were more frequently securely attached, and those who showed high irritability were insecurely attached.

Further statistical analyses and detailed study of some of the cases led the investigators to speculate that unresponsiveness of the mother is the key variable in keeping the insecure infants from developing trust, and this unresponsiveness is in part caused by the infant's irritability as well as by lack of support from the social context. This lack of support was presumed by the investigators to directly affect the mother because she is unlikely to be aware of and responsive to the infant's needs if her own needs are not met. Lack of support may also affect the infant directly because a supporting context often contains an individual such as a sister or aunt who provides responsiveness for the infant, who can then form a secure attachment with its mother despite her own unresponsiveness. Nonetheless, despite the importance of the social context, most infants in homes with low support who were not irritable were able to achieve a secure attachment. They appeared invulnerable. The way in which the irritable infant affected maternal responsivenes developmentally could be seen in an analysis (Crockenberg & McCluskey, 1986) that began with prenatal attitudes toward responding to an infant's cries. The mother whose expressed prenatal attitudes indicated unresponsiveness, and whose infant was irritable in the newborn period (and presumably through the early months), became *more* resposive by the third month in efforts to cope with the infant's irritability then, apparently having exhausted her limited capacity to change, reverted to her prenatal level by the 12th month, by showing *decreasing* responsiveness, unless she had adequate social support.

In short, the infant, the mother, and the support system were all important in the evolution of the dyadic attachment system in the portion of this essentially middle and working class sample that was stressed by low support and irritability in the infant. Without this combination of factors, there was little predictability of maternal sensitivity or attachment security at 12 months from either prenatal maternal attitudes or early maternal behavior in the third month. These data do not support the common assumption that attachment security is produced by sensitive mothers who were always that way, regardless of their situation or the temperament of the infant. In fact, an infant who shows low irritability can survive an unresponsive mother in an inadequate environment and still achieve a secure attachment!

The North Germany Study

A congenital contribution to a facet of newborn behavior other than irritability has been reported in a study carried out in Germany (Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985). Since this study could take advantage of a longer stay in the hospital for the mother and infant (average of 9 days), permitting three administrations of the Brazelton, and lower levels of sedation administered to the mothers than in United States samples, as important set of measures labelled "Orientation" reached an adequate level of reliability and could be related to later attachment at 12 months. This set of items, based on a factor analysis, reflected attention to visual and auditory stimuli. Scores above the median, indicating good attention in the first nine days of life, were significantly associated with later attachment security at 12 months, and the predictive relationship was just as strong as that for maternal sensitivity, rated from home observations at 2 and 6 months. In fact, maternal sensitivity rated from a 10-month home observation even failed to show a relationship to attachment security, despite substantial evidence of stability of the measure between 2, 6, and 10 months.

Since the mothers in selected subsamples received as expérimental conditions early, extended contact, or both, versus normal care, it was possible to evaluate the extent to which increased contact by the mother affected orientation and irritability within the first 9 days of life (Grossmann, & Grossmann, 1986). In dyads that had early, extended, or early and extended contact four of the 5 items comprising the orientation factor showed significant gains over the control condition of routine care. Only two of the irritability items showed a relationship to the mother's contact condition, and even these items did not show a consistent and interpretable pattern. These experimental findings seem to indicate that orientation is susceptible to improvement with mothering in the first few days of life, while irritability is resistant to effects of the mother. If the resistant nature of irritability should persist over the first year of life, these findings might help explain the increased efforts of low responsive mothers with irritable infants at the 3rd month, followed by lower levels of responsiveness by the 12th month as reported by Crockenberg and McCluskey, (1986) and discussed previously.

The Mother's Contribution in the Four Studies

In the Minnesota study the mother's contribution could be traced from prenatal

personality measures to later *shifts* in the infant's security of attachment but not to the quality of attachment itself. In the California study there were no consistent relations between self-reported unresponsiveness in the prenatal period and later maternal responsiveness or sensitivity except in cases where the mother had inadequate social support and the infant was irritable, in which case the mother continued to show low responsiveness. Just as it is a difficult task to assess newborn behavior reliably, it is not easy to capture the nature of mother-infant interactions from home visits, and thus some findings of discontinuity in the first year may be due to lack of measurement reliability. However, this is unlikely in the North Germany study because the newborn was assessed 3 times rather than the usual 2, and the home observations of the mother's functioning were frequent (2, 6, and 10), comprehensive, and thorough. For this reason we should pay special attention to the comparison of predictions from neonatal behavior and early maternal behavior to security of attachment at 1 year. Both early maternal sensitivity and neonatal behavior predicted later attachment security, but the latter predicted just as well as the former. Thus the well-measured data from this study provides little support for the position that the critical variable in prediction of attachment security is maternal sensitivity or that the infant is a passive recipient of the mother's caregiving. In fact, in this and the California study, there were examples of infants who withstood unresponsive mothers or unfavorable support contexts to achieve security of attachment. It is assumed that the support situation acts directly on the mother by meeting her needs so that she can turn her attention to her infant, or directly on the infant by providing supporting figures that are responsive when the mother is not.

LIMITATIONS AND GENERALIZATIONS

Most of the conclusions that have been drawn from the foregoing review are sufficiently strong to be statistically significant, but some interpretations offered are simply those of the investigators based on their detailed knowledge of the subjects. All conclusions are based on a small number of studies even though there was often more than one report summarized under the heading of the study. In one study (Miyake *et at.*, 1985) the N is quite small, 11 B's, 8 C's, and no A's, and the question has been raised whether Japanese C's are equivalent to those in U. S. samples, since all Japanese infants may be more upset by a separation. Their mothers seldom leave them in the first year. However, it is behavior in the reunion that defines attachment security, not that during the separation. Similarly, Type A infants in the North German sample used by Grossmann *et al.* (1985) may not be similar to those in U. S. studies because of pressure for early independence in that area of Germany. Other areas of Germany yield percentages of secure and insecure classifications closer to those in U. S. samples. Nonetheless, the relations of neonatal behavior and attachment exist *within* each of these three cultures on which the four major studies were based, and these rank order longitudinal relations are not necessarily invalidated by average differences in attachment categories, especially since there is some similarity in nature of the relationships in all 4 studies, as will be discussed further below.

There are two inconsistencies in the findings from the four studies. The first,

involving the North Germany findings, has just been mentioned, namely the fact that neonatal orientation, not irritability, was correlated with later attachment security. This is an inconsistency because it was an irritability cluster score, not orientation, that showed a relation to later insecurity of attachment in the California study; the insecurely attached Minnesota infants were rated by their nurses as being "difficult to care for" or not alert, and; irritability was considered by Miyake to be underlying determinant of the reaction to interruption and its relation to later attachment insecurity. Support for Miyake's interpretation is available in that the reaction to interruption of sucking was associated with later crying or fussing during home observations as 1 and 3 months. First of all, a significant relationship between the North Germany irritability and orientation factors (-.37), indicates a departure from orthogonality of factor structure. This occurs because investigators often only select significant loadings to compose a factor score whereas the orthogonality was achieved in the factor analysis by nonsignificant loadings. The irritability and orientation factors were really components of one factor and, in fact, the irritability factor showed differences in the right direction even if small and not significant. Fifty eight percent of the group A infants had been more irritable newborns in comparison with 44% of the securely attached. Since an irritable infant does not attend well, findings on irritability are in the same domain, and adequacy of measurement or range of variation will determine which component will show longitudinal relations to later security. The irritability component may have been manifest in the Japanese longitudinal study because the strange situation stressed the infants and produced variation in crying and fussing, while the attention component was manifest in the German study because the range of variation was not curtailed by the presence of any substantial number of fussing and crying infants. Orientation might have shown significant relations in the Minnesota and California studies if conditions for testing were as favorable as in the North Germany study in which the infant was available in the maternity hospital for 9 days. This made it possible to achieve a rare level of uniformity of testing conditions (see p. 237, Grossmann *et al.*, 1985), and to select the optimal state of the infant for testing, an espeially critical element items requiring attention. The California and Minnesota assessments of the neonate took place in the home and, the latter case, in poverty level homes in which it is very difficult to achieve uniformity or select optimal states (Vaughn, Taraldson, Chrichton, & Egeland, 1980). It is easier to assess irritability than orientation in the home situation, but the minimal level for either factor is difficult to achieve in the inadequate space and frequently chaotic conditions of a poverty level home. This difficulty probably accounts for the other inconsistency in the data, namely that none of the Brazelton factor scores showed a relation to later security of attachment in the Minnesota study, and relations to directly observed behavior in the home were sparse.

Behavior in home observations at 1 month is of less interest than neonatal behavior as an index of the infant's own characteristics, since a month of caregiving has transpired, but findings that yield inconsistencies should be noted. Isabella, Belsky and von Eye (1989) have reported that amount of time asleep or amount of crying observed in home obervations during the first year did not differentiate later infants identified as secure versus insecure, but another earlier report from the same study (Belsky,

Rovine, & Taylor, 1984) indicated that insecurely attached infants were more *fussy* at 3 and 9 months but not at 1 month. In a cross-lag analysis early maternal involvement with the infant predicted later attachment classification when infant fussing was controlled, but the latter did not predict attachment classification when maternal involvement was controlled. A cross-lag analysis was not reported in the North Germany study, but the authors concluded that the mother's sensitivity and the infant's orientation made independent contributions to security of attachment. Thus, at the present is no clear isomorphic progression from neonatel irritability to fussiness in the early months of the first year and later attachment that can be constructed by juxtaposing the studies of Belsky and colleagues with those starting in the newborn period. Studies of maternal reports of temperament and later attachment are not reviewed for reasons mentioned in the introduction.

SUMMARY

Findings from the four follow-up studies starting in the newborn period and involving later assessment of attachment security at 12 months, indicate that within each of three different cultures the infant, the mother, and their situation are intricately involved in the process by which secure or anxious attachments evolve. The infant's own contribution to insecurity of attachment can be seen in 3 studies of neonatal irritability (being " difficult to care for ") and 2 studies of lack of alertness or inattentiveness to sensory input in the noenatal period.

There is some support for linking these findings as all tapping a complex factor involving attention and irritability in the neonate, one or the other component emerging in any given study as a predictor of security of attachment, depending on psychometric adequacy or range of variation in the components in the sample. It is noteworthy that the irritability component has already been the subject of considerable research starting at the first month involving direct observation of the infant and mother in the home, rather than relying on maternal reports of temperament. Research on the component of attention has not been pursued sufficiently. If pursued in follow-up studies from the newborn period, much higher standards for uniformity of testing conditions and selection of optimal states must be achieved.

There are inconsistencies both within the findings of the four studies, and within the fiindings from the follow-ups starting in the first month, but these may be resolved as better conceptualizations emerge based on the data on neonates, and as better methods are applied to the problem so as to achieve higher levels of psychometric adequacy, and more sensitive assessment of the strange situation. None of the studies reviewed dimensionalized the elements of the attachment situation or examined subgroups of the 3 main groups, though it has been conjectured that the infant's contribution may be seen in the sub-groups.

Data on the mother's contribution is only available in three of the studies, and on the mother's situation in two studies. The four studies were selected for evidence of the infant's not the mother's contribution, but one particularly thorough study of the neonate and mother provides the surprising result that early maternal sensitivity or responsiveness predicts later security of attachment no better than neonatal characteris-

tics. Furthermore, one study shows that continuity of a maternal characteristic such as unresponsiveness depends on both the infant and the mother's situation. There are individual examples in the studies of infants who were able to withstand unresponsive mothers or unfavorable support contexts to achieve security of attachment. All in all, findings on infants and mothers in these studies are not consistent with recent reviews that accord a minor role to the infant's own characteristics, but these reviews have not paid close attention to the few studies on neonates and taken technical problems of measurement into consideration. Research and conceptualization needs to proceed beyond the dominant concept of the sensitive mother to the interaction of infant, mother, and their situation. At the present, the data point to the need for a transactional model, but we must also be prepared for the possibility that the infant's own characterisitics may have both a direct and interactive effect on attachment (Belsky *et al.*, 1984).

REFERENCES

Bates, J. E., Maslin, C. A., & Frankel (1985). Attachment security, mother-child interaction, and temperament as predictors of behavior-problem ratings at age three years. In I. Bretherton & E. Waters (Eds.), Growing points of attachment theory and research. *Monographs of the Society for Research in Child Development*, **50**, Nos. 1-2.

Bell, R. Q. (1975). A congenioal contribution to emotional response in early infancy and the preschool period. In R. Porter & M. O'Connor (Eds.), *Parent-infant interaction* (*Ciba Foundation Symposium 33*). New York : Associated Scientific Publishers.

Bell, R. Q. & Chapman, M. (1986). Child effects in studies using experimental or brief longitudinal approaches to socialization. *Developmental Psychology*, **22**, 595-603.

Bell, R. Q. & Harper, L. V.(1977). *Child effects on adults*. Hillsdale, NJ : Lawrence Erlbaum Associates.

Bell, R. Q., Weller, G. M., & Waldrop, M. F. (1971). Newborn and preschooler : Organization of behavior and relations between periods. *Monographs of the Society for Research in Child Development*, **36** (Nos. 1-2).

Belsky, J., Rovine, M., & Taylor, D. G. (1984). The Pennsylvania Infant and Family Development Project, III : The origins of individual differences in infant-mother attachment : Maternal and infant contributions. *Child Development*, **55**, 718-728.

Brazelton, T. B. (1973). *Neonatal behavioral assessment scale* (Clinics in Developmental Medichine, No. 50). Philadelphia : Lippincott.

Crockenberg, S. B. (1981). Infant irritability, mother, responsiveness, and social support influences on the security of infant-mother attachment. *Child Development*, **52**, 857-865.

Crockenberg, S. & McCluskey, K. (1986). Change in maternal behavior during the baby's first year of life. *Child Development*, in press.

Egeland, B. & Farber, E. A. (1984). Infant-mother attachment : Factors related to its development and changes over time. *Child Development*, **55**, 753-771.

Goldsmith, H. H., Bradshaw, D. L., & Rieser-Danner, L. (1986). Temperamental dimensions as potential developmental influences on attachment. In J. V. Lerner & R. J. Lerner (Eds.), *Temperament and psychosocial interaction in infants and children*, Francisco : Jossey-Bass.

Grossman, K., Grossmann, K. E., Spangler, G. S., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborns' orientation responses as related to quality of attachment in northern Germany. In I. Bretherton & E. Waters (Eds.), Growing points of attachment theory and reseach. *Monographs of the Society for Research in Child Development* (Ser. No. 209, 50,

Nos. 1-2, pp. 233-256).

Grossmann, K. & Grossmann, K. E. (1986). Newborn behavior, early parenting quality and later toddler-parent relationships in a group of German infants. In J. K. Nugent, B. M. Lester, & T. B. Brazelton (Eds.), *The cultural context of infancy* (Vol. II). Norwood, NJ : Ablex.

Isabella, R., Belsky, J., & von Eye, A. (1989). Attachment and interactional synchrony. *Developmental Psychology*, **25**, 12-21

Miyake, K., S-J, Chen., & Campos, J. J. (1985). Infant temperament, mother's mode of interaction, and attachment in Japan : An interim report. In I. Bretherton & E. Waters (Eds.), Growing points of attachment theory and research. *Monographs of the Society for Researh in Child Development* (Ser. No. 209, 50, Nos. 1-2, pp. 276-267).

Moss, H. A. (1974). Early sex differences and mother-infant interaction. In R. C. Friedman et al. (Eds.), *Sex differences in behavior*. New York : Wiley.

Sameroff, A. J. (1978). Summary and conclusions : The future of newborn assessment. In A. J. Sameroff (Ed.), Organization and stability of newborn behavior : A commentary on the Brazelton Neonatal Behavior Assessment Scale. *Monographs of the Society for Research in Child Development*, **43**, Nos. 5-6, 102-117.

Sroufe, L. A. (1985). Attachment classification from the perspective of infant-caregiver relationships and infant temperament. *Child Development*, **56**, 1-14.

Vaughn, B. E., Taraldson, B., Chrichton, L., & Egeland, F. (1980). Relationships between neonatal behavioral organization and infant behavior during the first year of life. *Infant Behavior and Development*, **3**, 47-66.

Vaughn, B. E., Lefever, G. B., Seifer, M., & Barglow, P. (1989). Attachment behavior, attachment security, and temperament during infancy. *Child Development*, **60**, 728-737.

Yang, R. K. & Halverson, C. F. (1976). A study of the "Inversion of Intensity" between newborn and preschool-age behavior." *Child Development*, **47**, 350-359.