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A behavioral study of maternal-infant interaction with focus on infant attachment and infant cognition

Bruce McNickle
University of Nebraska at Omaha

A BEHAVIORAL STUDY OF MATERNAL-INFANT INTERACTION WITH FOCUS ON INFANT ATTACHMENT AND INFANT COGNITION

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Bruce McNickle

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Abstract

This study examined the interactions between 15 maternal-infant dyads using an operant learning format with special emphasis on the relationship of infant attachment to maternal behaviors, specifically the security-insecurity dimension of infant attachment. Observations of maternal-infant interactions were made each month from infant ages 9 months to 12 months. Maternal and infant behaviors were coded and each category was scored for frequency and duration of behavior with an Esterline-Angus Event Recorder. Maternal ratios of responding and latency in responding to infant behaviors were calculated from the Esterline-Angus charts. Infants were administered several cognition tests and an attachment test, while mothers were given several attitude measures. Intercorrelations of infant behavior suggested three systems of organized behavior: distress contact with mother, positive or affiliative contact with mother, and exploratory behaviors. Infant behavior was unstable across months, and evidence was found that infant behaviors change with development, in that certain behaviors take on new meanings and different patterns of organization in the interaction between mother and child. Few relationships were found between infant behavior and the attachment test results, except that insecurely attached infants tended to emit more verbal distress and touching behavior. Important factors found in a factor analysis of infant behavior were: Lack of physical contact with mother, distress contact with mother, and non-verbal distal contact. Intercorrelations of maternal behaviors indicated more stability across months than for infant behaviors, with the most stable behaviors being distal contact and stimulation behaviors, whereas the most stable infant behaviors were proximity seeking behaviors. From a factor analysis of maternal behaviors, two important factors emerged: An

acceptance and child-oriented factor and a verbal factor. The maternal responsiveness and latency data did not cluster into one or two factors, rather these measures loaded on several factors. No relationship was found between maternal ratio of responding and frequency of infant behaviors. Latency measures were related to infant behaviors, but contrary to the operant position, longer latencies to infant proximity seeking behaviors increased the frequency and duration of these behaviors, whereas shorter latencies to infant social affiliative behaviors did increase these behaviors, thus some infant behaviors demonstrated agreement with the operant position. There were few significant relationships between infant cognition measures and maternal behaviors, or between infant cognition and maternal responsiveness ratios and latency measures. The findings support a modified ethological position to infant socialization rather than an operant position. An ethological or control and communication theory assumes infants have goals and a repetoire of behaviors to achieve these goals. Infants can alternate behaviors to achieve goals. If a selected behavior does not result in goal satisfaction, other behaviors are available for use. Some determinants of this repetoire of behaviors include: developmental changes in specific response capabilities due to maturation, developmental re-organization of infant behaviors into more discrete and efficient behavioral system, and the reactions of the caretaker to infant behavioral overtures leading to infant goal satisfaction. The major goals for infants are proximity contact with attachment object, social stimulation from the caretaker, and exploration of the environment. No strong relationships between maternal variables and infant security of attachment were found, although infants of more responsive mothers evidenced more proximity seeking behavior as shown by more following and touching behavior.

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THESIS ACCEPTANCE

Accepted for the faculty of the Graduate College, University of Nebraska, in partial fulfillment of the requirements for the degree Master of Arts, University of Nebraska at Omaha.

Thesis Committee

Name	Department
C. Raymond Oxtoby	Psychology
Patricia Kolaska	Educational Foundations

Joseph P. LaVoie
Chairman

May 15, 1979
Date

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Chapter 1

Introduction

Infant social development has been the subject of intensive research efforts with much emphasis on the formation of attachments (e. g. Ainsworth, 1969; Bowlby, 1969). Attachment, whether defined by maintenance of proximity to caretaker (Bowlby, 1969) or more generally as a focused social relationship (Yarrow, 1972), has been considered important for several reasons. Freud (1940) postulated that the infant-mother relationship was the prototype for all future relationships engaged in by the child. The recent emphasis by Ainsworth and her associates (e. g. Ainsworth, 1972) has focused on the quality of the infant attachment as it reflects different styles of infant social development. Yarrow (1972) has suggested such individual differences are influenced by certain perceptual and cognitive developments which effect future perceptual and cognitive growth. Although developmental data are needed to assess the effects of infant social development on later personality functioning, evidence from longitudinal studies (e. g. Yarrow, Goodwin, Manheimer & Milowe, 1973) and deprivation studies (Yarrow, 1964) suggest that early experiences have some long term effects. Psychoanalytic theories have stressed that distorted attachments or lack of an attachment by the infant are causative factors in later personality pathology. Bowlby (1973) has reviewed the evidence and concludes that pathological attachments or traumatic separations will mediate a variety of later personality dysfunctions and social maladjustments. Although the exact relationship between very early life experiences and later personality adjustment remains more a clinical and theoretical phenomena than an observed and scientifically recorded fact, clarification and understanding of the first attachment relationship

would appear necessary before more controlled and rigorous studies can be initiated to trace developmental progression of attachment.

The aim of the present study was to clarify the parameters of the attachment relationship, and to explore factors that may determine the quality of this relationship. The focus of this study is on those maternal behaviors that influence infant attachment, and the relationship between attachment, as a typology or generalized category of infant behavior, with selected infant behaviors observed in a natural setting.

Evidence that infants differ in rate and patterns of social development points to the importance of environmental factors, in particular, maternal caretaking activities. Using an ethological framework to study mother infant interaction, Ainsworth and her associates (e. g. Ainsworth, 1967; Ainsworth, Bell, & Stayton, 1972; Ainsworth & Wittig, 1969) have found that responsive mothers are more likely to have securely attached infants. Secure infants protest less when left by their mother and are more likely to greet their caretaker upon reunion. Ainsworth, Bell, and Stayton (1972) reported that the securely attached infant was more likely to initiate pick-ups upon reunion, but when put down, the child turned to independent activity. The secure child is best seen as enjoying proximity to mother, but the child has a sense of competence that allows more freedom from the demands of continuous contact and freedom to actively explore the immediate environment. The insecure child protests strongly when left, but is ambivalent towards the mother upon her return.

According to Ainsworth (1972), the infant-mother relationship can be qualitatively distinguished on several dimensions other than security-insecurity. These include: the balance between proximity seeking behavior and

defensive proximity avoiding of contact with the caretaker, the degree of ambivalence or anger the infant shows when seeking contact with mother, and a tempo dimension that Ainsworth simply labels as activity-passivity. Ainsworth considers defensive proximity avoiding and ambivalence, as well as exploratory behaviors, to be systems of organized behaviors that compete with attachment behaviors. The infant then can be conceptualized as being active or passive, attached in a secure or insecure manner, with the amount of proximity seeking behavior determined by the balance between the strengths of the three competing behavioral systems (exploratory, defensive avoiding, and ambivalence) and the strength of the proximity seeking system. Maternal caretaking activities that affect infant personality development, and situational constraints, determine a particular infant's balance between the various behavioral systems. Proximity avoiding of the mother upon reunion was found to be characteristic of children who were actively rejected by their mothers (Ainsworth, Bell, & Stayton, 1971). This proximity avoiding was hypothesized as a defensive reaction against maternal rejection of the infant's attachment behavior. Ambivalence was suggested to be an aggressive reaction to minor separations. The infants, whose mothers were rejecting and unresponsive, would often show proximity avoiding behavior when reunited with the mother, whereas infants of mothers who were unresponsive and inaccessible but not rejecting or interfering, tended to be ambivalent upon reunion.

Maternal Responsiveness. ✓

Maternal responsiveness to crying is a major correlate of the strength of attachment according to Schaffer and Emerson (1964). However they chose to define the intensity of attachment by the degree of separation protest,

a measure which Ainsworth (1969) argues is more characteristic of the insecure infant. Stayton, Ainsworth, and Main (1973) reported that infants of sensitive and responsive mothers were more likely to follow their mothers during the second half of the first year rather than protesting minor separations. Bernal (1974) suggests that separation protest may be a useful measure for determining the age of onset of specific attachments, but provides little information regarding individual differences in attachment patterns.

Although writters disagree about the effects of the responsive mother on infant crying behavior, the responsive mother is perceived as a positive influence on the formation of specific attachments. In their research on maternal responsiveness to crying in the first year of life, Ainsworth et. al. (e. g. Ainsworth, Bell, & Stayton, 1972; Bell & Ainsworth, 1972) found that prompt and consistent responding to an infant's crying by the mother resulted in decreased duration and frequency of crying over the first year, indicating that crying was gradually being replaced by more mature communication modes. There was little evidence that mothers' intervention techniques were responsible for this decrease in crying behavior. The most effective intervention technique was close physical contact, but mature communications emitted by the infant was a factor that facilitated the effectiveness of the caretaker's intervention techniques. Mature communications was defined by the authors as gestural signals, pre-language verbalizations, etc., that allowed the caretaker to receive more complex messages regarding the infant's needs. Ainsworth and her colleagues observed that infant crying was activated by aversive states such as hunger, and lack of contact with the mother during the first half of the first year. Toward the end of the first year, crying appeared to be more of a communication device and more

likely to be emitted in the mother's presence. These observations suggest that children of responsive caretakers have confidence in their ability to control their environment. The responsive mother provides the child with feedback that aids in differentiation of means and ends which fosters the development of communication. Lewis and Goldberg (1969) suggest that when a mother responds promptly and consistently to her child's signals, the infant learns that behavior does have consequences which leads to a generalized expectancy of similiar control in new settings. The securely attached infant can be characterized as having this generalized expectancy of control and perceives the environment, whether familiar or new, as interesting and non-threatening.

Infant Behavior.

The findings from the crying research conflict with the operant learning position that increased responsiveness to crying would increase the frequency of this infant behavior. Gewirtz (1972) proposes that attachment behavior should be conceptualized as classes of functional relationships involving control over the infant's response by the discriminative and reinforcing stimuli provided by the particular behavioral and physical characteristics of the caretaker. The instrumental learning position (Gewirtz, 1969) would suggest that selective responding by the mother may be the important factor in the replacement of crying by more mature vocalizations and gestures. As the infant matures, caretakers selectively respond to more verbal and sign communication and tend to ignore crying and thus extinguish this behavior. The importance of selectivity centers around changing response probabilities and encouraging the growth of responses that are incompatible with the undesired responses. For example, Etzel and Gewirtz (1967) demonstrated that responding to smiling and glances, but ignoring crying,

resulted in diminished crying episodes. More recently Gewirtz (1972) has altered his position that crying behavior is a functional relationship. He suggests that crying is an emotional response resulting from an interference with normal functional relationships, thus crying is a disorganized response that interfers with approach responses.

Ainsworth et. al. (e. g. Bell & Ainsworth, 1972) have argued that the typical laboratory model experiment (e. g. Etzel & Gewirtz, 1967) is too short-range to consider developmental changes, such as growth in infant cognitive abilities and changes in maternal patterns of responsiveness that accommodate this growth of infant cognition. Ainsworth (1972) has suggested that the results from laboratory experiments may not be totally incongruent with her research. However, Ainsworth contends that adult responsiveness to non-crying signals may have been a more important factor in extinguishing crying behavior than nonresponsiveness to crying behavior. As yet undetermined, is whether selectivity or generalized maternal responsiveness is the critical factor. Ainsworth would argue that responding to signals incompatible with crying and refraining from responding to crying behavior are not sufficient conditions to create infant confidence and development of complex communication skills. Rather the caretaker must respond to all infant behavior (including crying behavior) to facilitate infant generalized expectancy of control. The operant position would suggest that selectivity is the crucial factor in retarding crying behavior and increasing alternative communication modes. Learning theorists would tend to regard generalized maternal responsiveness, although more healthy for the infant than generalized nonresponsiveness, as hindering maturation of communication skills and personality growth.

The issue of selective versus generalized maternal responsiveness can be extended to infant cognition, in particular those cognitions that underlie observable social behaviors such as communication skills. For example, the two styles of maternal responding can be theoretically examined for their effects on the development of the infant's understanding of means-ends distinctions. Selective responding, it can be argued, is conducive to means-ends differentiation because the infant learns different contingencies with different behaviors. These different contingencies cause the unified action patterns to separate into independent means and ends. Initially the infant perceives the mother's response to his behavior as part of his action pattern. Through the disequilibrium caused by differing contingencies to crying and smiling, for example, assimilation and accommodation force a higher stage of cognition where the behavior becomes independent of the mother's response. Selective responding by the mother should encourage more positive communication which provides more information on the infant's needs, and thus increases the mother's reinforcing effectiveness. If communication is defined as the purposeful transmission of signals where the sender has rudimentary awareness of self-other distinction, this line of reasoning suggests that a primitive means-ends differentiation precedes communication, and that maternal selective responding is necessary for the child to conceptualize the distinction between means and ends.

An alternative to the selective responding approach, and one congruent with Bell and Ainsworth (1972), is that crying represents a gross and rather low level means-ends distinction while more positive communication reflects a higher level of discrimination between means and ends. This higher level could be conceptualized as a finite means-ends differentiation where the

means used reflect the ends sought. The mother, by responding to crying, accelerates global means-ends, and her responsiveness to more positive vocalizations increases the growth of specific means. For the mother to accomplish both, she must be responsive to all signals, especially during the first year, and later she might choose to become selective. This approach would argue that means-ends and communication proceed in parallel development and that different contingencies are not necessary for the infant to reach an awareness of self-other distinction. The ethological school would suggest general responsiveness contributes to the infant's feelings of competence which gives the infant the needed security to feel powerful and thus perceive a self-other distinction. Neither approach disagrees greatly as to what happens, rather there is disagreement on the appropriate timing for selective responding. The operant approach suggests that caretakers should be selective once the infant has the physiological capacity for positive communication signals. The ethological approach assumes selective responding will retard means-ends until well after the first year of life. It should be recognized that the exact relationship between means-ends differentiation, self-other distinctions, and communication skills is very complex and the above paragraphs have examined these relationships from the narrow perspective of maternal responsiveness patterns.

Ainsworth and Wittig (1969) have suggested that sensitive caretakers have a positive effect on the infant's developing sense of competence but the crying research previously reviewed does not strongly confirm this. It seems reasonable that mothers' sensitivity to the child's needs, as reflected in successful intervention practices, would contribute to growth of positive communication skills. Conversely it could be argued that an overly

sensitive mother would retard the maturation of communication behaviors as the infant would lack the necessary motivation to increase the complexity of his signals. Bell and Ainsworth (1972) found no evidence that intervention techniques were responsible for a decrease in infant crying behavior which would indicate that the pattern of responsiveness is more focal to increasing positive communication that the particular response class emitted by the mother. This would tend to support the ethological position that generalized maternal responsiveness is a more important factor in developing infant communication skills than is differential responding by the caretaker.

Additional research, specifically longitudinal studies, are needed to assess the question of selectivity, and more data are needed on the relationship between caretaker's responsiveness and infant non-crying behaviors. Further research may suggest a relationship between selective responding and several of the attachment dimensions. Gewirtz (1972) has argued that different patterns of attachment behavior reflect nothing more than different reinforcement histories. A longitudinal study of caretakers' reinforcement patterns may clarify the relationship with attachment variables, and also provide a controlled replication for many of Ainsworth et. al.'s findings.

If responsive and sensitive mothers enhance infant cognition, this effect should be detected with the Uzgiris and Hunt (Note 1) subscales for means-ends and operational causality. The Uzgiris and Hunt scales developed from Piaget's theory of sensori-motor development, provide the investigator with a relevant methodology to examine infant cognition. Past research (e. g. Wachs, Uzgiris, & Hunt, 1971) has demonstrated a relationship between environmental differences and the rate of sensori-motor progression. Para-

skevopoulos and Hunt (1971) found home reared infants were more advanced than institutionalized infants, but they did not directly examine caretaker interaction variables. The large standard deviation for the home reared sample suggests such variables were operating. In research demonstrating the importance of maternal caretaking activities to infant cognition, Bell (1970) found securely attached infants were more advanced in mother permanence over object permanence as assessed with Piaget's stages of object permanence. Further, this person decalage group was more advanced in both person and object permanence at 13½ months. The proximity avoiding infants were delayed in both social and non-social cognition which supports Bell's contention that a responsive and sensitive interpersonal environment stimulates social cognitive development, thereby accelerating non-social cognition. An awareness that when mother is not in sight but that her being still exists, implies the infant has achieved a rudimentary understanding of self-other distinction, thus Bell's research findings collaberate the ethological position that general responsiveness contributes to certain cognitive achievements that underlie infant communication skills.

Mother-Infant Interaction.

Studies of maternal-infant interaction have become greatly sophisticated with the advent of complex correlational and multivariate designs. Investigators have recently focused on the stimulus value of infant behavior as an antecedent factor in maternal responses (Bell, 1971). The reciprocity involved in the maternal-infant dyad (Brazelton, Koslowski, & Main, 1974) have discouraged simple studies utilizing global maternal styles as determinants of infant behavior. Lewis and Lee-Painter (1974) note that the type of measure used in a study directly influences the results, and they contend that frequency of occurrence of behaviors, interactional direction

and intensity of maternal and infant behaviors, and the sequence of behaviors between the mother and infant must all be measured to understand the dyad. The research in this area is too vast to review adequately, however a recent study by Clarke-Stewart (1973) examined a number of maternal variables associated with infant social and cognitive development, similiar to the variables investigated in the present study.

The infant variables studies by Clarke-Stewart included such measures as infant cognition, several Uzgiris and Hunt scales, language measures, observations of social behavior, attachment behaviors, observations of play activity, and the Bayley Scales of Mental Development. Maternal variables included personality measures, observations of social behaviors, responsiveness measures, measures of maternal effectiveness, and maternal appropriateness. Clarke-Stewart found that the infant cognition measures were intercorrelated, suggesting that competence in one area is related to competence in another area. The social measures, as well as the language measures, formed separate clusters. Five factors emerged from the factor analysis. The first factor, labeled competence, included a wide variety of language, cognitive, and intellectual abilities. Positive attachment to mother and expressions of joy also loaded on this factor. The second factor was oriented toward objects and included physical attachment to objects and the tendency to spend time involved with different physical objects located in the environment. The third factor, labeled early test talent, reflected early ability to perform well on infant tests. However this generalized testing ability was not evident at later testing. The fourth factor was close physical contact with mother. The fifth factor, labeled irritability, loaded on crying, fretting, and expression of negative emotion.

The factor analysis of maternal variables revealed a number of clusters, the first of which was optimal maternal care. This factor loaded on variables that reflected a stimulating, non-rejecting, and involved mother. This mother visually and verbally stimulated the child with appropriate materials. The second factor loaded on maternal effectiveness variables, including acceptance of the child by the mother, mother's ability to soothe the child, and the child attending to the mother when she talked. The third factor, labeled control, was derived from two personality measures. This factor correlated with maternal directiveness and the effectiveness of maternal instrumental speech, suggesting that the factor denoted mothers who were concerned with controlling the environment and perceived the environment in rather concrete terms. These mothers imparted this concrete approach to their children. The fourth factor was labeled cuddling, and reflected a strong degree of physical contact with the infant and a positive maternal attitude toward the infant. The fifth factor was derived from the intelligence measures given this sample of mothers and included verbal intelligence, imagination, knowledge about child rearing, and knowledge about child development. Restrictiveness seemed to describe the sixth factor, and included variables of a negative attitude toward the child, frequent physical caretaking and contact, restriction of child's freedom by restraint, punishment, verbal control, and taking away of playthings.

A subsequent regression analysis indicated that optimal maternal care was positively related to infant competence and negatively related to infant irritability. The optimal maternal care factor and maternal intelligence factor were the best predictors of infant competence. The infant's Bayley scores were related to maternal non-physical stimulation and mothers'

responsiveness to their children's social behavior. Maternal restrictiveness was correlated with less infant exploration of objects and negatively related to Bayley scores. The maternal effectiveness factor and infant irritability factor were negatively related.

Of particular importance to the present study, are Clarke-Stewart's findings regarding language development. She reported that an infant in the early stages of language development required a language model rather than a language reinforcer. Maternal responsiveness was more highly related to the child's general competence and motivation rather than frequency of specific infant behaviors. Clarke-Stewart suggested that during the second year of life, maternal responding to a wide variety of social behaviors was more valuable than responsiveness to distress.

The analysis of attachment behavior showed that mothers who were above the sample average in stimulation, contingent responding, and expressing affection, had the most securely attached children.

Clarke-Stewart attempted to separate the effects of maternal stimulation from maternal responsiveness. Mothers who were found to be high on both variables were the most effective caretakers. Among those mothers high on one variable but low on the other, Clarke-Stewart found stimulation was most related to the infant's language ability and the infant's positive involvement with the mother. Bayley scores and the child's expression of positive emotions were related to maternal responsiveness. In examining the specific effects of the appropriateness of maternal responses, Clarke-Stewart reported that appropriateness was related more highly to the child's intellectual performance than to the child's emotional state or attachment to mother.

In general the Clarke-Stewart study supports the position taken by the ethological school as represented by Bowlby, Ainsworth, and associates. Her results suggest general responsiveness is a more important factor in infant development that the operant strategy of ignoring undesired infant behavior and reinforcing desired behavior. If mothers are to selectively respond to infant pro-social behavior and ignore crying, such a decision should take place in the second year of life, after the infant has acquired internal feelings of competence, trust in the environment, and an expectancy of control over new situations. Furthermore, Clarke-Stewart's findings show stimulation to be as crucial as responsiveness, and effective caretaking requires a judicious balance between both.

Experimental Design and Predictions.

A major difficulty in conducting a research project that presumes to provide evidence that one theory is more correct than another theory, is that the opposing theories often use a different vocabulary, different research methodologies, and focus on divergent aspects of the human experience. The theory of ethology expounded by Ainsworth and Bowlby is a mixture of European animal ethology and Freudian psychoanalysis. With this fusion, the theory accommodates personality constructs such as security and trust in the environment with the construct of genetic programming of social behavior. Bowlby and Ainsworth have extended their theorizing to include Piaget's theory of cognitive development. The operant learning tradition, presently more a family of related theories than one theory, has never been concerned with inferred concepts like feelings of security and few writers of the learning position have incorporated stages of cognitive development. The sum result is that proponents of either theory can conduct research

which demonstrates evidence for their viewpoint while claiming their opponent's successes are not relevant criticisms of their own position. This problem is most evident when reading the ethological criticism of the learning position. Ainsworth et. al. assume that when a caretaker responds in a manner that brings pleasure to the infant, this behavior should, a priori, be labeled a reinforcer. If the caretaker's response results in infant irritation, then the label is punishment or negative consequences. Gewirtz would certainly argue this description of learning theory is an inaccurate statement of his concept of functional analysis and harks back to the early learning tradition of Thorndike. For Gewirtz, the discriminating stimulus is as important as the consequence, and the label reinforcer cannot be applied without evidence the behavior functions to increase the preceeding behavior beyond baseline.

In order to test opposing theories, the investigator usually must compromise between polemics of both theories, find or construct a shared vocabulary, and intermingle methodologies and constructs. This writer was less concerned with dogma and semantics but in researching an issue where the results could be directly applied to child rearing situations. A decision was made to observe maternal-infant interaction from a behavioristic framework, devise some statistics regarding reinforcement using a definition of reinforcement that most child developmentalists would accept, and then apply these observations of behavior and reinforcement statistics to inferred concepts of infant development such as security of attachment, means-ends cognitive development, etc.

The purpose of the present study was to investigate the effects of maternal responsiveness and sensitivity on infant behavior. As this writer

chose to be concerned with selected inferred concepts regarding infant development, the literature review has unjustly favored the ethological viewpoint. However, examples were presented that selective responding by the caretaker could result in the same findings reported by researchers favoring the concept of generalized maternal responsiveness. Therefore the predictions for this study will be presented from the perspective of the selective responsiveness position. Maternal caretaking activities are assumed to influence infant social behavior and infant cognition through reinforcement patterns. Within this general premise, the following specific predictions are made: 1) Infants of responsive and sensitive mothers are accelerated for means-ends and object causality understanding and are more advanced in communication ability. These infants are more secure in their attachment to their caretaker. It is assumed that selective responsiveness is more conducive to infant development than is generalized maternal responsiveness, which in turn, is more healthy for the infant than non-responsiveness. 2) Mature communication is associated with accelerated means-ends and object causality understanding, thus infant cognition is related to infant social communication. 3) Selective responding by the caretaker is the major factor in mature communications replacing crying behavior in the infant. 4) Emission rates of infant behavior will reflect the amount of reinforcement provided by caretakers. 5) Infants, defined as being securely attached to their caretakers, will evidence accelerated means-ends and object causality understanding and more advanced communication and language skills. A further aim of this study was to investigate whether the security-insecurity dimension of attachment behavior would be evident in the infant's usual or non-separation interactions with his caretaker. The rationale is that

if insecurity simpily reflects highly selective infant responses to a separation and reunion testing situation and is not reflected in other stimulus conditions, then this dimension of attachment behavior cannot be defined as an inferred concept with broad explanatory powers. The operant position, as outlined by Gewirtz, would be supported if infant behavior during separation and reunion episodes reflects only the functional conditions of these particular behavioral events.

Chapter II

Method

Subjects.

The subjects consisted of 15 nine-month old infants and their mothers (M age 27.6 years, SD= 3.4) who were selected from the patient population of a local pediatric clinic. Based upon the Pediatrician's report and initial screening with the Alpern and Boll's Academic Scale (1972), infants with neurological or gross cognitive disabilities were deleted. The infants were caucasion and from families in which the father's occupation rating ranged from one to five with a mean of three, as determined by the Warner, Meeker, and Ellis' Scale (Miller, 1964). This wide variance in SES suggests more heterogeniety than actually existed if income level was chosen as the criteria for inclusion in the study. The lowest rated occupation, that of truck driver, was held by husbands with incomes equivalent or above the national average income. The range of occupations was from truck driver to medical doctor and architect. The families of the infants were intact, and none of the mothers were employed outside of the home. The mother's mean WAIS equivalent intelligence quotient was 115.4 with a SD of 7.1. These women were considerably brighter than a general sample of American women. All mothers had completed their high school education, and half of the sample had varying amounts of college education, ranging from one year to a Master's Degree in education. In seven families, the infant was the only child, six families had two children, and two families had three children. With the exception of an uncle to one infant, there were no relatives living in the homes other than the nuclear family. The sex composition of the sample was 9 females and 6 males. All families resided in a metropolitan area.

Procedure.

Mothers of the infants were first contacted by a letter which explained the purpose of the study. A follow-up phone call was made a week later to schedule the first home visit. All observations and testing occurred in the infants' homes.

Mothers and infants were observed each month, commencing at 9 months of age and terminating when the infants were one year old. Behavioral observations were recorded with an Esterline-Angus Event Recorder. As the recorder is not mobile, mothers were requested to have the child remain in one room as much as possible. The observer attempted to find a place in the pre-selected room which provided visual access to the room, but enabled the observer to keep a sufficient distance from the mother-infant interactions. If the home situation allowed the observer to view several rooms at one time, mothers were told they could move freely between rooms and the child could follow them. Most of the homes afforded this flexibility, and mothers did not feel confined to one room. The mothers were told they could leave the main observation area at any time, but these mothers usually remained in close proximity to their infants. Most mothers periodically left the room to attend to various housekeeping tasks such as kitchen work, etc. The observer would establish verbal and affectional contact with the infant while setting up the recording equipment, but once the recording session began, no further contact was made until the observations were terminated. None of the infants appeared to exhibit a fear reaction to the observer or the equipment, however the aloofness of the observer discouraged infant attempts to show off and make the observer a playmate. In general the infants were oblivious to the observer's presence except for occasional

interest in manipulating the recording paper. Mothers were aware of the observer's intense concentration on the infant and the Esterline-Angus keyboard so they made few attempts at extended verbal communication with the observer until the recording session was completed. Mothers, on their own initiative, insured that older siblings were outside of the home or that observations took place during school hours. Four families had siblings in the three- and four-year-old range and it was not possible to arrange visitations when these siblings were absent from the home. The observer did not record sibling interaction with the infant, but if the mother was interacting with both children, the observer continued recording. Triadic interaction was extremely rare in this sample; rather mothers would spend time with one child, then spend time with the other. If anything, mothers tended to discourage sibling and triadic interaction, feeling that such interactions would detract from the infant's presence as the focal point of the observer's attention.

During the first visit, information on the number of siblings, amount of time father spends with the child, and general health of the child, was obtained. The Alpern and Boll's Academic Scale (1972) was administered. Mothers were then given a brief explanation of the Esterline-Angus Event Recorder and were told about the general plan of the study. However, it was emphasized that the infant was the focal point of the research, not the mother's interaction with the child. The mothers were instructed to carry on their normal activities during the visits. Pretesting on the various infant measures was performed during the first visit with post-testing at 12 months of age. The infant measures consisted of: attachment, means-ends and object causality subscales of the Uzgiris and Hunt (Note 1) Scales, language items from the Bayley (1969) Scales of Infant Development, and a

communication measure. The communication and attachment measures were administered only at post-testing, the other three measures were given at both initial and post-testing sessions.

The procedural sequence for the first home visit was: 1) interview with mother. 2) 60-minute observation. 3) administration of the means-ends and object causality scales. 4) administration of the Bayley language items. The 10 and 11 month visits consisted of the observation periods only. For the 12 month visit, the sequence of events was the same as that for the first visit except that the communication and attachment measures were administered after the Bayley language items. The attachment measure was purposely administered last so that the infant was relatively comfortable with the presence of the observers, and "stranger" effects were not present to confound the results. A second observer was present at all 12 month visits for the necessary reliability data on the infant tests. If the two observers disagreed upon a particular item on the Bayley or Uzgiris and Hunt subscales, the item was re-administered until agreement could be reached or the infant lost interest. Both observers completed written reports on the infant's attachment and communication behavior. These reports were later combined and then scored by two independent raters. These reports were independently made by the observers with no attempt to resolve discrepancies. Such discrepancies were submitted in the summation report given to the raters.

After the infant measures were completed during the final visit, the mothers were given three paper and pencil measures to complete: Shipley Institute of Living Scale (Shipley, 1939), Mother-Child Relationship Evaluation Scale (Roth, 1961), and a maternal sensitivity scale constructed by the author.

Measures.

Mother-Infant behavior. Maternal-infant interaction was coded into ten categories of maternal behavior and ten categories of infant behavior. Table 1 shows the codes, category definitions, and abbreviations for these measures. The choice of categories was based upon Ainsworth's research and factors that could influence cognition, such as those assessed with the Uzgiris and Hunt scales. The category rationale was to select behaviors that demanded minimal inferential decision-making on the part of the observer and yet were sufficiently broad. The categories were chosen to be inclusive in order to provide a total behavioral record of interaction, since all behaviors important to the dyad were coded. Mean frequency and duration per 15 minute block of observation time were computed for most categories, with the exception of maternal physical punishment and maternal changing items behavior which were scored for mean frequency only. Duration was the total time a behavior was exhibited during the block, not the average duration of behavior per frequency of behavior. The original plan was to observe the dyad for one hour, which would provide four blocks from which a monthly mean could be computed. In some cases circumstances allowed only three block to be recorded for certain infants. Such situations included excessive sibling interaction that prolonged the home visitation beyond prescheduled time, unforseen onset of nap time, the mothers having unscheduled visitors to the home, machine difficulties, etc. If the minimum of three blocks could not be obtained in one day, the observer returned the same week to complete the observations. This happened a total of five times out of the 60 observations and the mothers rescheduled the finish of the observation period within two days. The average observation time for the total

TABLE 1

Mother-Infant Observation Codes and Measures.

Name	Abbreviation	Description
Infant Observation Codes		
Frequency looks at mother.	F-LM	Frequency infant looks at any part of mother.
Duration looks at mother.	D-LM	Duration of looking behavior.
Frequency of smiles.	F-Sm	Frequency of smiling or laughing behavior directed toward mother.
Duration of smiles.	D-Sm	Duration of smiling behavior.
Frequency of crying.	F-Cry	Frequency infant cries, and intense and continuous tearful negative vocalization.
Duration of crying.	D-Cry	Duration of crying behavior.
Frequency of verbal distress.	F-VD	Frequency of fretting, fussing, whining, or any negative vocalizations of short duration and low intensity.
Duration of verbal distress.	D-VD	Duration of verbal distress behavior.
Frequency of verbal positive vocalizations.	F-VP	Frequency of vocalizations of a positive nature, including speech and pre-speech, babbling satisfaction.
Duration of positive verbal vocalizations.	D-VP	Duration of positive vocalizations.
Frequency of gestural signals.	F-GS	Frequency that infant points, waves hands, makes any physical motor behavior intended to communicate a message to mother. Physical temper tantrums or throwing objects not included as these behaviors reflect more frustration than communication.
Duration of gestural signals.	D-GS	Duration of gestural signals.
Frequency of following mother.	F-FM	Frequency that infant follows mother, infant moves from one place to another to be closer to mother.
Duration of following behavior.	D-FM	Duration of following behavior.

TABLE 1 (Continued)

Name	Abbreviation	Description
Frequency touches mother.	F-TM	Frequency infant touches, places hand, on mother's physical body.
Duration touches mother.	D-TM	Duration of touching behavior.
Frequency of visual exploration.	F-VE	Frequency infant looks at objects, environment, persons (other than mother). Not coded if infant is looking at object while playing or manipulating object.
Duration of visual exploration.	D-VE	Duration of visual exploration.
Frequency manipulates objects.	F-MO	Frequency infant touches, plays, handles objects and toys. Objects in mouth not coded, holding baby bottle or food utensil not coded unless utensil or bottle used as a play object.
Duration manipulates objects.	D-MO	Duration of manipulation behavior.
Maternal Observation Codes		
Frequency of punishing behavior.	F-PP	Frequency mother physically punishes infant, such as slaps, pushes child away, shakes child.
Frequency changes items.	F-CI	Frequency mother takes objects away from infant. The infant must have physical hold of object for mother to be scored.
Frequency gives stimulation.	F-GS	Frequency mother gives toys to child, rattles objects for infant's amusement. Any stimulation not physical or verbal.
Duration gives stimulation.	D-GS	Duration of stimulating behavior.
Frequency of gentle physical stimulation.	F-GPS	Frequency mother touches, caressess, kissess, pats, handles infant.
Duration of gentle physical stimulation.	D-GPS	Duration of gentle physical stimulating behavior.

TABLE 1 (Continued)

Name	Abbreviation	Description
Frequency of vigerous physical stimulation.	F-VPS	Frequency mother rocks child on knee, plays pat-a-cake, throws child in air for child's amusement.
Duration of vigerous physical stimulation.	D-VPS	Duration of vigerous physical stimulating behavior.
Frequency of holding behavior.	F-Hold	Frequency mother picks up and holds infant, carries infant, sits infant on lap.
Duration of holding behavior.	D-Hold	Duration of holding behavior.
Frequency of verbal discouragement.	F-VD	Frequency mother gives verbal prohibitions, rejecting remarks, angry verbalizations.
Duration of verbal discouragement.	D-VD	Duration of verbal discouragement.
Frequency of verbal positive behavior.	F-VP	Frequency of positive verbalizations directed toward infant.
Duration of verbal positive behavior.	D-VP	Duration of verbal positive behavior.
Frequency of smiles.	F-Sm	Frequency mother smiles, laughs at or with the infant.
Duration of smiles.	D-Sm	Duration of smiling behavior.
Frequency of looking behavior.	F-LB	Frequency that mother looks, visually attends to infant.
Duration of looking behavior.	D-LB	Duration of looking behavior.
Percentage of time with child.	Time	Percentage of time mother spends in same room with infant per 15 minute block.
Maternal Responsiveness Measures		
Responsiveness to smiling behavior.	R-Sm	Maternal responsiveness to infant smiling behavior.
Responsiveness to crying behavior.	R-Cry	Maternal responsiveness to infant crying.
Responsiveness to verbal distress.	R-VD	Maternal responsiveness to infant verbal distress.

TABLE 1 (Continued)

Name	Abbreviation	Description
Responsiveness to verbal positive.	R-VP	Maternal responsiveness to infant positive vocalizations.
Responsiveness to gestural signals.	R-GS	Maternal responsiveness to infant gestural signals.
Responsiveness to follows mother.	R-FM	Maternal responsiveness to infant following behavior.
Responsiveness to touching mother.	R-TM	Maternal responsiveness to infant touching behavior.
Mean responsiveness	R-Mean	Each mother's responsiveness means for the seven infant behaviors were averaged to derive a global responsiveness mean for each mother.
Latency to respond to smiling behavior.	L-Sm	Maternal latency in responding to infant smiling behavior.
Latency to respond to crying behavior.	L-Cry	Maternal latency in responding to infant crying behavior.
Latency to respond to verbal distress.	L-VD	Maternal latency in responding to infant verbal distress behavior.
Latency to respond to verbal positive.	L-VP	Maternal latency in responding to infant positive vocalizations.
Latency to respond to gestural signals.	L-GS	Maternal latency in responding to infant gestural signals.
Latency to respond to following behavior.	L-FM	Maternal latency in responding to infant following behavior.
Latency to respond to touching behavior.	L-TM	Maternal latency in responding to infant touching mother behavior.
Mean Latency	L-Mean	Mother's latency means for the seven infant behaviors were averaged to derive a global latency mean.
Maternal sensitivity	Sens	Mean amount of time required to soothe and quiet infant when dustressed. (See text for complete description.)
Infant Assessment Measures		
Bayley language scale.	Bay-9	Score on the Bayley language items taken when infant was 9 months old.
Bayley language scale.	Bay-12	Score on the Bayley language items taken when infant was 12 months old.

TABLE 1 (Continued)

Name	Abbreviation	Description
Development of means-ends relationships	Mean-9	Score on the Development of Means for Achieving Desired Environmental Events Scale taken when infant was 9 months old.
Development of means-ends relationships.	Mean-12	Score on the Development of Means for Achieving Desired Environmental Events Scales taken when infant was 12 months old.
Development of causality relationships.	Caus-9	Score on the Development of Causality Scale taken when infant was 9 months old.
Development of causality relationships.	Caus-12	Score on the Development of Causality Scale taken when infant was 12 months old.
Communication.	Comm	Score on the communication measure taken when infant was 12 months old. (See text for complete description.)
Attachment.	Att	Attachment classification assigned when infant was 12 months old. (See text for complete description.)
Maternal Trait Measures		
Maternal sensitivity scale.	Sn-Sc	Score gained on maternal sensitivity scale constructed by author.
Acceptance Scale from Roth Scale.	R-Acc	Score gained on Acceptance Scale from Roth Scale.
Over-protection Scale from Roth Scale.	R-OP	Score gained on Over-Protection Scale from Roth Scale.
Over-indulgence Scale from Roth Scale.	R-OI	Score gained on Over-Indulgence Scale from Roth Scale.
Rejection Scale from Roth Scale.	R-Rej	Score gained on Rejection Scale from Roth Scale.
Maternal intelligence.	IQ	Intelligence quotient derived from Shipley Institute of Living Scale.
Socio-economic status of mother.	SES	Socio-economic status of family derived from father's occupational rating.
Number of children in family.	# Child	Number of children in the family.

sample was 3 hours 50 minutes, with a range from 3 hours 30 minutes to 4 hours. Since the mother-infant behavioral measures utilized 15 minute blocks, this discrepancy was not considered serious.

Because of the speed of behavior and the possibility of not maintaining adequate finger pressure on the Esterline-Angus Recorder, frequencies were expressed in clusters of the same behavior. A cluster was defined as the same behavior (category) emitted with five or less seconds between same behaviors. A difference of six or more seconds constituted a new cluster, hence another frequency. However, duration was scored from amount of time shown on the Esterline-Angus charts regardless of start and stop pattern. As an example, assume the mother is charted for verbalizing negative remarks to the infant for 10 seconds, she pauses for three seconds, then continues the negative verbalizations for 15 seconds. Later in the 15 minute block, this mother is charted for 12 seconds of negative verbalizations, she pauses for four seconds, then finishes the remark with 8 more seconds of verbalizations. For this block, the mother would be given a frequency of 2 for negative verbalizations, with a duration of 45 seconds. The use of clusters for frequencies instead of exact behaviors based upon charted start and stop patterns reduced the elegance of the scoring system but pilot use of the Esterline-Angus Event Recorder suggested the instrument was so sensitive that language patterns were charted as being broken and discontinuous when the intentions of the speaker was a phrase with minor pauses. Non-language examples include the mother who is rattling a toy for the infant's amusement but pauses slightly between wrist movements. Had this project intended to focus only on one or two specific behaviors, such precision may have been necessary. But in attempting to code all important

behaviors of the dyad, this precision created an information overload on the observer which resulted in overlooking other important behaviors while the observer was concentrating upon one specific behavior. It is important to recognize that the observers attempted to be very precise when coding behavior with the keyboard, but the use of clusters was a compromise decision based upon a realistic expectation that slight nuances of behavior provided difficulties in interpretation. For example, on the above instance of the mother rattling a toy, was her pause a slowing down of rattling movement or a stop and start of new rattling movement? In summary, clusters as frequencies were a compromise decision that sacrificed accuracy for greater reliability and a more total view of interaction. Pilot testing had indicated that inter-observer reliability was more satisfactory with clusters as frequencies than specific behaviors as frequencies. Because the major problem with frequencies were short and sporadic pauses in the stream of a particular behavior, duration did not present difficulties during the pilot phase of this study. Time wise, these pauses did not create enough discrepancy to require revision of the scoring method.

Prior to the initiation of the study, an interaction period with a mother and infant was video taped to provide reliability data and observer training. The mother and child were not among the subjects used in the study. Only one event recorder was available at the institution providing support for this project therefore reliability data based upon observations in one of the subject's home was not possible. The first observer (the one who went into the subject's homes and made the actual recordings) scored the film sequence twice for intra-observer reliability. Then the first observer and a second observer scored the film sequence for inter-observer

reliability. The filmed interaction was 30 minutes in length. Table 2 shows the reliability, expressed in percentage of agreement, for the observation codes. The inter-observer reliabilities were considerably lower for several codes than what is usually acceptable for research projects. The difficulty was not disagreements between the observers on what behaviors were exhibited, nor were there disagreements on what code a particular behavior should be scored. Rather one observer had five hours of practice, the other had one hour, and the latter observer was not sufficiently skilled at coordinating hand movements on the Esterline-Angus key board with the visual observations. To manage 20 codes, the competent observer has to function much like a good typist; that is, visual attention is directed to the source of information, not toward the key board. Hand movements must become automatic with little conscious awareness of key placement. There were three options at this point: combine codes to reduce the number, ask the second observer to spend a minimum of five hours in actual practice before coding the film, place more importance on the intra-observer reliabilities because this observer would make the actual home observations. Reducing the codes was a questionable option because several of the present codes were, in some respects, already too broad in meaning; thus to reduce the codes would reduce the effectiveness and the richness of the behavioral observations. Demanding five hours of practice from an unpaid volunteer was not feasible either. The third option, that of placing the greater emphasis on the intra-observer reliabilities was chosen, and the study continued as originally designed.

Both observers agreed that the film was very difficult to score and were more comfortable scoring a live maternal-infant dyad. The principal difficulty with the video tape was the narrow focus on the participants

TABLE 2

Reliabilities for the Observation Codes. [1]

Inter-Observer Reliabilities

Infant Codes				Maternal Codes			
Frequency		Duration		Frequency		Duration	
LM-	46	LM-	21	PP-	100*	PP-	Not Scored
Sm-	43	Sm-	100	CI-	50	CI-	Not Scored
Cry-	100*	Cry-	100*	GS-	84	GS-	13
VD-	100	VD-	50	GPS-	40	GPS-	14
VP-	97	VP-	68	VPS-	100*	VPS-	100*
GS-	54	GS-	13	Holds-	71	Holds-	80
FM-	15	FM-	12	VD-	67	VD-	66
TM-	57	TM-	40	VP-	100	VP-	71
MO-	100	MO-	100	Sm-	72	Sm-	97
VE-	100	VE-	100	LB-	69	LB-	32

Intra-Observer Reliabilities

Infant Codes				Maternal Codes			
Frequency		Duration		Frequency		Duration	
LM-	100	LM-	68	PP-	100*	PP-	Not Scored
Sm-	88	Sm	80	CI-	100	CI-	Not Scored
Cry-	100*	Cry-	100*	GS-	87	GS-	94
VD-	100	VD-	80	GPS-	50	GPS-	64
VP-	100	VP-	93	VPS-	100*	VPS-	100*
GS-	64	GS-	73	Holds-	86	Holds-	96
FM-	100	FM-	91	VD-	91	VD-	87
TM-	93	TM-	80	VP-	95	VP-	92
MO-	100	MO-	100	Sm-	89	Sm-	80
VE-	100	VE-	100	LB-	98	LB-	96

1. Reliabilities are expressed in percentage of agreement.

* Observers agreed that no behavior of this code was exhibited by mother or infant.

demanded by the camera. If the infant wandered a short distance from the mother, the camera had to travel back and forth between mother and child to record the interaction. This left the observers scoring the film in the nebulous position of having to interpret whether a certain behavior was directed toward the other member of the dyad without actually seeing the object of the behavior. The mother was easier to score than the infant because she made an effort to talk distinctly and confined her movement to the camera field. The infant moved extensively.

Attachment measure. This measure was adapted from Ainsworth, Bell, and Stayton (1971). The mother was asked to leave the room for five minutes and then return. Upon her return she was asked to pick up the infant and then release the infant to give the child an opportunity to leave her side to explore some interesting objects. The infant's behavior was coded from a written report based on the form in Appendix A. Ainsworth et. al. (1971) found three general categories of attachment behavior--proximity-seeking, proximity-avoiding, and ambivalence--plus various sub-groupings. This classification system was developed from observations on a series of separation and reunion episodes with the mother, and with a stranger present in some of the episodes. These episodes were designed to elicit behavior under stressful conditions. The procedure used in the present study was considerably less complex, and designed to elucidate differences on the security dimension of attachment behavior rather than the more complex typology observed in the Ainsworth et. al. study. Therefore stranger effects were eliminated in the present procedure, and the only stress induced in the testing methodology was the separation of the mother from the infant for a short period of time.

The attachment reports were coded into two categories. Secure attachment was defined as the infant expressing distress when the mother left the room, pleasure and greeting behavior when the mother returned, acceptance and desirous of pick-up, acceptance of put-down, and willingness to leave the mother to explore a new toy. Insecure attachment was defined as the infant expressing distress or no distress when mother left, ambivalence or distress when the mother returned, ambivalence or anger when picked up, resistance to being put down, and refusal to leave the mother's physical presence to explore a new toy. Two raters, who were unaware of the hypotheses, scored the attachment reports by placing the infant's behavior into either the secure or insecure classification. The categories were relatively discrete and the raters reached 100% agreement. Discrepancies between the two observers proved to be minor and of no consequence for the ratings given the infants.

Means-ends and causality measures. The Development of Means for Achieving Desired Environmental Events and Development of Causality series were developed by Uzgiris and Hunt (Note 1) to measure sensori-motor schema achievement based on Piaget's (1951, 1952, & 1954) theory of intellectual development. The total Uzgiris and Hunt instrument consists of six different series, but only the means-ends and causality series were used in the present study. The provisional instrument has now been superceded by a more discriminative and fully revised instrument (Uzgiris & Hunt, 1975) which was not available during the date collection phase of this study. The differences between the provisional and revised instruments are not extensive but caution should be exercised when interpreting results from the provisional measure. The Development of Means for Achieving Desired Environ-

mental Events consists of 12 ordinal reactions beginning with the appearance of hand-watching behavior and ending with the infant demonstrating foresight by not attempting to stack a solid ring over a rod. The Development of Causality series consists of nine ordinal reactions starting with the infant attempting to prolong interesting environmental events and concluding with the infant actively searching for independent causes of spectacles. The infant's score for each of the two series was the number of the highest reaction demonstrated. If the child failed three consecutive steps, testing was discontinued. If the infant failed a lower item but passed a higher one, the score was the total number of items passed. Theoretically an infant should not pass more advanced items and fail less advanced reactions. However, lapses in attention and choice of materials could result in such a situation. This occurred only three times, twice on the Causality Scale at 12 months and once on the Means Scale at 9 months. Choice of testing materials followed the suggestions in the 1966 provisional manual. The two observers reached 100% agreement on the Means Scale and 94% agreement on the Causality series. The lowered percentage on the object causality scale reflected observer differences in interpretation of behavior rather than differences in behavior being observed. By mutual agreement prior to the 12 month testing, and providing reliability was acceptable, the second observer's rating were the actual numbers submitted to the computer for analysis. As the first observer had spent some four hours with the infants completing the behavioral observations, it was felt the second observer would be less susceptible to experimenter bias.

Infant communication skills. To measure the infant's language skills at the first and last sessions, the child was administered the vocalization

and comprehension items from the Bayley Scales of Infant Development (1969). The infant's score was the total number of items passed. With the exception of one gestural communication item, the Bayley Scale is limited to verbal items, therefore to measure the infant's gestural and sign communication ability in conjunction with the appropriateness of verbal communication, the infant was given several stiuational tests. These tests were: 1) The mother held an attractive object in her hand (food, candy, etc.) and pretended to ignore the child such as reading a book or talking to the observer. The child's methods of gaining his mother's attention and expressing his/her desire for the object was reported. 2) The mother held two objects in her hand, an attractive toy or food item and a toy the child was bored with or disliked. When the child expressed a desire for the attractive object, the mother gave the bland one. The infant's reactions were reported as she/he attempted to communicate with the mother a desire for the more attractive object. These written reports were later rated for: 1) The number of strategies or behaviors the infant had at its disposal for communication. 2) Maturity of strategies, defined as the degree the strategies involved verbal and gestural communication less distress vocalizations. These situational measures were taken at the 12 month session only. Both observers completed written reports, which were scored by two independent raters unaware of the hypotheses of the study. Each infant was assigned a score from one to three, representing the degree of maturity and flexability of communication.

The two observers reached 100% agreement on the Bayley language items, and the two independent raters were able to agree 92% of the time on the communication ratings. To give an example of the communication ratings, a

score of one was assigned to those infants who emitted slight distress calls and made vague pointing movements. A three rating usually included positive vocalizations, specific pointing movements, gestural signals such as hitting the table or hands over the head which signaled to the mother the infant was in need, etc. A two rating was a compromise and involved specific gestures and distress calls but no complex gestures beyond trying to reach for the object and no positive vocalizations.

Responsiveness and sensitivity of mothers. Responsiveness was defined as the frequency and latency of maternal responses to the infant's behavioral output. Frequency ratios and latency means were generated for all infant behaviors except looking at mother, visual exploration, and manipulation of objects. The latter two infant behaviors were not social behaviors and looking at mother was recorded, irrespective of diadic gazing; thus, infants were often coded looking at their mothers without the mothers being aware, and no social interaction was taking place. Pilot testing had indicated a stationary observer could not reliably code diadic gazing, therefore the more inclusive category of looking at mother was substituted.

In selecting what maternal behaviors were to be classified as reinforcers, numerous theoretical problems had to be resolved. Maternal behaviors such as verbal responses and touching have been used in recent research as operant reinforcers but there is no research indicating whether select maternal behaviors differ in potency or the effects of combined reinforcers as opposed to a single reinforcer. For example, there is little definitive research that indicates maternal smiling is a more effective reinforcer than touching, and there is no research that reports maternal smiling and touching are more or less effective than smiling or touching alone. The

Esterline-Angus charts often showed a varied combination of maternal responses following an infant behavior. For example, the infant touches the mother, who first smiles, then while smiling picks up the child, and while holding the infant begins to verbalize. This mother has reinforced one infant behavior with four different maternal behaviors with different latencies.

The concept of punishment or negative consequences is not well defined in the operant maternal-child interaction literature, with some learning theorists viewing punishment as an inhibiter of responses, while other writers view punishment as creating emotional dysfunctions which cause dysfunctional avoidance responses. Although the concept of maternal punishment is widely used and researched in the child development literature, there is little definitive laboratory research defining the parameters of negative parent behavior from an operant position, and the behaviors that function as negative consequences are not clearly defined. Furthermore there is no research indicating the effects of a positive maternal response and negative maternal response occurring in unison or in varied sequence to an infant behavior.

This writer made a decision to simplify the scoring as much as possible, and apriori select what maternal behaviors were to be categorized as positive consequences and negative consequences. Giving stimulation, gentle physical stimulation, vigorous physical stimulation, holding, verbal positive, and smiling were considered positive consequences. Physical punishment, changes items, and verbal discouragement were assigned to the negative consequence category. Maternal looking at baby was not scored as a consequence because this code was not limited to diadic gazing, and the

infant was not always aware of his mother's visual attention. In the absence of valid research guidelines, negative consequences were excluded from the scoring system. If the mother's first response to the infant's behavior was a negative behavior, the mother was given a "no response" score for that select infant behavior. The rules that were followed in scoring maternal responsiveness from the Esterline-Angus charts are presented in Appendix B. Latency means were scored as time from the beginning of the infant cluster to time for the initial maternal intervention. Maternal looking and the negative maternal consequences were not included in the latency means. The procedures for deriving latency means can also be found in Appendix B. Frequency ratios and latency means were based on ratios between the child's output and maternal reactions to this output. Although few learning theorists would argue with the classification of maternal behaviors into two distinct consequence categories, nor with this writer's selection of behaviors for each category, the final scoring system could not consider the discriminative stimulus value of the maternal behavior activating the infant's behavior and would not fulfill the criteria for a functional operant investigation of maternal-child interaction, as proposed by Gewirtz. The learning theory most similiar to this project is that of the Behavior Modification school where consequences are usually labeled positive or negative and administered to decrease or increase target behavior.

Some difficulties occurred when the infant's output was depressed. For example, in a block where the child cried four times and the mother responded two times, this mother received a ratio of 50%. The same ratio would be given to the mother who responded 20 times to a child's 40 cries.

The averaging of the block means to yield a monthly mean rather than a ratio derived from a single block should have equalized situations where the infant's behavioral output was very unstable across the observation period. A second problem was that certain infant behaviors were not exhibited during every monthly observation period. For example, a certain infant might exhibit crying behavior only in the 9- and 12-month observations. Only verbal positive and following mother behavior were uniformally exhibited by all infants across the four months. Furthermore, if an infant's behavior was depressed and the mother did not respond, her frequency ratio would be 0%; therefore, no latency score would be available since the mother had to respond in order to be given a latency time. Only latency to respond to infant verbal positive was scored for all mothers across the four months. A decision was made to average the four months into one set of responsiveness ratios and latency means. In the above exmaple of the infant who exhibited crying behavior only at 9 and 12 months, the mother's responsiveness ratios for the two applicable months were averaged to derive the maternal crying responsiveness ratio. This procedure was an unsatisfactory compromise because maternal changes across the months could not be analyzed. But the decision was necessary to prevent reducing the sample size to six or seven mothers for select responsiveness and latency measures for select months.

Maternal sensitivity to infant's needs was defined as the quality of the mother's response to her child's crying and negative verbalizations. Sensitivity represented the time required by the mother to quiet her child, not the mother's initial speed in responding to the infant's distress. Sensitivity was obtained from the Esterline-Angus charts by recording the

time duration from the initial maternal response to the end of the infant crying or verbal distress episode. Because infant behaviors were clustered, a time duration of 60 seconds was used to separate episodes. If the infant was not exhibiting negative vocalizations for 60 seconds or more and became upset again, the mother gained another sensitivity time measure. Sensitivity time per episode was averaged for each block. The blocks were averaged to yield a monthly sensitivity mean and then the monthly means were averaged to derive a global sensitivity time measure. If the initial maternal response to infant distress and crying was a negative maternal behavior--either verbal discouragement, physical punishment, or changing items--then sensitivity time was not measured until the mother emitted a positive behavior. It was presumed that if the mother emitted a negative consequence, her intentions were not to soothe the child, and sensitivity was intended to be a measure of maternal skill not maternal motivation.

Maternal trait measures. Maternal intelligence was measured from the Shipley Institute of Living Scale (Shipley, 1939), a short paper and pencil test which measures vocabulary and abstract cognitive ability. Originally designed to assess brain damage, the instrument was found to correlate highly with the Wechsler-Bellevue Intelligence Scale (Wechsler, 1944) and more recently with the Wechsler Adult Intelligence Scale (Wechsler, 1955). Paulson and Lin (1970) have reviewed the research demonstrating the correlation between the Wechsler tests and the Shipley Scale. These correlations range from the .70's to the .90's depending upon the particular study. The Bartz and Loy (1970) norms were used to derive the WAIS equivalent intelligence quotients.

Maternal sensitivity to infant's needs was defined as the quality of

the mother's responses to her child. Sensitivity involves an awareness of the needs and wants of the infant, and the willingness of the mother to modify her behavior to meet these needs. The mothers were asked to answer a structured questionnaire consisting of 30 hypothetical situations with three alternative responses representing gradients of sensitivity. Mothers were asked to select one of three responses they would most likely initiate for the situations presented. The sensitivity score was derived from the sum of the numerical scores per situation divided by 30. To provide a theoretical basis from which to construct the hypothetical situations, the author constructed a model of maternal sensitivity with five dimensions of maternal behavior and corresponding anchor points. Appendix C gives the dimensions and anchor points which served as the theoretical guide for writing the questions, and Appendix D illustrates the actual questionnaire that was administered to the mothers. No reliability or validity data are presently available on this measure.

The Mother-Child Relationship Evaluation (i. e. Roth Scale) was designed by Roth (1961) to measure maternal attitudes toward children. The scale consists of 48 items which are grouped into four dimensions with 12 questions per dimension. These dimensions are acceptance, overprotection, overindulgence, and rejection. Roth defines acceptance as an adequate mother-child relationship with the mother expressing much interest in the child's pleasures, activities, and development. The child is perceived as being a good child. Overprotection measures excessive maternal control, prevention of development of independent behavior, and prolonged infantile care. Overindulgence is lack of parental control, expressed in oversolicitousness and excessive contact. The mother is oriented toward excessive gratification of the child's needs. Roth defines rejection as denial of love

and dislike for the child. This rejection is expressed in neglect, harshness, and severe punishments. Roth reports adequate reliability data, however at the present there is very little validity data on the scale, which may explain why the measure has not been very popular among researchers investigating maternal-child interaction. The Roth measure was included in this study to gather data on the correlation between maternal attitudes and actual maternal behavior.

Chapter III

Results

The results are presented in five sections. The first section includes the descriptive statistics relating to the demographic variables, stability of behaviors across months, efects of sex and birth order, and attachment classification. The second section contains the correlational and factorial analysis of infant behavior codes and other related measures. The correlational and factorial analysis of maternal behavior codes and trait measures are presented in the third section. The fourth section contains the correlational analysis of the maternal-infant interaction. The fifth section reviews specific hypotheses, in particular the issue of selective responding. In a study of this scope, innumerable correlations are generated and to comment on all significant correlations is of questionable value. Therefore, only correlations relative to the major concerns of this study are discussed. Because of space limitations, the correlation tables are labeled by abbreviations rather than the full name of the particular variable, which can be found in Table 2.

Descriptive Statistics.

Stability and changes in maternal and infant behavior. The mean frequencies and mean number of seconds duration per averaged 15 minute block for the 18 coded maternal behaviors appear in Table 3. Percentage of time that mothers were with their children is also included. The data show that maternal behavior was stable across the four months. With the exception of duration of maternal stimulation and duration of vigorous physical stimulation in the tenth month, and duration of looking in the ninth month, mothers were generally consistent in their behavior across time, but mothers

TABLE 3

Mean Coded Maternal Behaviors. [1,2]

Coded Behaviors	Month 9	10	11	12
Frequency-physical punishment	0.0	0.1	0.1	0.0
Frequency-changes items	0.1	0.4	0.6	0.3
Frequency-gives stimulation	4.8	5.4	4.6	4.4
Duration-gives stimulation	23.0	36.7	16.0	20.6
Frequency-gentle physical stimulation	2.2	3.0	2.7	2.3
Duration-gentle physical stimulation	7.0	12.4	9.3	6.4
Frequency-vigorous physical stimulation	1.0	1.6	1.0	0.9
Duration-vigorous physical stimulation	5.5	14.9	4.9	3.6
Frequency-holds	2.3	2.3	2.4	2.3
Duration-holds	67.4	82.8	57.3	53.7
Frequency-verbal discouragement	1.0	1.7	1.4	1.6
Duration-verbal discouragement	2.1	4.0	3.3	3.9
Frequency-verbal positive	11.2	13.7	13.3	12.5
Duration-verbal positive	41.2	58.3	57.7	55.8
Frequency-smiles	1.9	4.6	3.6	3.6
Duration-smiles	3.9	11.1	6.9	8.6
Frequency-looks at baby	16.1	17.0	20.6	18.3
Duration-looks at baby	223.9	294.5	286.7	301.6
Time with child	90%	92%	92%	92%

1. Duration is expressed in seconds per 15 minute block of observation time.

2. Frequency is expressed in number of behavior clusters per 15 minute block of observation time.

tended to be more active after the ninth month observations. This increase in activity may be due, in part, to the mothers and infants adjusting to the presence of the observer. Overall, the mothers engaged in few negative behaviors. With the exception of physical punishment, it did not appear that the mothers were overly defensive which could have decreased the reliability of the data. Frequency of physical punishment is a behavior that presence of an observer would be expected to depress. It appeared from discussions with the mothers that they were restraining use of such punishments as slaps to the hands, however no mother implied that physical punishment was used with any regularity. In summary, mothers spent most of their time looking at their child, followed by holding and picking up their infant, talking positive, and giving stimulation. The most frequent maternal behaviors were looking and verbalizing positive to the infant.

Mean maternal responsiveness and latencies for the specific infant behaviors can be found in Table 4. The mean responsiveness ratio and mean latency measures were derived as follows. Each mother was given a mean responsiveness and latency score averaged from the means for each of the seven infant behaviors. These measures for each of the mothers was then summed and divided by the number of mothers in the sample (15) to yield a grand or sample mean. Mothers were responding to slightly more than 50% of the behavior clusters emitted by their children, however a breakdown into specific infant behaviors shows that maternal responsiveness ranged from responding 79% of the time to crying, while following behavior was responded to 37% of the time. This range is also evident for the latency measures. The infant behaviors in Table 4 are presented in

TABLE 4

Mean Maternal Responsiveness and Latency to Infant Behaviors. [1,2]

Variable	Mean	Standard Deviation
Responsiveness-crying	79	5.4
Responsiveness-touching mother	69	3.3
Responsiveness-gestural signals	63	7.3
Responsiveness-smiling	56	5.5
Responsiveness-verbal distress	56	4.0
Responsiveness-verbal positive	37	3.7
Responsiveness-follows mother	35	4.0
Mean responsiveness	57	2.7
Latency-smiling	4.7	0.9
Latency-gestural signals	6.4	1.7
Latency-crying	6.5	0.7
Latency-verbal distress	7.7	0.6
Latency-touches mother	8.4	0.5
Latency-verbal positive	10.7	0.5
Latency-follows mother	11.5	1.2
Mean Latency	8.2	0.3
Sensitivity mean	57.1	8.5

1. Responsiveness is expressed in percent.

2. Latency and sensitivity are expressed in seconds.

descending order of maternal reinforcement efficiency, in other words, reinforcement theory usually presumes the higher ratio of reinforcement is more effective than a lower ratio and a shorter latency is more effective than a longer latency. The relationship between responsiveness and latency ranks were similiar except for smiling and touching mother. The discrepancy for smiling may be due to the short duration of this behavior and its frequent occurrence with other behaviors. Unless a mother quickly reinforced this behavior, her response would be reinforcing another and possibly different behavior, resulting in a very short latency but lowered response ratio. The relationship for touching mother suggests infants were persistent in receiving a response from their mother, but mothers did not feel compelled to respond quickly. The data in Table 4 show a large difference between infant negative verbalization and positive verbalization means. Mothers seemed to interpret negative verbalizations as signals for action, whereas positive verbalizations were often ignored.

The sensitivity mean in Table 4 was derived as follows. Each mother's monthly sensitivity means were averaged to yield a mean representing her sensitivity for the four months. This mean was summed across the 15 mothers and then divided by the sample size to derive a grand mean representing sample effectivensss at quieting infants. The resulting sample mean suggests that mothers were relatively successful in soothing their infants, with the average time being less than 60 seconds. However, this figure can be misleading since the infants were not observed during obvious illness or stress. If a particular child was reported by the mother to be extremely fussy or irritable, the appointment was rescheduled for another time.

The mean frequencies and duration of infant behaviors for the four months are presented in Table 5. Although these behaviors seemed to be quite stable across the four monthly periods, crying behavior and verbal distress tended to decrease, while looking, verbal positive, gestural signals, and following mother increased. These trends suggest that negative vocalizations are gradually being replaced by more positive communication signals. The increase in following behavior can be attributed to growth in infant physical capabilities. Averaging the infant frequencies across the four months revealed no particular relationship with the maternal responsiveness and latency ranks. There is no evidence that mothers are more likely to respond to high or low frequencies of infant behavior, nor is there evidence of a relationship between level of maternal responding and infant behavioral output. However, these statistics are group means only and do not provide convincing evidence against reinforcement theory. These tables may indicate that the variable of importance in the relationship between maternal responding and levels of infant behaviors is the nature of the particular behavior and its meaning to the dyad. Mothers respond to infant behavior for qualitative reasons not any specific quantitative factors.

Birth order and sex of infant. Although these variables were not included in the design of the study, they have a potential confounding effect. Therefore, the effect of these two factors was examined by means of *t*-tests on the 198 variables (10 *t*-tests would be significant by chance at the .05 level). Those variables for which significant differences were found for birth order are shown in Table 6. In all cases the first borns scored higher than later borns. Considering that *t*-tests were performed

TABLE 5

Mean Frequency and Duration of Infant Behaviors and Assessment Measures.[1,2]

Variable	Month 9	10	11	12
Frequency-looks	16.3	18.1	20.6	19.8
Duration-looks	110.2	120.7	130.4	138.9
Frequency-smiles	0.8	2.9	2.4	2.3
Duration-smiles	3.7	9.9	8.1	5.7
Frequency-cries	0.6	0.6	0.3	0.3
Duration-cries	4.8	6.2	6.3	3.6
Frequency-verbal distress	6.2	6.0	4.2	4.1
Duration-verbal distress	34.2	37.7	29.7	23.9
Frequency-verbal positive	14.2	16.9	17.7	18.4
Duration-verbal positive	47.9	69.6	74.2	76.5
Frequency-gestural signals	0.2	1.0	1.2	1.4
Duration-gestural signals	0.6	2.6	3.0	3.3
Frequency-follows mother	3.3	3.4	4.8	6.4
Duration-follows mother	25.3	15.6	25.0	25.6
Frequency-touches mother	3.4	3.6	4.2	4.3
Duration-touches mother	55.3	54.3	68.8	61.5
Frequency-visual exploration	12.3	11.6	13.2	12.6
Duration-visual exploration	330.0	319.9	299.2	333.4
Frequency-manipulates objects	19.1	18.2	20.9	17.9
Duration-manipulates objects	285.2	287.8	242.8	240.3
Bayley language scale	6.6			10.1
Development of means	8.3			12.6
Development of causality	4.4			6.9
Communication				1.8

1. Frequency is expressed in numbers of clusters per 15 minute block of observation time.

2. Duration is expressed in seconds per 15 minute block of observation time.

TABLE 6

Infant and Maternal Variables for which Significant Birth Order Effects were Found.

Variable	Firstborns $\underline{M}^a$	Laterborns $\underline{M}^b$	t Value[1]
Infant			
Frequency-looks at mother-9	18.1	14.7	3.66**
Duration-looks at mother-9	130.2	92.6	2.37*
Frequency-looks at mother-11	23.3	18.2	2.43*
Frequency-verbal positive	21.9	14.0	2.48*
Frequency-touches mother-11	6.3	2.4	2.78*
Duration-touches mother-11	111.5	31.5	2.29*
Frequency-verbal positive-12	23.6	13.9	2.72*
Frequency-touches mother-12	6.5	2.4	3.47**
Duration-touches mother-12	109.3	19.7	4.91***
Communication rating-12	1.9	1.6	2.59*
Mother			
Percent time with child-9	97.3%	83.4%	2.19*

1. Critical value t (13) = 2.16 for two tailed test, pooled variance estimate.

[a] $\underline{n} = 7$

[b] $\underline{n} = 8$

* $\underline{p} > .05$

** $\underline{p} > .01$

*** $\underline{p} > .001$

on such a large number of variables, the small number found significant suggests that birth order was not a major confounding variable. First born infants were more likely to look at, touch, and emit positive verbalizations to the mother. With the exception of physical contact at 11 and 12 months, and looking at mother at 9 months, birth order effects were related to the frequency of behavior not the duration of the behavior. This finding suggests that infants with siblings emit these behaviors less often, but not for a shorter amount of time. However, the behaviors for which birth order effects were found were the same behaviors that were shown to be less stable across the four month period. While first borns were communicating in a more mature manner than the later borns, the sheer amount of infant verbalizations and quality of vocalizations, as measured by the Bayley items, reflected no birth order effects. Only one maternal behavior, that of percent time spent with child, showed a significant difference for birth order. This finding may reflect the initial uneasiness of primiparious mothers, whereas multiparious mothers were of necessity forced to spend some time with the infant's siblings. As the design of this study prevented observation without some sibling presence during the coding of behavior, the findings on birth order are most readily explained by the ecological situation of a mother having to nurture more than one child and the infant's adaptation to this sharing of maternal attention.

Separate *t*-tests for sex effects were also performed on the 198 variables (10 *t*-tests would be significant by chance at the .05 level). The variables for which significant effects were found appear in Table 7. Sex of infant does not appear to be an influential variable, as the num-

TABLE 7

Infant and Maternal Variables for which Significant Sex Effects were Found.

Variable	Males M[a]	Females M[b]	t Value[1]
Infant			
Duration-manipulates objects-9	216.1	331.3	2.58*
Duration-verbal distress-11	55.8	12.6	2.48*
Frequency-verbal positive-12	12.5	22.4	2.72*
Mother			
Maternal IQ	120.0	112.4	2.31*
Frequency-holds-11	33.5	17.2	3.08**
Responsiveness-infant touching	79.3%	62.2%	3.26*

1. Critical value t (13) = 2.16 for two tailed test, pooled variance estimate.

[a] $n = 6$

[b] $n = 9$

* $p > .05$

** $p > .01$

*** $p > .001$

ber of significant differences did not reach the chance level.

An interesting finding for both birth order and sex effects, especially stronger for birth order, is the discrepancy between the number of significant differences for infants as compared to mothers. This finding suggests a continuity in maternal behavior regardless of family size or sex of infant. Also of interest is that the birth order effects for infant behavior were most significant for the last two months of observations, which may indicate a trend is developing for first borns to be more favored, especially for emission of vocalizations. A test of this hypothesis would require more lengthy observations that this study attempted. The present findings do indicate that frequency of vocalizations may be more related to maturity of communication than the duration of vocalizations.

Attachment. The infants were divided into secure and insecure attached groups based on their behavior to a brief separation and reunion episode with their mother. This classification was used as the independent variable for t-tests on the 198 variables (10 t-tests, on the basis of chance, would reach the .05 level of significance). The insecurely attached infants or their mothers had the highest mean for all variables found significant (see Table 8). However, the number of variables found significant did not reach the chance level, which suggests that either the attachment measure used in this study was lacking in sensitivity or attachment is a more global behavioral style and not easily related to specific clusters of quantitative behavior. A third possible hypothesis is that the attachment concept is not a valid infant typology and only reflects infant behavior in a highly select stimulus condition,

TABLE 8

Analysis of Attachment Behavior

Variable	Insecure Infants M[a]	Secure Infants M[b]	t Value[1]
Infant			
Frequency-looks at mother-9	18.2	14.2	3.16**
Frequency-visual exploration-11	15.5	11.7	2.81*
Duration-touches mother-12	103.7	33.7	2.80*
Mother			
Frequency-gentle physical stimulation-9	30.0	16.7	3.10*
Duration-gentle physical stimulation-9	95.0	53.4	2.86**

1. Critical value + (13) = 2.16 for two tailed test, pooled variance estimate.

[a] $n = 6$

[b] $n = 9$

* $p > .05$

** $p > .01$

*** $p > .001$

the condition of maternal separation and reunion. As noted in the literature review, Ainsworth and her associates would argue that security of attachment is a valid typology of infant behavior and is reflected in the infant's cognitive and social adjustment. However the ethological group would argue that this typology is not easily related to quantitative behavior unless the dyadic interaction is subjected to high stress levels. Security is an inferred concept that implies stress coping skills, and only under stress conditions would the lack or presence of such skills be highly evident. The maternal-infant dyads observed in this study were not under high tension levels except for the induced tension of the attachment test situation. The negative findings of few significant *t*-tests also supports the reinforcement viewpoint that behavior during the attachment testing would not necessarily carry over into dyadic interaction of differing stimulus conditions. In summary, the results of the attachment classification analysis are ambiguous with respect to which hypothesis best explains the finding that few dependent variables are significant.

Analysis of Infant Behavior.

Correlational analyses of behavior within months. Separate analysis were performed on the infant behavior for each month of observation. The significant intercorrelations for all four months appear in Tables 9 through 12. In examining these tables, several conclusions seem warranted. The lack of stability in correlational patterns from month to month is quite evident. Stability, for this study, was defined as two or more different infant behaviors correlated at a minimum significance level for at least three of the four months studied. Excluded from this definition was the obvious significant correlations between frequency and duration of the same

TABLE 9

Intercorrelations of Infant Behavior at 9 Months [1]

Infant Behavior	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-IM		70																-51		
D-IM					53	70	59						54		77	62	-61	-72		
F-Sm				53									-54							
D-Sm																				
F-Cry						88	76	50					65					-62		
D-Cry							70	47	-47	-47			71		55			-65		
F-VD								91	-53				60	44	49			-64		
D-VD									-44		49		55	56	52					
F-VP										77								56		
D-VP																				
F-GS												73							-52	
D-GS													45							
F-FM														69	49					
D-FM																				-46
F-TM																81				-52
D-TM																	-57			-48
F-VE																		64		
D-VE																				-53
F-MO																				
D-MO																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On basis of chance, eight r's of the 190 computed would be expected to reach the .05 level of significance.

TABLE 10

Intercorrelations of Infant Behavior at 10 Months [1]

Infant Behavior	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-IM		65																	55	
D-IM																		-51		
F-Sm				97	-45													-57		
D-Sm																		-52		
F-Cry						86	67	57												
D-Cry							85	80						-45	57					-46
F-VD								89				53	-47	-57	61	53				
D-VD											44	45			79	69				
F-VP										89										
D-VP																				
F-GS												86					-45	-54		
D-GS																	-52			
F-FM																73				
D-FM																			58	52
F-TM															94			-50		
D-TM																		-45		
F-VE																		50		
D-VE																				-68
F-MO																				68
D-MO																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, eight r's of the 190 computed would be expected to reach the .05 level of significance.

TABLE 11

Intercorrelations of Infant Behavior at 11 Months. [1]

Infant Behavior	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-LM		85													49	52		-50		
D-LM															58	53	-61			
F-Sm				85			-57										60			
D-Sm																				
F-Cry						94														
D-Cry																52				
F-VD								90	-45		-51	-45	50	58			-50	-60		
D-VD									-52		-47		59	66			-45	-56		
F-VP										84				-47	48		46		-48	
D-VP																			-67	
F-GS												93			48					
D-GS																				
F-FM														95				-75		
D-FM																	-56	-71		
F-TM																83	52			-44
D-TM																				-53
F-VE																				
D-VE																				
F-MO																				49
D-MO																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, eight r's of the 190 computed would be expected to reach the .05 level of significance.

TABLE 12

Intercorrelations of Infant Behavior at 12 Months. [1]

Infant Behavior	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-IM										51										
D-IM												46	49	67						
F-Sm				90			-54	-45												
D-Sm							-62	-54			47	52								
F-Cry						96	62	45												
D-Cry							75	56												
F-VD								90								55				
D-VD																59				
F-VP										92	53									
D-VP											49									
F-GS												88								
D-GS																				
F-FM														73						
D-FM																	47			
F-TM																86				
D-TM																		-51		
F-VE																		50		
D-VE																				-55
F-MO																				60
D-MO																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, eight r's of the 190 computed would be expected to reach the ,05 level of significance.

behavior. A plausible explanation for this lack of stability is that infant behaviors acquire different meanings and relationships during the four month observation period. For example, gestural signals did not appear to be an important variable at 9 months, but at 10 months these signals emerged as part of the distress communication system. At 11 months these signals were negatively related to verbal distress, while at 12 months, gestures emerged as part of the positive communication system. Apparently, gestural signals function initially as distress behaviors which are later suppressed from the distress system and emerge at 12 months of age as signals for positive communication to mother. Touching the mother is another exmaple of this change in behavioral organization. At 9 months both physical and verbal contact with mother were associated with a state of distress, but at 10 months this pattern disappeared and then re-emerged at 11 months in the form of two contact and communication systems with the mother--distress and positive contact. However, these two patterns again disappear at 12 months. In subsequent months this pattern of organization, break down, and re-organization may appear for more discriminative sub-systems of infant behavior. Since correlational analysis provides relationships, not cause and effect statements, the reason why infant behaviors assume different meanings will necessitate speculation. In some cases, developmental trends may explain the process, as with gestural signals. Initially, gestures are crude motor movements associated with the physiological tension of distress. As the infant develops more discret motor control, gestures become independent from states of tension, and become associated with communication to the mother. Behaviors such as touching the mother do not fit the maturation explanation,

although the concept of developmental re-organization of behavioral systems provides a possible alternative. The concept of developmental re-organization assumes that behaviors are originally organized into a minimum number of behavioral systems required by the organism to survive. As the infant develops, more discrete motor control matures, more complex stimuli must be assimilated, and survival becomes as much a label for psychological needs as for physiological needs. This ontological process necessitates the break down of the behavioral systems into more discrete systems. A select behavior, depending upon functional usage, will change system membership, and may be a component of several different systems.

The correlational analyses revealed three systems of infant behavior--distress contact with mother, positive contact with mother, and exploratory behaviors. Furthermore the three systems can be sub-divided into distal and proximate classifications. For example, distal exploratory behavior is visual exploration, while proximate exploratory behavior would be manipulation of objects. Distal distress is verbal distress and following the mother, while proximate distress is touching the mother. Distal positive contact is looking at mother, positive vocalizations, and smiling; whereas proximate contact is touching the mother and following the mother. Within this typology, the correlations suggest that initially the distress system is most intense and inhibits the other two systems. The 9 month correlations indicated behaviors were organized around maintenance of contact with the mother when distressed. The negative correlations between maternal contact behaviors and visual exploration and manipulation of objects supports Ainsworth's (1972) contention that attachment behaviors and exploratory behaviors are competing systems of organized behaviors.

In the tenth month, looking at mother and following mother appear to be separate and independent from the cluster of behaviors indicating proximity of contact when distressed. The 10 month correlations suggest that infant attachment and exploratory behaviors are more evenly balanced during maternal-child interaction. Further, the infant is organizing its actions so that exploratory behaviors can be exercized while still maintaining proximity to mother, as indicated by the positive correlation between manipulation of objects and following mother. At 11 months, two distinct behavioral patterns seem to have emerged: a distress pattern consisting of negative vocalizations, following mother, refraining from gestural signals, and less visual exploration; and a pattern of positive contact characterized by looking at mother, touching mother, positive verbalizations to mother, more frequent but shorter duration of visual exploration, and less manipulation of objects. The 11 month correlations suggest the role of the mother changes from a security base to an object the infant can touch, explore, discover, and engage in verbal interaction. This change in maternal role was just beginning to appear at the 10 month observations. The mother retains her role of security base when the infant is distressed, but complex positive social interaction has become a major goal for the infant. The 12 month correlations indicated few relationships were significant.

Certain behaviors do not readily fit the typology of three major infant behavior systems. For example, touching mother and following mother are related to both the distress system and positive contact system. However, there is no theoretical reason why certain behaviors cannot cross system lines because the end goal for both of these systems is pro-

ximity and interaction with the mother. Distal behaviors are most concisely placed in one system, while the proximate behaviors cross system membership. A possible explanation for this division is that the distal behaviors are more mature expressions of needs than are proximate behaviors, thus proximate behaviors are reminants of a stage of development when the systems were more discrete and functioning with more complete boundaries.

The use of distal or proximate behaviors appears to be determined by the intensity of the system need, however maturation also influences the set of behaviors used by the infant. A less intense positive contact need for the mother may be expressed by positive vocalizations and smiling, whereas a more intense need necessitates that the infant follow and touch the mother. This would suggest that stress results in reliance on less mature and more globally diffuse behaviors. If attachment security or insecurity affects the behavioral systems, then insecure infants may be more easily stressed and thus rely more on the proximate behaviors.

Gewirtz (1972) has argued that crying is not an attachment behavior, but an emotional and disorganized non-functional behavior that prevents infant proximity seeking. The four correlation matrices show that verbal distress is associated with proximity seeking behavior, whereas crying, with the exception of the ninth month, is not related to active contact seeking behavior. Gewirtz's contention that crying is dysfunctional receives support, but verbal distress must be considered a functional behavior.

Correlational analyses of behavior across months. Because little information was gathered from the across month correlational matrices,

these matrices are presented in the appendix. The six matrices are shown in Appendix E. Only five behaviors--frequency of verbal positive, duration of verbal positive, frequency of following mother, frequency of touching mother, and duration of touching mother--were significantly intercorrelated across three or more months. These results suggest that infant behaviors have a low predictability. For example, 9 month crying was associated with 10 month following mother and manipulating objects, 11 month smiling and touching mother, and 12 month touching mother. Crying at 10 months was associated with 11 month smiling and 12 month looking and following mother, the latter correlation of following mother was negative. At 11 months, crying was correlated with 12 month visual exploration and, negatively with manipulating objects. Unless noted, all the above correlations were positive. On the basis of these correlations, the infant who cries much at 9 months will exhibit positive proximity seeking for later months. However, the infant who cries at 10, 11, or 12 months would be expected to demonstrate little future positive attachment behaviors. By constructing similiar chains for all infant behaviors, only touching mother has reasonable predictability, and to a lesser extent following the mother. Further, based on these chains, there is little evidence for predicting from one behavior to a different behavior. Coates, Anderson, and Hartup (1972a) also reported considerable variation in attachment behaviors within monthly observations as well as across months for a sample of infants observed at 10 and 14 months, and a second group observed at 14 and 18 months. They found that touching behavior and proximity to mother (the time spent by the infant in space proximity to mother) were reliable and could be considered stable attachment behaviors. The

results from the present study support the Coates et. al. findings, especially if proximity to mother in the Coates et. al. study is considered similiar to following the mother measure used in the present study. If the model of infant behavior presented in the previous section of within month correlations is correct (i. e. that infant behavior systems are undergoing change and re-organization) then the absence of reliability between months is reasonable. The behaviors that cross system lines, such as touching and following mother, would be the most predictable, since different stimulus conditions elicit different systems, but the same behaviors.

Correlations of infant behavior and assessment data. Table 13 summarizes the four month correlations between infant behavior and the test data. The actual correlations for these measures are found in Appendix F. Crying and verbal distress during months 10 and 11 were negatively correlated with development of means and development of causality at 12 months. This relationship supports Bell's (1970) contention that insecurely attached infants are delayed in the development of certain cognitive skills. Positive verbal responses were more highly related to the communication measure than the Bayely scores, although a significant correlation appeared at 12 months for frequency and duration of infant positive verbal responding and the Bayley score. Gestural signals were related to both the Bayley measure and causality measure at 12 months. The data suggest a closer relationship between gestures and causality then gestures and the development of means. Apparently cognitive awareness of the mother as an independent source of action is more important for directional motor signals than perception of mother as a means to a desired end. Con-

TABLE 13

Summary of Correlations Between Infant Behavior and Infant Assessment Measures.[1]

Infant Behavior	Infant Assessment Measures							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
F-LM		1,4		4				-1
D-LM					-3			
F-Sm	4		4		4			
D-Sm					4			
F-Cry				-2,-3				
D-Cry				-3				
F-VD				-2		-3	-3	
D-VD						-3		4
F-VP		4					3,4	
D-VP	3	4	1,3	1,2			3,4	
F-GS	-2	3,4	-2		-2	3,4	3	
D-GS	-2	3	-2		-2	3	3	
F-FM				4				
D-FM	4		4			1	-3	
F-TM					1		3,4	-2,-4
D-TM	-3		1		-3	3	4	-4
F-VE		-2						-3
D-VE		-2		-4	-4			
F-MO	-3	4	-2,-3					
D-MO		4	-1		-1			

1. Numbers are codes for months, 1 refers to the ninth month, 2 to the tenth month, 3 to the eleventh month, and 4 refers to the twelveth month. No sign indicates positive correlation, a minus sign indicates the correlation was negative.

trary to previous research, this study found no evidence of a strong relationship between means-ends cognitive development and language, regardless of whether the language was verbal or non-verbal, except for the previously noted negative relationship between verbal distress and means-ends at 12 months. It should be noted that the 10 month gestural measure was negatively related to the 9 month Bayley and causality scales. This suggests a 10 month idiosyncrosy for this sample or that gestural signals assume a different meaning in the developmental structure of the infant's behavior.

The attachment measure was not highly correlated with infant behavior, although duration of verbal distress and frequency and duration of touches mother at 12 months were negatively correlated with secure attachment. This relationship is in accord with the literature and suggests that the attachment measure may have been more sensitive to infant behaviors at 12 months than the infant behavior of previous months. This finding supports one of the hypotheses in this study; namely, that insecure infants are more likely to depend upon proximate behaviors, whereas secure infants use distal behaviors.

The communication measure was positively correlated with frequency and duration of touching mother and verbal positive behavior at 11 and 12 months. The finding that touching mother is positively related to mature communication and negatively related to <u>secure</u> attachment suggests that insecure attachment is more related to insecurity regarding the mother object relationship than an underdeveloped ability to communicate with mother. The literature on attachment has stressed the use of verbal distress and crying as measures of the strength of the maternal-child bond.

However distress vocalizations are circumspect since maturity of communication may have been the actual variable. Evidence from Tables 13 and 14 do not support this confounding effect.

Intercorrelations for the assessment measures are presented in Table 14. Few significant correlations emerged, and only development of means was intercorrelated between the initial and final testing sessions. The Bayley score, development of means, and development of causality were intercorrelated at 9 months, but not at 12 months. Apparently these three measures are developmentally related at 9 months, but function independently at 12 months. This may reflect the phenomena of infant behavior becoming more differentiated into specific systems with advancing age. The Bayley score and causality score at 12 months were correlated with the communication score, which supports a closer relationship between communication skills and causality than development of means. This relationship between causality and communication may reflect the findings from Table 13 that gestures are strongly related to causality and the communication measure included verbal and non-verbal signals. The intercorrelations in general suggest that caution should be exercised when attempting to predict infant cognitive development in the last quarter of the first year. The infant who is advanced at 9 months may not necessarily be this advanced over age mates at 12 months.

Factor analysis of infant behavior. The infant behavioral and social data were further analyzed with a factor analysis using a varimax rotation. The resulting analysis produced 14 factors, of which seven met the criterion of variables with a loading of .600 or above and meaningful categories. However, certain variables were included in a particular

TABLE 14

Intercorrelations Between Infant Assessment Data.

Infant Tests	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
Bay-9			90		84			
Bay-12							50	
Means-9				49	83			
Means-12								
Caus-9								
Caus-12							47	
Comm								
Att								

r Values: .05 > .4397
.01 > .5888
.001 > .7124

factor even if the criterion of .600 was not met, provided that the variable was conceptually related to the factor in question. The .600 criterion is rather stringent, but the small sample used in this project necessitated this cut off. The total variance was rather diffuse throughout all seven factors, and only two factors accounted for 10 or more percent of the variance. These factors are tabled in the main text, the remaining five factors are tabled in the appendix (See Appendix G) and are briefly discussed in the main text.

The first factor, presented in Table 15, can be labeled distress contact with mother. This factor accounted for 16% of the total variance. The variables loading on this factor focus on touching and verbal distress behaviors, but touching and verbal distress at 11 months are noticeably absent. The negative coefficient for attachment suggests that this factor reflects an insecure attachment to the mother.

The second factor, which appears in Table 16, is difficult to label because it includes a more diverse group of infant variables. These variables seem to reflect a lack of interaction with the mother, or stated in the positive, an intense and physical contact with mother. This factor accounted for 10% of the total variance. Although the loading for birth order did not meet the coefficient criterion, this variable reinforces the impression that this factor seems to organize around lack of intense proximity with the mother. The attachment coefficient sign suggests this factor encompasses secure relationships with the mother. It has been previously hypothesized that insecure infants rely more on proximate behaviors while secure infants tend to rely on distal behaviors. The first and second factors support this assumption however the second

TABLE 15

Behavioral Components of Distress Contact

Variable	Factor Loading
Frequency-touches mother-10	.955
Duration-touches mother-10	.895
Duration-verbal distress-10	.887
Duration-verbal distress-12	.753
Frequency-verbal distress-10	.709
Duration-cry-9	.620
Frequency-verbal distress-12	.600
Duration-touches mother-12	.560
Duration-touches mother-9	.550
Frequency-gestural signals-11	.523
Attachment	-.522

TABLE 16

Behavioral Components of Lack of Proximate Contact with Mother

Variable	Factor Loading
Duration-looks at mother-9	-.957
Frequency-touches mother-12	-.846
Duration-cry-9	-.853
Frequency-touches mother-9	-.773
Frequency-cry-9	-.702
Frequency-verbal distress-9	-.695
Duration-smiles-11	-.691
Duration-visual exploration-9	-.682
Frequency-smiles-11	-.679
Frequency-touches mother-11	-.668
Frequency-follows mother-9	-.667
Frequency-visual exploration-11	-.655
Duration-touches mother-12	-.652
Frequency-looks at mother-9	-.643
Frequency-follows mother-10	-.613
Birth order	.450
Attachment	.407

factor did not include such distal contact behaviors as verbal positive, gestures, etc. The exception to this is smiling in the eleventh month, however the coefficient sign suggests secure infants smiled less not more than insecure infants. Although distress verbalizations may appear to be distal behaviors, the end goal is closer proximity to mother, whereas positive verbalizations are expressions of communication that may not necessarily entail physical contact.

The low coefficient for attachment on both factors suggests that the attachment typology is overlapping with distress contact and lack of physical proximity, but these two factors are more generalized infant categories. In other words, both secure and insecure infants use distress contact behaviors, but the insecure infants will be behaving in a distressed manner more often than the secure infants.

Non-verbal distal contact with mother seems to describe the third factor, which accounted for 9% of the variance. Behaviors included were smiling at 9, 10, and 11 months, and crying at 12 months. The inclusion of crying behaviors appears discordant, but a possible explanation is that crying is functioning as a distal non-verbal communication mode at 12 months, whereas previously crying was an emotional disorganized response to stress. The fourth factor is somewhat unusual in that it includes behaviors at 11 months only, and explains 8% of the variance. Labeled distress contact at 11 months, this factor included verbal distress, following mother, and negative verbal positive and visual exploration. The fifth factor, and its focus on development of means, indicates that crying at 11 months is associated with less positive performance on the development of means test at 12 months, but manipulation

of objects at 12 months is related to advanced understanding of means. The fifth factor accounted for 5% of the total variance. Communication and positive verbal behaviors describe the sixth factor, which accounted for only 3% of the variance. This factor loaded on verbal positive at 11 and 12 months, gestural signals at 11 and 12 months, and the Communication and Bayley scales. The sixth factor, as well as the fifth, indicates the infant assessment at 12 months was sensitive only to behaviors in the same or preceeding months. Factor six appears to reflect mature communications rather than quantity of positive vocalizations, although at 12 months there is a relationship between quantity and quality. A further comment is needed on the second factor which did not contain positive verbalizations contrary to theoretical expectations. If vocalizations occurred to both mother and objects, and if these vocalizations were emitted for many different need states of the infant, then the variance for vocalizations across the prior factors may have been reduced to the degree that only high loadings could be obtained on a unique factor for positive vocalizations. Distress vocalizations are rarely emitted toward objects, and appear organized around one need state of the infant, the need for proximity to mother. This factor confirms the previous findings from the correlational analyses that gestural signals emerge as part of the positive communication system in the latter two months of the first year.

The seventh factor includes cognitive assessment measures at 9 months and non-verbal behavior at 10 and 12 months. This factor accounted for 2% of the variance. At 12 months, the infant assessment data were not organized into a specific factor, which illustrates the differentiation of the cognitive structure that was present at 9 months. Clarke-

Stewart (1973) also encountered this phenomena of infant testing data clustering together at initial testing sessions, but the clustering was not evident at later testing sessions. Clarke-Stewart chose to label the factor "early test talent."

Summary of factor analysis. Any conclusions to be drawn from the factor analysis are tentative at best. No single factor provided a large proportion of the total variance. The factor analysis reinforces the notion that the same behaviors at different months may group into different categories; that is behaviors assume different meanings within the infant's response repetoire. Three infant behaviors were rather unstable in that they loaded on several different and divergent factors. These behaviors were gestural signals, crying, and smiling. Touching the mother and verbal distress were relatively stable and tended to load on the same factors. The most powerful factor to emerge was a distress contact factor. Lack of physical proximity and non-verbal distal contact were other factors that loaded across the four months. The remaining factors were organized around specific months, specific behaviors, and the the infant cognition measures at 9 months. Positive infant verbal behavior was not an important component except in the mature communication factor, and was absent from the factor that loaded on secure attachment.

Comparing the present factor analysis with the results reported by Clarke-Stewart (1973), three factors in the present study show some agreement. Both studies found an early test talent ability, although a different interpretation of this result was presented. The distress contact factor in the present study was somewhat similiar to Clarke-Stewart's factors of close physical contact and irritability. Since the infants in

the Clarke-Stewart study were older, it may be that distress contact separated into the two groupings with age. The present study contained few competence measures, therefore, one would not expect the two studies to agree on the presence of this factor, although positive attachment (which is similiar to secure attachment used in this study) was a component of Clarke-Stewart's competence factor, which suggests some relationship to the second factor in the present study. If one assumes that infants who touch less and verbalize distress less are more competent in coping with the stresses of their existence, then the relationship between the two study factors becomes stronger. Interestingly, exploratory behaviors did not emerge as a factor in the present study. However quality of manipulation of objects was not measured in this study, which might account for the discrepancy between the two investigations.

The t-test analysis (see Table 8) indicated few differences between secure and insecure infants for frequency and duration of behaviors. Several alternative hypotheses were offered to explain these negative results. In examining the results from the t-tests, correlational analyses, and the factor analysis, one hypothesis appears to explain the combined results. The most appropriate model of infant behavior is one in which the 9 to 12 month old infant's behavior is organized into three major systems: distress contact with mother, positive contact with mother, and exploratory behaviors. Each system can be further broken down into distal or proximate behaviors. All infants, with the exception of those from extreme pathological environments, are attached; but some are securely attached, others are insecurely attached. Unless stimulus conditions are controlled to elucidate this sub-division of attachment, and recognition

is made that behaviors can be members of different behavioral systems, the attachment classification is not readily observed in non-stressful maternal-infant interaction, although there is a trend for insecure infants to touch and fret more. It is interesting to note that very few published studies have examined infant behavior with respect to explicit frequency and durations of behavior prior to the separation episode and during the separation episode. issue is the relationship between behavior observed during a testing situation with behavior in non-test stituations. As the literature review indicates, there is sufficient evidence that security of the infant does affect selected measures of competence and global infant styles of interaction, but there is little evidence that security influences explicit behavioral measures. Coates, Anderson, and Hartup (1972b) examined infant behavior prior to a separation, during a separation, and on reunion, in an attempt to interrelate infant behavior across different stimulus conditions. However, they did not partition attachment into security classifications, which confounds any attempt to compare the findings of this study with Coates et. al. Based on the resulting patterns of behavior, Coates et. al. concluded that attachment was a useful typology. While the results from the present study do not contradict the assumption that attachment represents a unitary and viable concept, one needs to exercise caution when interpreting infant behavior without control of the stimulus conditions.

Analysis of Maternal Behavior.

Correlational analyses of behavior within months. The intercorrelations between maternal behaviors and maternal demographic variables are

shown in Table 17. Maternal age was most often related to maternal behaviors, with indications that older mothers' emitted less stimulation but also were less verbally discouraging. There was also some suggestion that mothers of lower tested IQ and mothers of lower SES level tended to be more verbally discouraging. There were few significant correlations between maternal behavior and number of children in the family, indicating that caretaking activities were not strained by the additional duties of other children in the home. But, the infant was the focal point of attention during the observation period, and it is questionable whether this absence of significant correlations would emerge if the families were observed under different circumstances.

Table 18 shows the intercorrelations between the maternal demographic variables. The negative correlation between age and SES level, and the positive correlation between age and IQ seems idiosyncratic to this particular sample. SES level was positively associated with intelligence, suggesting mothers of higher status were brighter than mothers of lower status, a common finding when intelligence is measured by verbal tests, as was done in this study.

The monthly intercorrelations of maternal behaviors are shown in Tables H-1 through H-4 in Appendix H. A few brief interpretive comments will be given here. The most significant finding is that maternal behavioral patterns appear more stable than infant patterns. Maternal stimulation, gentle physical stimulation, verbal positive, holding, and looking behavior were frequently intercorrelated at each of the four months. A negative cluster of physical punishment, changing items, verbal discouragement, and low percentage of time spent with child appeared to be

TABLE 17

Correlations Between Maternal Demographic Measures and Maternal Behavior at 9, 10, 11, and 12 Months. [1]

Maternal Measures	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
									9-Month Maternal Behavior										
Age			-45								-47	-55	-45						
SES			52										62				61		
IQ												-52							
# Child																			
									10-Month Maternal Behavior										
Age											-67	-68							
SES											69	67							
IQ	-52										-70	-65							59
# Child																			
									11-Month Maternal Behavior										
Age			-50	-65	-58						-57								
SES				54	53						63								
IQ						-49			76										
# Child				-52									-44					-54	
									12-Month Maternal Behavior										
Age										46								53	52
SES												60							
IQ																			79
# Child					-47														

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 13 r's of the 304 computed would be expected to reach the .05 level of significance,

TABLE 18

Correlations Between Maternal Demographic Variables.

Maternal Variables	Age	SES Level	IQ	Number of Children
Age		-63	47	53
SES			48	
IQ				48

r Values: .05 > .4397

.01 > .5888

.001 > .7124

a rather stable cluster that emerged from the within month analyses. Vigorous physical stimulation was associated with verbal discouragement, but it was not an integral part of the positive cluster organized around stimulation and positive verbal behavior, except at 11 months. Vigorous activity may be a maternal mechanism to compensate for the lack of more sustained maternal interaction with the infant; that is, a maternal attempt to reduce the impact of negative interactions. The correlational analyses suggest that gentle touching behavior and the more rough and tumble interactions are independent behaviors rather than a continum of physical stimulation. Apparently, maternal touching represents maternal attachment behavior; that is, the goal for touching behavior is to increase infant attachment behavior, whereas vigorous physical stimulation provides excitement and enjoyment for the infant.

There was little evidence that maternal behaviors changed in meaning across months, as was found for infant behaviors. It should be noted that maternal behaviors were more often significantly intercorrelated which suggests maternal behavioral patterns are more cohesive, less vulnerable to disorganization under differing stimulus conditions, than are infant behavioral patterns. The idiosncracies found in the infant monthly intercorrelations were not as evident in the maternal intercorrelations. One possible explanation is that mothers, because of their developmental maturity, have a wider variety of responses within the individual codes selected for this study. Another hypothesis is that mothers, because of cognitive maturity, are less stimulus bound, thus function with more goal-oriented reasoning when interacting with their children.

Correlational analyses across months. Intercorrelations for the six

monthly combinations are presented in Appendix H. Many maternal behaviors were not consistent across the months. Comparing a 9 month behavior with the same behavior in the tenth, eleventh, and twelveth months, a 10 month behavior with 11 and 12 months, and a 11 month behavior with 12 months, six significant correlations are possible. Therefore, the number of significant correlations for the same behavior across months indicates the stability of the particular behavior. Verbal positive was the most stable behavior as evidenced by six significant correlations. A mother who vocalized much in any particular month could be predicted to continue her high level of positive verbal behavior. Maternal stimulation, verbal discouragement, and smiling were significant for five of the six possible correlations. Looking behavior was significant for four correlations. Gentle physical stimulation and vigorous physical stimulation were less stable than looking behavior, and holding behavior was significant for one correlation only. It is interesting to note that the most stable infant behaviors were physical proximity seeking behaviors, touching and following mother, whereas the most stable maternal behaviors were distal and stimulating behaviors. Stable maternal behaviors seem to be less influenced by infant behavior, while the less stable maternal behaviors are more reactive to infant behavior. The correlations suggest that mothers are trying to discourage physical proximity and encourage distal proximity techniques such as language and smiling behavior. Mothers of 9 to 12 month old infants seem more interested in providing their infants with stimulation and language models than physical closeness. Mothers appear to be encouraging maturity by attempting to balance contact with the infant with their independence to perform other tasks. A mother

can look and verbalize to her child while engaging in house work, but she cannot do both if she is holding the child. Although somewhat inconsistent, maternal behavior is more predictable than infant behavior, which suggests that maternal patterns of behavior are not under going the change and re-organization that was evident in the infant correlations.

Analysis of maternal responsiveness and latency measures. The maternal responsiveness and latency intercorrelations appear in Table 19. Responsiveness to touching mother was most frequently correlated with the other responsiveness measures. Few significant correlations appeared for the individual latency measures or between the individual latency measures and the mean latency measure. Latency to smiling behavior was correlated positively with four responsiveness measures indicating that responsive mothers tended to react more slowly to their infant's smiling behavior, but they reacted more quickly to their infant's positive verbal behavior as judged by the five negative correlations with the responsiveness measures. Only three behaviors were correlated for both responsiveness and latency; verbal distress and verbal positive were negatively correlated suggesting the anticipated relationship between high responsiveness and quick responding, but smiling behavior was positively correlated. Smiling behavior and verbal behaviors are normally of short duration, thus a negative correlation would be expected. However the actual relationship for smiling was positive, which suggests responsive mothers may have viewed smiling as the initial behavior in a possible chain of behavior and the mothers delayed their response for a few moments. This may indicate mothers were trying to encourage sequential action patterns, that mothers were waiting for verbal or gestural signals to reinforce.

TABLE 19

Correlations Between Maternal Responsiveness and Latency Measures. [1]

Maternal Measures	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
R-Sm					44		55	55	73				50				-48
R-Cry												-49					
R-VD								57			-69						
R-VP						69	80	84				-80					
R-GS							45	66	47								
R-FM							62	65				-57					
R-TM								91	44			-54					
R-Mean									56			-69					
L-Sm													72			64	
L-Cry																	
L-VD																	
L-VP																	
L-GS														-55		79	
L-FM																	
L-TM																	
L-Mean																	
Sens																	

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, six $\underline{r}$'s of the 136 computed would be expected to reach the .05 level of significance.

Table 19 indicates that responsive mothers are not necessarily quick responders except in the case of positive verbal behavior. Perhaps more responsive mothers view their infant's babbling and pre-vocalizations as purposeful communication, therefore their response pattern is similiar to that in adult communication where a response is given quickly to prevent the chain of reciprical communication from being broken. Of interest, responsiveness to crying was not a major variable in the intercorrelation matrix which suggests that caution be exercised in assuming that a mother's responsiveness to her infant's crying behavior is a representative measure of her responsiveness to any or all other behaviors. Because crying behavior has been used in measuring infant attachment, the evidence from this study casts some doubt on the assumption that a mother's responsiveness to crying is a measure of her reinforcement of infant proximity seeking. Touching and following behavior, however, were strong components of the matrix, indicating mothers were reinforcing positive proximity seeking behaviors. The ratio of responding to infant behaviors appears to be more patterned than the speed of responding; a mother's rate of responding to one behavior is a reasonable predictor of her rate of responding to other behaviors (with the exception of crying behavior), but her speed of responding to a select behavior is of little value in predicting her latency to other behaviors. A possible explanation is that maternal responsiveness is a generalized personality and behavioral trait whereas latency is more determined by the actual infant behavior. Mothers have learned by their role as the child's physical and mental protector, that certain infant behaviors must be attended to immediately. Other infant behaviors are less crucial and the mother can wait to respond when the

time is more opportune.

Maternal responsiveness and latency measures were correlated with the monthly maternal behaviors. However, the interpretation of these correlations is questionable because responsiveness was averaged across the four months. The tables of these correlations can be found in Appendix I. Table 20 summarizes the correlational patterns across the four months by indicating the number of times a correlation was significant. If a particular responsiveness measure and monthly maternal behavior were correlated the maximum number of times, Table 20 would show the number "4". A significant correlation between a maternal behavior and a responsiveness measure does not imply that the particular maternal behavior was the primary consequence for that particular infant behavior. For example, the positive correlation between frequency of stimulation and responsiveness to infant's verbal positive behavior indicates that mothers who frequently reinforced positive verbal behavior also were more likely to stimulate their infant, not that maternal stimulation was the most frequent consequence given for infant vocalizations.

The most evident correlational pattern in Table 20 is the positive association between stimulation behavior and maternal responsiveness to infant verbal positive, infant touching behavior, infant following, and mean responsiveness. Another pattern is the association between maternal positive verbal behavior and responsiveness to infant positive vocalizations, infant following, infant touching, and mean responsiveness. In the latter pattern, latency to respond to infant verbal positive behavior was negative. These patterns suggest that highly responsive mothers are more likely to stimulate and verbalize in a positive manner. Of

TABLE 20

Summary of Correlations Between Maternal Responsiveness and Latency Measures[1] With Maternal Behaviors from 9 to 12 Months.

Maternal Behavior	Responsiveness and Latency Measures.																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-PP			-1								2						
F-CI									1			1	1		-2		-1
F-GS			2	4	1	4	3	4	1			-3					
D-GS	1		1	3	1	2	4	4	1			-1			1		
F-GPS			1	2			1			1	-1	-1				-1	
D-GPS	1			2	1	1	2	1	1	1	-1						
F-VPS							1			2							-1
D-VPS																1	-1
F-Hold	-1			2		1	1			1		-1	-1		1		2
D-Hold	-1			1			2							-1	-1		
F-VD																-1	
D-VD		-1													-1	-1	1
F-VP			1	4	1	2	4	3				-4					
D-VP				4		3	4	3		3		-4					
F-Sm		2	1	2			1	1				-1			1		-1
D-Sm			1	1			1	2		1		-1			1		-1
F-LB		1								-1			-1	-1		-1	-1
D-LB		1	2	2	1	2	1	1			1	-3					
Time		1		1	1												

1. A negative sign indicates the correlations were negative, no sign that the correlations were positive.

interest is the number of positive correlations for the latency means which would indicate greater amounts of maternal behavior are associated with longer response times. However the latency data did not appear to be patterned and significant correlations were sporadic with one month out of the four being the usual number of significant correlations for a particular behavior.

The positive correlations between responsiveness and maternal behaviors should be tempered by the dynamics of behavioral interaction, in that any mother who emits more behaviors will, all other variables equal, be more reinforcing regardless of her specific intentions. In other words, a more stimulating mother will also be a more reinforcing mother because of her high behavioral output. Further, maternal verbal positive and stimulation behaviors are more efficient consequences and antecedents because the mother can interact with the child while simultaneously enacting other behavior. An example that has been used previously is the mother who relies on verbal positive behavior as a dominant reinforcer and stimulator. This mother is more likely to be responsive than a mother who relies on holding behavior. The relationship between more frequent maternal behavior and longer durations in responding to crying behavior may be explained by noting that crying behavior is not extinguished by distal stimulation such as verbal positive, but rather by physical contact behaviors (Ainsworth, Bell, & Stayton, 1972) which requires movement by the mother, hence a longer duration. The implication is that mothers who engage in more child oriented behaviors are aware of the need for physical contact and refrain from behaving until physical contact with the child is initiated.

Table 21 presents the correlations between the Roth Scale and the maternal sensitivity scale with maternal responsiveness and latency measures. The chance occurrence of the few significant correlations render any relationships tenuous at best. Mothers who endorsed items suggesting overprotection and overindulgent attitudes on the Roth responded more often to their infant's verbal distress, a finding which provides some validity to the scale. Indulgent mothers also responded more quickly to infant distress calls. The negative correlation between the acceptance scale on the Roth and responsiveness to crying seems aberrant, but it may be that non-accepting mothers are more likely to respond to crying behavior while neglecting minor infant irritations. Table 19 indicated that responsiveness to crying does not predict generalized maternal responsiveness. Since the author of the Roth scale considered overprotection and overindulgent attitudes as negative, the correlations in Table 21 would suggest caution in making the assumption that these attitudes will have a negative effect on maternal behavior, at least for mothers of infants in this age range. In general, the Roth Scale does not appear to be related to maternal behavior in any systematic fashion, Table 21 only provides minor evidence of construct validity.

The intercorrelations for the Roth and maternal sensitivity scale were not tabled as only one of 20 possible correlations, a positive correlation between the maternal sensitivity scale and the Roth overindulgence scale ($r = .5006$), reached the required significance level. Over all the maternal sensitivity measures did not appear to be important variables. Neither the behavioral measure (Sens) nor the attitude scale (Sn-Sc) were important components of maternal patterns or related in any

TABLE 21

Correlations Between Maternal Demographic Data and the Roth Scale with Responsiveness and Latency Measures. [1]

Maternal Demograhpic Data	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
Age		49									56						
SES			44												-56	-57	
IQ																	
# Children		46	-47								46				-47		
Roth Scale																	
Roth-Acc		-58															
Roth-OP			48														
Roth-OI			71								-55						
Roth-Rej					60												
Sn-Sc																	

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, seven r's of the 153 computed would be expected to reach the .05 level of significance.

systematic way with maternal behavior, as indicated by Tables 19, 20, and 21.

The correlations between responsiveness, latency, and the demographic data also appear in Table 21. Older mothers were less responsive to crying, and slower to respond to verbal distress. Lower social status mothers were more responsive to verbal distress, but slower to respond to infant touching behavior, and slower to respond to all infant behaviors. Family size seemed to be the most frequently correlated variable. Mothers of larger families were more responsive to crying, but less responsive to verbal distress. Apparently mothers who are faced with numerous requests and demands from their children are more likely to ignore minor infant irritations, but respond to the urgent requests denoted by infant crying. Mothers with multiple caretaking duties were faster in responding to infant touching behavior. In a noisy home, touching behavior, in addition to crying behavior, may be the most efficient attention signals, from both the perspective of mother and child.

Factor analysis of maternal behavior. All maternal measures, including the attitude scales and responsiveness and latency data, were factor analyzed using a varimax rotation. Only 8 or the 14 constructed factors are reported. The other factors were deleted because they contained too few variables reaching the .600 criterion, or the variables did not permit labeling and meaningful interpretation. Some variables not meeting the .600 criterion, were included in a particular factor if these variables appeared relevant to the underlying structure of the factor. Congruent with the infant factor analysis, the maternal factors accounted for rather small proportions of the total variance, with only one factor

explaining more than 10% of the total variance. This factor will be tabled in the main text with the other factors tabled in the appendix (see Appendix J).

The main factor seems to represent positive and sustained non-verbal contact with the infant (see Table 22). Although visual contact behaviors, such as smiling and looking, were a large component of this factor, gentle physical contact such as holding and gentle physical stimulation, appeared to be as important. This factor accounted for 20% of the total variance. Although the loadings were low, the appearance of the attitude measures and the latency measure attribute a more global meaning to this factor, namely maternal acceptance or maternal sensitivity. Many of the components in this factor suggest child-oriented maternal behaviors--mothers who are actively involved in stimulating their infant and increasing the social bond between mother and child. Touching behavior emerged from the infant correlations as one of the most important and stable proximity seeking behaviors. The inclusion of the latency measure in this factor suggests maternal acceptance of attachment behaviors. Of interest is the finding that latency or responsiveness to verbal distress or crying were not components of this factor, which implies maternal acceptance of infant proximity behavior of a more social interactional basis rather than an attachment relationship founded on relieving the infant of discomfort. This factor suggests that the Maternal Sensitivity Scale and Roth Acceptance Scale are measuring similiar maternal attitudes, a finding which was indicated by the correlational analysis. In summary, this factor appears to encompass maternal behaviors that indicate acceptance of the infant, sensitivity to the infant's needs for physical proximity

TABLE 22

Components of Maternal Acceptance Factor.

Variable	Factor Loading
Duration-gives stimulation-12	.929
Frequency-smiles-9	.825
Duration-holds-12	.852
Latency-touches mother	.809
Frequency-gives stimulation-12	.776
Duration-smiles-9	.749
Duration-smiles-11	.749
Duration-gentle physical stimulation-12	.742
Duration-gives stimulation-10	.723
Frequency-holds-12	.681
Frequency-smiles-11	.656
Duration-looks at baby-10	.612
Duration-looks at baby-9	.567
Frequency-gentle physical stimulation-10	.567
Duration-looks at baby-11	.530
Duration-looks at baby-12	.517
Roth Scale-Acceptance	.451
Maternal Sensitivity Scale	.418

with the mother, sensitivity to the infant's needs for social stimulation, and maternal pleasure in positive interactions between her and the child.

The remaining factors will be briefly commented upon. The second factor consisted of two major components and accounted for 9% of the variance. These variables were the Roth Overindulgence Scale and maternal latency in responding to infant crying. This factor further supports the correlational analysis which showed that maternal behavior towards infant crying and infant verbal distress is different, and mothers are not reacting as if these two behaviors were end points on the same dimension. This factor provides some construct validity for the Roth Scale. A general verbal factor, containing both verbal positive and verbal negative behavior, describes the third factor, which accounted for 8% of the variance. The fourth factor, organized around latencies, can be labeled a slow responsiveness factor. This factor explained 7% of the variance. The components of this factor focused on slow maternal responding to infant distal and positive non-verbal behaviors. Factor five, which was labeled maternal sensitivity, seems to isolate the maternal skill of quieting a distressed infant. However, few other maternal behaviors clustered with this variable except for holding behavior. Only 5% of the variance was explained by this factor. In agreement with the correlational analyses, this factor suggests little relationship between skill at quieting an infant and more global maternal acceptance and sensitivity, as exemplified by the first factor. The holding variables suggests that holding the infant is an efficient method of controlling infant distress, but provides little stimulation or continuation of interaction. This factor suggests caution in making assumptions about the quality of

caretaking from observing a mother's ability to relieve distress. The sixth factor is organized around a rather specific maternal behavior, that of slow responding to infant following behavior. This factor accounted for 5% of the total variance. Maternal responsiveness to infant verbal distress characterized the seventh factor, which explained 4% of the total variance. This factor included high frequency and short durations of responding to infant distress signals, however maternal behavior toward infant crying did not load into this factor. The Roth Overprotection Scale is a component of this factor which suggests the negative interpretation of this scale by Roth (1961) may not be valid for mothers of infants. However, neither the Roth Overprotection Scale nor maternal responding to verbal distress were components of the first factor, which suggests that with advancing age of the child, maternal continuation of high responding to verbal distress may imply an overly indulgent and protective attitude toward the child. The eighth and final factor was organized around punishing behaviors, lack of time spent with the infant, the Roth Rejection Scale, and low responsiveness to crying behavior. This factor was labeled maternal rejection and explained 3% of the total variance.

The factor analysis of maternal behaviors is similiar to the analysis of infant behaviors in that the same behaviors across the four months did not necessarily cluster into the same factors. For example, maternal verbal discouragement at 9 months was included in the verbal factor but at 10 months this behavior was included in the rejection factor. Although considerable inconsistency was apparent in the maternal factors, the theoretical inconsistencies which appeared in the infant factors, such as infant smiling and crying clustering together, were not indicated. Although

the correlational analyses of maternal behavior showed greater stability than for infant behavior, the maternal factor analysis was less consistent than expected and more closely approximated the infant factor analysis in regards to distribution of the total variance.

The absence of dimensionality in the responsiveness and latency messures was not expected. In general these measures were distributed over several different factors, and several factors were uniquely organized around specific latency measures. By meeting or closely matching the criterion, more latency measures than responsiveness measures organized into factors. Only two factors included both the latency and responsiveness measures for the same infant behavior: factor three with infant verbal positive behavior, and factor seven for infant verbal distress behavior. The factor analysis implies that maternal responsiveness and latency is more influenced by the nature of the infant behavior than maternal personality or behavioral attributes. This does not negate the construct of responsive caretakers, but suggests investigators of parenting behaviors or attributes carefully consider the behavior of the infant before assigning ordinal positions to a sample of caretakers on their responsiveness to behavior.

A more important finding from the factor analysis is the implication that maternal stimulation is a stronger component of quality caretaking than is responsiveness. Only one measure of responsiveness, that of latency to infant touching behavior, loaded on the maternal acceptance factor. The maternal factor analysis provided further support for the evidence from the correlational analysis that quieting an infant and maternal sensitivity were not related.

In comparing the results of this study with Clarke-Stewart (1973), two factors showed inter-study agreement. Clarke-Stewart's dominant maternal factor, that of optimal maternal care which reflected a stimulating, non-rejecting, and involved mother, is similiar to the first factor in this study. Both studies found a negative maternal factor, although Clarke-Stewart's factor clustered around restrictive and harsh control, whereas the negative factor in the present study reflected hostility and non-involvement with the infant.

Mother-Infant Interaction Analyses.

Correlational analyses within months. The correlations between the maternal demographic data and infant behavior at 9 to 12 months are reported in Table 23. Few correlations were significant and no patterns were evident. Infants from larger families tended to look, touch, and initiate physical contact with their mothers less often. However, as noted previously, mothers with multiple caretaking duties responded more quickly to touching behavior. The finding that infants with siblings tended to engage in more visual exploration probably reflects visual interest in these siblings.

The correlations between infant and maternal behavior at 9 months can be found in Table 24. Frequency of holding was the maternal behavior most often associated with different infant behaviors, including the physical contact measures of touching and following, and verbal distress. Other correlations included the positive relationship between maternal changing items and infant crying behavior, and the negative relationship between infant smiling and maternal verbal discouragement. This latter correlation suggests that maternal discouragement tends to diminish in-

TABLE 23

Correlations Between Maternal Demographic Data and Infant Behavior.[1]

Maternal Demographic Data	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
Infant Behavior at 9 Months																				
Age																				
SES	50	57																		
IQ							48	59						56						
# Children	-70	-51										51								
Infant Behavior at 10 Months																				
Age									-54											
SES																				
IQ																				
# Children																				
Infant Behavior at 11 Months																				
Age					-52	-59									-45	-60				
SES															-48	48				
IQ																				
# Children	-60	-50							-63	-45					-62	-48	-62			
Infant Behavior at 12 Months																				
Age																				
SES				55			-47				46	45								
IQ																				
# Children															-55	-69				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 15 r's of the 320 computed would be expected to reach the .05 level of significance.

TABLE 24

Correlations Between Infant and Maternal Behavior at 9 Months. [1]

9-Month Infant Behavior	9-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM					60	50													50
D-LM			57						61				46						
F-Sm												-51							
D-Sm						45								67		53			
F-Cry		67									47								
D-Cry		46	46																
F-VD									58										
D-VD									68										
F-VP																			
D-VP															46				
F-GS																			
D-GS																			
F-FM									58										
D-FM							52		59										
F-TM			65						62										
D-TM							62		80	54					52			60	
F-VE									-58	-46									
D-VE																			
F-MO																		-56	
D-MO																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's of the 380 computed would be expected to reach the .05 level of significance.

fant distal contact behaviors. Similiar behaviors such as maternal and infant smiling, maternal and infant positive verbal behavior, and maternal and infant looking behavior were not generally correlated, suggesting that infants and mothers were not reciprically responding with the same behaviors. The most salient finding at 9 months was the relationship between holding behavior and various infant contact seeking behaviors.

The 10 month correlations are shown in Table 25. Infant verbal distress, duration of crying, gestural signals, and touching behavior were related to a maternal cluster of behaviors consisting of maternal stimulation, holding, and verbal positive behavior. Infant smiling appeared to form an independent cluster, correlating with maternal vigorous physical stimulation, duration of maternal verbal positive, and maternal smiling behavior. Infant visual exploration and manipulation of objects were negatively related to maternal behaviors. This undoubtably reflects time contraints, as there is less time for independent play when the infant is interacting with the mother.

Table 26 shows the infant-mother correlations at 11 months. Frequency of changing tiems by the mother was related to less frequent looking and following behavior from the infant, which suggests highly interferring mothers discourage contact seeking behaviors. Congruent with the 10 month analysis, infant smiling was related to maternal smiling and vigorous physical stimulation. Touching the mother appears to be the focal infant behavior, and was related to maternal stimulation, gentle physical stimulation, and positive verbalizations from the mother. Similiar to the 10 month correlations, intensive infant-mother interaction discour-

TABLE 25

Correlations Between Infant and Maternal Behavior at 10 Months. [1]

10-Month Infant Behavior	10-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-IM															54				
D-IM															46				
F-Sm						48	56	76						53	79	70			-50
D-Sm						55	55	76						47	69	60			-55
F-Cry															-47	-52	-46		
D-Cry				49	54				58	64									46
F-VD			54	61	58				57	78			46						
D-VD			66	84	73				71	84			56					47	
F-VP																			
D-VP																			
F-GS				47	67				53	60			63	51					
D-GS					50					60			46						
F-FM																			
D-FM			-55							-46									
F-TM			49	74	74	53			64	67			47	44				63	
D-TM				66	65	49			49	60								66	
F-VE					-52					-46				-50				-52	
D-VE					-67				-51				-44	-58					
F-MO			-47			-47													
D-MO																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE 26

Correlations Between Infant and Maternal Behavior at 11 Months. [1]

11-Month Infant Behavior	11-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM	-64	-66											69	57				47	
D-LM	-55	-71		49	60								63	57					
F-Sm							62	64							45	57			
D-Sm					51		90	92											
F-Cry																			
D-Cry			49	45	51	47					46	51	52						
F-VD										51						-44			
D-VD									55										
F-VP									-47										
D-VP									-47										
F-GS														51	57	72			
D-GS														52	45	61			
F-FM		-49																	
D-FM		-51																	-46
F-TM			69	78	70	51							77	78				76	
D-TM			89	85	75						56		88	79				69	
F-VE				46							49							51	
D-VE		54																	
F-MO																			
D-MO			-71	-62									-57	-48				-63	-73

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

aged infant manipulation of objects. Duration of crying behavior from the infant appeared to activate several maternal behaviors including stimulation, gentle physical stimulation and positive and negative verbalizations.

Table 27 presents the infant-mother correlations at 12 months. The correlations appear to cluster around infant verbal distress and touching the mother. Maternal verbal discouragement was negatively correlated with infant crying and distress, indicating that infant distress resulted in less negative maternal behaviors. Maternal verbal positive was less important than in previous months, however holding behavior continued to be highly correlated with infant distress and touching behavior.

In summary, the maternal-infant behavioral interactions reveal that select relationships across months are unstable. The assumption that significant correlations at 9 months would appear at 10, 11, or 12 months was not supported. Two systems of interaction seem to be evident. One system appears to be organized around infant distress and touching the mother, but also includes gestural signals. The maternal behaviors involved include stimulation, gentle physical stimulation, holding, verbal positive, and duration of looking behavior. A second system appears to be organized around infant smiling and looking, with maternal vigorous physical stimulation and maternal smiling. Although smiling behavior, except in the ninth month, appeared to be a reciprical maternal-infant behavior, looking and positive verbalizations were not. This finding suggests that looking and positive verbalizations have different functions for the infant and mother. This lack of reciprocity of same behavior is

TABLE 27

Correlations Between Infant and Maternal Behavior at 12 Months. [1]

12-Month Infant Behavior	12-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM											51	65	53				45	49	
D-LM																46			
F-Sm																			
D-Sm																			
F-Cry						47		71			-45	-57							
D-Cry						48		54		44	-45	-57							
F-VD			50	60	48	63			44	59	-72	-69							
D-VD			68	78	67	83			66	65	-67	-60							
F-VP																			
D-VP																	60		
F-GS													45	47					
D-GS																			
F-FM																54	71		
D-FM															45		54		
F-TM				50	74	50							45			46			
D-TM			50	65	65	50				57									
F-VE		52					44			-60			-45					-65	
D-VE										-58									
F-MO																			
D-MO																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

interesting, because one would assume that organisms of the same developmental level tend, when interacting, to recipricate with same behaviors. This highlights the interesting aspect of the mother-infant relationship, that of two organisms demonstrating care and interest in each other, yet communicating and showing this care in very different ways. For example, the infant alerts the mother by touching, whereas the mother alerts the infant by verbalization.

Note that important behaviors in the maternal-infant correlations, those behaviors which were most often correlated significantly with a variety of behaviors of the other member of the dyad, were not necessarily the most stable behaviors for either mother or infant. Infant touching and following were previously found to be the most stable and predictable infant behaviors, but only touching behavior was correlated often with numerous maternal behaviors. An important maternal behavior in the dyadic correlations was verbal positive, which was found to be a stable maternal behavior. However holding and gentle physical stimulation were unstable and unpredictable, but often correlated with infant behaviors. As more unstable maternal behaviors than infant behaviors were focal in the dyadic correlations, it appears that maternal behavior is more influenced by infant behavior than the converse. Although following behavior is a stable and theoretically important attachment or contact seeking infant behavior, the maternal-infant correlations suggest following behavior has minimal impact upon maternal behavior.

The correlations for the average mother-infant behaviors across the 4 months are presented in Table 28. These correlations should be more powerful since the sample size has been increased from 15 to 45 dyads.

TABLE 28

Correlations Between Mean Infant and Maternal Behaviors for the 9-12 Months Observations. [1]

Infant Behavior	Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM																			
D-LM							54	49								47			
F-Sm							52	69							58	68			
D-Sm							66	82							49	64			
F-Cry					48														
D-Cry					72								48						
F-VD										73	-49						-56		
D-VD				61	54	51			75	72	-47								
F-VP																			
D-VP																	47		
F-GS					57								62	68	54			60	
D-GS					47								52	68	61			51	
F-FM							47												
D-FM																			
F-TM			61	68	81	50			58	44			55					58	
D-TM			53	66	73	45			51	52			60					68	
F-VE										-64					-53	-51		-48	-46
D-VE		53			-61									-53	-57	-64			
F-MO	-46																-52		
D-MO			-50	-52															

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

However, the findings that infant behavior changes in meaning according to the complexities of the mother-infant interaction and infant development, and that the same behaviors can be cross organized into several different behavioral systems contradicts this statistical assumption of increased sample size. Infant looking was related to maternal vigorous physical stimulation and smiling. Apparently infants were most likely to smile when highly aroused or when cued by maternal smiling behavior. Crying behavior was not a focal infant behavior, the only significant relationship that emerged was frequency of maternal verbal positive and frequency of gentle physical stimulation. In contrast, infant verbal distress activated numerous maternal behaviors, including stimulation, gentle physical stimulation, and holding behavior, while decreasing maternal verbal discouragement. Infant verbal positive did not relate in any consistent manner to maternal behavior, with the exception of frequency of maternal looking. Apparently mothers do not view all positive verbalizations as communication or vocal sounds that signify maternal action. Mothers may interpret some vocalizations as infant word play and talk directed toward objects. Gestural signals emitted by the infant were associated with gentle physical stimulation, verbal positive behavior, and duration of maternal looking. Touching the mother was an infant behavior that correlated with several maternal behaviors, including stimulation, gentle physical stimulation, holding, verbal positive, and duration of looking behavior. In agreement with the monthly intercorrelations, following the mother was not an important infant behavior. The negative correlations between maternal punishing behavior and infant frequency of manipulation of objects suggests that punishing behavior tends to stifle infant indepen-

dent play. Infant visual exploration and manipulation of objects were negatively related to maternal behavior indicating that maternal-infant interaction tends to compete with infant exploratory behaviors. Considering maternal behavior was strongly organized around infant touching and verbal distress, the mean correlations support the assumption from the monthly correlations that infant behavior controls the mother more than maternal behavior controlling the infant. The correlations between maternal punishing behavior and decreased infant play behavior would appear to be an exception to this inference. The impression gained is that mothers allow the infant to dictate the relationship until the infant goes beyond a certain limit, at which time the mother interjects her control.

Correlational analyses across months. Twelve correlational matrices were produced, which can be grouped into two blocks of six. One block consists of those matrices with the infant behavior related to later maternal months. The other six matrices show maternal behaviors to later infant months. These matrices permit estimation of possible behavioral chains. For example, a 9 month maternal behavior is examined for significant infant correlations at 10, 11, and 12 months; the same maternal behavior at 10 months is examined for significant relationships to infant behaviors at 11 and 12 months; and this same maternal behavior at 11 months is studied for relationships to 12 month infant behavior. Examinations can be made for reliability and patterns. If a prior maternal behavior is significantly related to a select later infant behavior for at least four or five out of six possible correlations, then this maternal behavior can be considered a possible precursor of such infant behavior. Pattern analysis is more intuitive and involves examining the chain cor-

relations for relationships between behaviors. The 12 matrices appear in Appendix K.

The behavioral chains for maternal influence revealed great instability and no discernable patterns. For example, the chain for giving stimulation showed the following significant correlations: 9 month maternal stimulation was negatively related to 10 month infant manipulation of objects, positively related to 11 month smiling and visual exploration, and positively related to 12 month touching mother. At 10 months, maternal stimulation was positively related to 11 month infant gestural signals and negatively to manipulation of objects, positively related to 12 month verbal distress, gestural signals, and negatively to 12 month following mother. Maternal giving stimulation at 11 months was positively associated with 12 month infant touching mother behavior. The only chain to approximate a behavior pattern was maternal smiling at 9, 10, and 11 months with infant crying at 12 months. The infant correlations did not reveal patterns or stability in causation for later maternal behavior.

The correlations between maternal behavior and the infant assessment data appear in Table 29. The correlations were somewhat erratic and contrary to expectation. For example, maternal verbal behavior was largely unrelated to infant verbal measures. The 9 month infant assessment measures tended to correlate with maternal behavior at 9 months, and the 12 months assessment data tended to correlate with maternal behavior at 11 and 12 months. This finding concurs with the previous infant analyses which showed that the infant measures were most closely associated with those infant behaviors observed in the same month as the testing was

TABLE 29

Correlations Between Maternal Behavior and Infant Assessment Data. [1] *

Maternal Behavior	Infant Assessment Data							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
F-PP	.53(11)							
F-CI	-.56(9)		-.53(9)		-.60(9)			
F-GS	-.45(11)				-.45(11) .45(12)			
D-GS	.45(9)		.49(9)		.54(9)			
F-GPS							.45(12)	-.65(9)
D-GPS								-.62(9)
F-VPS			.54(9)			.70(12)		
D-VPS						.54(12)		.49(12)
F-Hold						.48(9)	.49(12)	
D-Hold								
F-VD					-.53(9)			
D-VD					-.45(9)			
F-VP	-.45(11)				-.47(11)	.52(9)		
D-VP						.51(9) .51(11)		
F-Sm						.56(12)		
D-Sm								
F-LB		.56(9)		.53(12)				-.45(9)
D-LB						.53(9)		
Time								

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 29 r's of the 608 computed would be expected to reach the .05 level of significance.

* Numbers in parenthesis are the months for which the particular maternal behavior was significantly correlated with the infant assessment data.

accomplished. This suggests infant behavior is rather fluid, and cognitive growth is quite variable but heavily dependent upon immediate life experiences. Causality at 9 and 12 months correlated with more maternal behaviors than the other infant measures. Possibly a major social cognitive step for the infant in the last quarter of the first year is a focus on self-other differentiation from the mother. Thus the mother's behavior, rather than infant manipulation of environmental objects and other variables, would most affect the rate of cognitive growth in perceiving causation that is independent from self actions. Overall, the correlational analysis suggests that specific and quantitative maternal behaviors are not major contributors to the infant measures. However, an examination of the qualitative aspects of maternal behavior might find strong relationships between maternal actions and infant cognitive development. This study examined behavior only, were maternal behavior studied with a focus on the appropriateness of the behavior and whether the behavior stimulated infant cognitive growth, possibly a stronger relationship would have emerged.

Table 30 shows the correlations between infant behavior and maternal attitude measures. It was not expected that the Roth and Sensitivity Scale would correlate strongly with specific infant behaviors since attitude measures are assumed to measure organization of behavior rather than specific behaviors and, unless multiple sources of variance are removed, effects of maternal attitudes on specific infant behaviors would be tenuous at best. This expectation was supported by the findings. Although some of the correlations are of interest, the lack of stability across months prevents one from determining if the relationships are chance fac-

TABLE 30

Correlations Between Infant Behavior and Maternal Attitude Measures. [1] *

Infant Behavior	Maternal Attitude Measures				
	Sens Scale	Roth-Acc	Roth-OP	Roth-OI	Roth-Rej
F-LM					
D-LM	-.44(11) .63(12)		.53(12)		
F-Sm	.51(11)				
D-Sm			.45(12)		
F-Cry	-47(10)				-.54(10)
D-Cry					-.58(10)
F-VD	-.49(11)	.45(12)			
D-VD					
F-VP					
D-VP		.47(11)			
F-GS	.47(9)		.53(12)		
D-GS			.74(12)	.46(9)	
F-FM					
D-FM		-.47(11)	-.56(9) -.50(10)		
F-TM					
D-TM					
F-VE					
D-VE	.50(11) -.50(12)				
F-MO		-.50(11)		-.63(12)	-.45(12)
D-MO					

r Values: .05 > .4397; .01 > .5888; .001 > .7125

1. On the basis of chance, 19 r's of the 400 computed would be expected to reach the .05 level of significance.

* Numbers in parethesis are the months for which the particular infant behavior was significantly correlated with the attitude measure.

tors or differential meanings of the same infant behaviors due to maturation and re-organization of infant behavioral systems. Although the Roth overprotection scale was designed to measure negative maternal attitudes, it correlated most often with positive infant behaviors, such as smiling, looking, and gestural signals. The bias of Roth in constructing the scale was that over-protective maternal behaviors discouraged strivings for independence, a concept more derived from later childhood and adolescent studies than infant research. It's difficult to understand how a mother can be too protective until the child is truly capable of self-protection. Although Roth's other scale dimensions--acceptance, over-indulgence, and rejection--are heuristic and viable concepts regarding maternal attitudes toward infants, over-protection appears inconsistent with the biological necessity of maternal care.

Correlational analyses of maternal responsiveness and latency measures with infant behaviors. Tables 31 though 34 present the correlations between maternal responsiveness and latency measures and the frequency and duration for each of the four months of observed infant behavior. Comparing a behavior that has been averaged across four months for one member of the dyad with specific monthly behaviors for the other member is a questionable procedure, but the importance of these maternal measures as potential causal agents of infant behavior necessitates the inclusion of these correlations. However, caution must be exercised in their interpretation.

At 9 months (see Table 31), the latency measures indicate that longer duration of maternal responsiveness to following mother, but shorter duration to gestural signals were associated with greater infant vocalizations.

TABLE 31

Correlations Between Infant Behavior at 9 Months and Maternal Responsiveness and Latency Measures. [1]

9-Month Infant Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-LM																-52	
D-LM					53												
F-Sm													45			46	-48
D-Sm										65							
F-Cry																	
D-Cry																	
F-VD																	
D-VD																	
F-VP													-54	61			
D-VP													-45	65			
F-GS		48															
D-GS															-45		
F-FM																	
D-FM			-52														
F-TM					45				50								
D-TM																	
F-VE																	
D-VE																	
F-MO																	
D-MO						-45	-49										

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. Cn the basis of chance, 16 r's of the 340 computed would be expected to reach the .05 level of significance.

TABLE 32

Correlations Between Infant Behavior at 10 Months and Maternal Responsiveness and Latency Measures. [1]

10-Month Infant Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-LM																	-49
D-LM										65							-54
F-Sm												-47					
D-Sm												-50					
F-Cry												47					53
D-Cry																	
F-VD														-48			48
D-VD																	60
F-VP											-59		54			-65	
D-VP																	
F-GS				57						50							
D-GS										51				-50			
F-FM	56								58								
D-FM													-44				
F-TM															69		
D-TM															78		
F-VE				-48						-45		54					
D-VE				-44						-63		65					
F-MO						-45	-45										
D-MO												-45					

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 16 r's would be expected to reach the .05 level of significance.

TABLE 33

Correlations Between Infant Behavior at 11 Months and Maternal Responsiveness and Latency Measures. [1]

11-Month Infant Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-IM	53																
D-IM										54							
F-Sm					47												
D-Sm										44							
F-Cry																	
D-Cry																	
F-VD														-46			
D-VD					-46												
F-VP													-52		47		
D-VP														45	57		
F-GS										57							
D-GS										71							
F-FM	54						52					-54					
D-FM	46																
F-TM				52	53		49	55				-49					
D-TM				54								-47				-47	
F-VE			59		50						-52						
D-VE											-46						
F-MO										51							
D-MO				-59	-53		-46	-51									

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 16 r's would be expected to reach the .05 level of significance.

TABLE 34

Correlations Between Infant Behavior at 12 Months and Maternal Responsiveness and Latency Measures. [1]

12-Month Infant Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-LM												-47				-53	
D-LM											-49			49		-47	-61
F-Sm														63			
D-Sm														58	-54		
F-Cry										55							
D-Cry										48					46		
F-VD															71		
D-VD															69		53
F-VP									-56				-45				
D-VP									-60				-44	47			
F-GS				46								-57					
D-GS			52								-46	-58					
F-FM													-59	50			
D-FM														65			-44
F-TM																	
D-TM															58		
F-VE											-51						
D-VE																	
F-MO			-50														
D-MO						-62											

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 16 r's would be expected to reach the .05 level of significance.

The correlations at 10 months (see Table 32) indicated that maternal latency to crying behavior was positively related to infant duration of looking, and frequency and duration of gestural signals. This relationship suggests that infants use gestural signals to attract their mother's attention when crying fails. Previous analyses of infant behavior revealed that gestural signals initially were a part of the distress contact system with the mother, but near the end of the first year, infants begin emitting gestural signals as part of the positive verbal system. Shorter maternal latencies in responding to infant gestural signals and following mother were associated with several infant behaviors, such as greater verbal positive and longer duration of following. Shorter latencies to infant verbal positive behavior were associated with greater infant smiling behavior and less infant visual exploration. Longer maternal latency to touching was associated with greater amounts of the same behavior from the infants. It appears that when the infant touched the mother and no response was forthcoming, the infant continued this tapping-touching behavior until the mother responded.

The correlations at 11 months, reported in Table 33, were similiar to those for 10 months in that slow responding by the mother to infant crying was associated with such infant behaviors as more looking, smiling, following the mother, and gestural signals. Quick responding by the mother to infant verbal positive behavior was associated with greater infant following and touching. However, longer latencies in maternal responding to touching were associated with greater infant verbal positive behavior, suggesting that infants used positive vocalizations to obtain maternal attention when simple touching failed. The data on cry-

ing for this month suggests that when crying failed to elicit the desired maternal response, infants used more mature responses for gaining maternal attention.

The correlational patterns for infant behavior at 12 months, as shown in Table 34, indicate that shorter maternal latencies to infant verbal positive, gestural signals, verbal distress, and smiling behavior were associated with greater amounts of infant gestural signals, verbal positive, looking, and following the mother. However, longer maternal latencies in responding to following the mother and touching were also associated with greater amounts of infant behaviors, including looking, smiling, verbal distress, following, and touching the mother. Mothers who responded more slowly to their infant's following behavior actively encouraged more smiling, looking, verbal positive, and following behavior. Slow maternal responsiveness to touching was associated with verbal distress and crying, suggesting that infants resorted to distress behavior when touching failed to elicit the desired maternal response.

In summary, the responsiveness measures were less important than the latency measures in terms of specific relationships. There were indications that infants of more responsive mothers spent less time exploring and manipulating their environment. This finding is contrary to the literature which suggests infants of responsive mothers are more secure to explore an environment, however these research studies were conducted in an unfamiliar environment or with a stranger present. In a non-stressful but familiar environment, it seems reasonable that a secure infant would perceive the caretaker as the most interesting object available. Responsive mothers were associated with more infant following and touch-

ing behavior, especially at 11 months. This finding concurs with the literature on attachment which shows that responsive mothers encourage more positive contact seeking behaviors. The assumption that rate of responsiveness to a select infant behavior would elicit higher frequency and duration of this behavior was not confirmed. Only responsiveness to touching the mother was significantly correlated with the amount of touching behavior emitted by the infant, and this occurred at 11 months only. These results seem to question a reinforcement theory of maternal-infant interaction, while supporting Clarke-Stewart's (1973) finding that maternal responsiveness was related to the child's general competence rather than responses to specific behaviors. The sensitivity measure, or maternal skill at quieting an infant appeared unrelated to infant behavior. Findings from the maternal correlational analyses and factor analysis indicated that this skill is largely unrelated to maternal behaviors or to maternal quality caretaking. Lay persons tend to judge a mother's caretaking abilities from her skill at calming an infant, but evidence from this study suggests this skill has neither a positive nor negative effect on the infant, and is not a good measure of maternal sensitivity in the more global sense.

Reinforcement theory would predict a negative relationship between maternal response latency to a specific infant behavior and the frequency and duration of that infant behavior. However, none of the significant correlations showed this hypothesized relationship. Four relationships contradicted reinforcement theory, including latency to touch mother at 10 months, and latency to crying, following mother, and touching mother at 12 months. An alternative explanation to reinforcement theory is to

group infant behavior into two classes. One class consists of infant behaviors that demand rather intensive maternal reactions before the behavior will cease. These behaviors are crying, following, and touching. Slow responding should encourage increased frequency of the same behavior as well as alternate behaviors. Restated, slow maternal responsiveness encourages same and alternate behaviors to appear in order that the end goal can be reached, while continuing the same behavior. For example, the infant cries, then follows, and then touches, in order to receive maternal comfort. Apparently latency of the consequence is more powerful than the absolute level of responsiveness. Therefore, the mother is reinforcing more mature behaviors if she refrains from initially responding to the first behavior of the chain. Infants in this age range seem to progress toward more mature behavior in order to reach their goals. The other class is lower in intensity of maternal contact seeking behavior, the end goal of which is a maternal visual-verbal response rather than a physical one. These behaviors reflect less need for security than need for social stimulation. The infant behaviors concerned are smiling, gestures, verbal distress, and verbal positive responses. Quick maternal responding encourages greater frequency of these infant behaviors, slow responding discourages the same behaviors. This class of behaviors is not additive, that is, an infant cannot first smile, then continue smiling and vocalize in a positive manner while emitting a distress call. Gestural signals are probably an exception in that gestures can be added to responses such as smiling or distress. A motivational reinforcement or ethological theory assumes the infant must be reinforced by the goal desired. Unless the consequences for a select behavior provide a need

satisfaction, these consequences will not function as operant theory would predict. Motivational theory assumes that infants either desire visual-verbal consequences from the mother or physical comfort from the mother, and these infants have a repetoire of behaviors that can be used to attain these goals. Maternal responding must be appropriate to the goal desired by the infant before the behavior ceases. Some behaviors, because of less intense goal need, cease without consequences, and when quickly reinforced, encourage similiar and same behaviors to increase. One could argue that the reason that the visual-verbal class of needs cease without consequences is that the infant has an alternative goal for satisfaction namely, visual and manipulative contact with the environment. However, if the mother is not available for physical comfort, the infant has no alternative source of comfort except in pathological cases where objects become sources of security. But normal infants also rely on objects to some degree when mother is not available (Bowlby, 1969). The second group of behaviors or the physical interaction class continue until reinforced and encourage other behaviors to emerge until maternal contact is made. If a mother wanted her infant to increase positive vocalizations, decrease crying, and increase following and touching behavior, this explanation suggests that the mother should respond quickly to positive verbal and crying behavior, but delay responding to touching and following behavior. If the physical contact class of infant behavior is considered more primitive than the visual-verbal class of behaviors, mothers who wish to encourage maturity in their infant, should respond more quickly to the visual-verbal class, but more slowly to the physical contact behaviors, because slow responding to the latter group appears to increase the output

of the visual-verbal system. Slow responding also increases the output of the physical contact system, including crying behavior. Longer latencies in responding to touching the mother, for example, were associated with both verbal positive and crying behavior, contingent upon the month involved. At 10 and 11 months, slow responding to crying increased gestural signals, following, and smiling, although at 12 months slow responding to crying increased crying. By responding quickly to the visual-verbal behaviors and more slowly to the physical contact behaviors, the mother may set up a competitive situation where infant visual-verbal behaviors gain more strength over physical contact behaviors. These results do not necessarily contradict Ainsworth et. al. (1971) findings that fast responding to crying decreases crying. However, the situation becomes more complex when the effects of latency for one behavior are examined for effects on other behaviors. Further Ainsworth has questioned whether the major factor in mature communications replacing crying behavior was not the mother's responsiveness to negative communications but rather her responsiveness to positive verbalizations.

The data does not contradict the laboratory research that has demonstrated reinforcement of a specified behavior encourages emission of such behavior. However, the real environment of maternal-infant interaction assumes both members of the dyad have behavioral goals that subsume specific behaviors. Both dyadic members are confronted with a variety of interpersonal stimuli, and both members have alternative behaviors available if a specific behavior does not elicit the desired consequences. In a laboratory study, these alternatives, if available, do not produce the normal consequences, setting up a psuedo-condition that may not be appli-

cable to the normal interactional sequence of the dyad.

An argument can be made that mothers tend to react according to the model presented. Although most mothers enjoy cuddling and touching their infant, during this age range mothers are also attempting to encourage more verbalizations from the infant and less physical dependency. The finding that the most stable maternal behaviors are verbalizations and stimulation behaviors while the most stable infant behaviors were touching and following, suggests that mothers are slowly attempting to shape their infants but not at the cost of thwarting the infant's needs. The maternal-infant correlations indicated that infant verbal distress and touching behavior most dominated the relationship.

Correlations with infant assessment data. The correlations between the maternal measures and the infant assessment measures are found in Table 35. These data are relevant to several of the hypotheses presented in the introduction to this study. Generally the results do not support the assumption that maternal responsiveness and sensitivity were associated with infant cognitive growth. Only two correlations were significant for attachment. A low rate of responsiveness to verbal distress and a high rate of responsiveness to gestural signals encouraged more secure attachment. Responsiveness and latency to touching the mother were not associated with the infant measures. This null relationship is contrary to predictions, considering the importance of maternal responding to touching behavior as a consequence for positive proximity seeking behavior. Infants of more sensitive mothers were advanced in development of means at 12 months, which supports one of the hypotheses of this study. But the previous findings showed that quieting irritable

TABLE 35

Correlations Between Maternal Responsiveness and Latency Measures and Infant Assessment Data. [1]

Maternal Measures	Infant Assessment Data							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
R-Sm								
R-Cry								
R-VD								-51
R-VP					46			
R-GS								
R-FM								
R-TM								
R-Mean								
L-Sm					45			
L-Cry								
L-VD								
L-VP								
L-GS								45
L-FM	63		60		47			
L-TM								
L-Mean								
Sens				-58				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, six r's of the 136 computed would be expected to reach the .05 level of significance.

infants was an isolated skill not related to other measures of maternal sensitivity. Responsiveness to infant verbal positive behavior was associated with more advanced development of causality at 12 months, but not to the Bayley language measure. It would appear that the quality of the infant's verbalizations must be measured if relationships with maternal consequences is to be studied. It should be noted that Clarke-Stewart (1973) found that infants required a language model rather than a language reinforcer to enhance language development. The evidence from the present study supports the Clarke-Stewart findings that stimulation may be a more important variable for many aspects of infant cognitive growth than maternal consequences. Latency to following mother was correlated with three infant measures at 9 months, but not at 12 months, which may reflect the breakdown of the cognitive unity of these measures. At 9 months, infants have just acquired the motor skill to crawl after their caretakers; therefore, an important variable of maternal responsiveness may be maternal responding to newly acquired skills of the infant.

Because this study examined responsiveness and sensitivity from a quantitative viewpoint only, the results should not be generalized to studies where the appropriateness of maternal behavior is the major caretaking variable. A mother can have a high rate of responsiveness to a specific infant behavior, but her behavior may not enhance cognitive growth. Furthermore, the infant's behavior was not measured according to appropriateness or maturity. As noted above, there is a difference between a mother who responds to all of her infant's verbalizations and a mother who ignores her infant's babbling and nonsense sounds but responds to initial word productions. The evidence presented in this

study indicated that infant cognitive operations are enhanced by variables other than simple quantitative record keeping of maternal caretaking behavior.

The Issue of Selective Responding.

Some specific hypotheses about selective responding will be examined in this section. The first hypothesis proposed that infants of responsive and sensitive mothers are accelerated in language development, means-ends, object causality, and communication skills. The previous discussion of maternal-infant correlations has negated the assumption that responsiveness and sensitivity, as measured in this study, are reflected in greater infant achievement in cognitive development. To test the assumption that the combination of responsiveness and sensitivity contribute to cognitive achievement, mothers were rank ordered from 1 to 15 on their mean responsiveness ratios (R-Mean), and also on their sensitivity mean. The higher the mean responsiveness ratio and the lower the sensitivity mean, the higher the maternal rank. The mean for both ranks was then determined by adding both ranks and dividing by 2, and omitting rank 8. This procedure left two groups of seven mothers, and resulted in a group of high responsive and sensitive mothers and a group of low responsive and sensitive mothers. The corresponding infant scores on the cognitive measures were subjected to a t-test analysis.

The results were non-significant for each infant measure. The mean score for the infants in the low mother group were higher on the Bayley scales at 12 months (M = 10.57 versus M = 9.71) and the object causality scales at 12 months (M = 7.00 versus M = 6.71). For the attachment measure, five securely attached infants had sensitive and responsive mothers,

whereas four securely attached infants had low responsive and sensitive mothers. Therefore the first hypothesis must be rejected. However, one must be cautious in applying these results to other studies that have found a relationship between maternal measures and infant cognition. One difficulty in applying these results is that the maternal responsiveness measure and sensitivity measure were previously found to lack power and not reflective of the theoretical constructs presumed to underlie these measures. For example, the mean responsiveness ratio was significantly correlated with very few infant behaviors, and the evidence suggested that maternal responsiveness was based as much on the particular infant behavior as on maternal personality characteristics. This is not to argue that mothers do not differ on their ratios of responding, but in a normal population, variance in responding ratios is as likely caused from infant characteristics than explicit maternal caretaking attitudes and behaviors. The sensitivity measure also lacked power because it did not correlate with attitude measures that supposedly assessed maternal sensitivity. Similiarly the sensitivity score was not present in the maternal factor that loaded with variables reflecting maternal sensitivity.

The second hypothesis predicted that selective responding is the major factor in mature communications replacing crying, and that selective responding facilitates infant cognition, including means-ends, and object causality achievement. No mother in the study was rated as selective. All mothers reinforced their infant's crying and verbal distress behavior at a higher response ratio than the infant's positive verbal output. Rather than reject the hypothesis outright, the sample of mothers

were divided into two groups based on the degree of discrepancy between their response ratios to verbal distress and crying versus their response ratio to verbal positive. Mothers were rank ordered from 1 to 15, based on the degree of discrepancy, which was defined as the product of the verbal positive ratio subtracted from the mean for the crying and verbal distress ratio. It was assumed that selective mothers had less discrepancy, whereas non-selective mothers had greater discrepancy. The mother with rank 8 was omitted, thus permitting a comparison of the first seven mothers with the last seven mothers on infant scores on the Bayley language scale, means-ends, object causality, and communication measure at 12 months. Three possible comparison groups were generated: verbal positive responsiveness ratio subtracted from the mean of the crying and verbal distress ratios; verbal positive responsiveness ratio subtracted from the crying ratio; and the mean verbal positive and verbal distress responsiveness ratio subtracted from the crying ratio. None of the 12 resulting *t*-tests were significant nor were the means significant in the opposite direction. These results do not confirm the hypothesis related to selective responding. However, it is questionable whether the revised definition of selective responding was an appropriate measure of the concept. It is also questionable whether selective responding ever occurs in real maternal-infant dyads, except for isolated cases of excessive whinning and crying in older children. Crying and verbal distress are important components of infant communication and are probably more critical for the survival of the infant than positive vocalizations. With maturation, positive vocalizations emerge as the major communication mode for survival, but this change occurs in infants older than those used in the present sample.

Over a wider age span from birth to two years, mothers may become more selective by showing less discrepancy between their response ratios to verbal distress and verbal positive, but it still seems unlikely that mothers would ignore verbal distress to the degree that a higher response ratio to verbal positive would be generated. Clarke-Stewart's (1973) results suggest that mothers should respond to most of their infant's output during the first year of life, but later focus on responding to positive social behavior. Apparently the infants in this study were not the appropriate age for a test of the selective responding hypothesis. The *t*-tests were computed on a very small sample which is another factor to consider. Further, the results from the previous section suggested that latency in responding may be more important to infant behavior than the amount of responding. Unfortunately few relationships were found between maternal latency measures and infant cognitive achievement. Results from the previous maternal-infant correlations suggested that mothers should react more slowly to crying, but quickly to positive verbalizations, which is in accordance with the selective responding position. However show responding to crying behavior increased crying behavior as well as positive vocalizations. Therefore, the mother is most effective when she responds quickly to all verbal behaviors. It follows that the infant will come to rely more on positive verbalizations because they contain more information and will guide the mother's behavior more effectively than distress verbalizations. The most effective caretaker should be the mother who responds quickly to her infant's crying when she accurately perceives the infant will not use alternative verbalizations to gain her attention, but more slowly to crying when crying

encourages the infant to use positive vocalizations to gain her attention. The intensity of the cry and the circumstances surrounding the crying incident can serve as adequate cues for the mother to make a judgment. It should be noted that the maternal consequences for crying and positive verbal behavior affected the amount of crying and verbal behavior emitted by the infant, as judged from the maternal-infant correlation tables. However, there was no evidence these consequences affected infant cognitive achievement. Thus the hypothesis is not confirmed when using the latency data rather than the responsiveness data.

Chapter IV

Discussion.

The infant intercorrelations suggested three organized systems of behavior, with each system divided into distal and proximate behaviors. Distal behaviors of the distress contact system included verbal distress and following the mother, whereas the proximate behavior was touching the mother. The positive contact system included looking, positive vocalizations, and smiling for the distal behaviors; the proximate behaviors included touching the mother and following the mother. The third or exploratory system, was represented by visual exploration for the distal behavior, and manipulation of objects for the proximate behavior. Initially the distress system was more pronounced, but as development proceeded, the three systems tended to reach a balance. Verbal distress, rather than crying, appeared to activate other proximity seeking behaviors, suggesting that crying is more of an emotional and disorganized infant behavior than an organized attachment response. The inter-month correlations of infant behavior were generally unstable, with touching and following showing the most stability. Insecurely attached infants were noted for emitting more verbal distress and touching behavior. The major infant factor was distress contact with mother which included verbal distress and touching the mother behavior.

The maternal intercorrelations were more stable than the infant correlations. Maternal stimulation, gentle physical stimulation, verbal positive, holding, and looking behavior clustered together. A second cluster consisted of physical punishment, changing items, verbal discouragement, and low percentage of time spent with the infant. The inter-

month correlations were more stable than the infant inter-month correlations. The most consistent inter-month maternal behaviors were verbal positive, giving stimulation, verbal discouragement, and smiling. The more stable infant behaviors were proximity seeking behaviors, while the most stable maternal behaviors represented distal contact and stimulation behaviors. The maternal responsiveness, but not latency measures, were highly intercorrelated. More responsive mothers were not quick responders except when reacting to infant verbal positive behavior. Correlations of the responsiveness and latency measures with frequency and duration of maternal behaviors suggested that mothers were more alert to stimulating their infants than responding to infant behavior.

The major maternal factor was maternal acceptance, which included a diverse set of maternal variables incorporating child-oriented and child stimulating behaviors. The responsiveness and latency measures did not cluster into one or two factors, suggesting that maternal responsiveness is more an aspect of the particular infant behavior than a maternal personality or behavioral attribute. There was little relationship between maternal skill at quieting an infant and maternal attitudes, as well as maternal behaviors that appeared to indicate sensitivity and child-oriented caretaking. Mothers behaved differently to crying behavior and verbal distress behavior, and appeared to be more active in responding to verbal distress than crying. However, mothers were more responsive to crying than verbal distress. Apparently mothers felt they must respond to crying, although their repetoire of behaviors is diminshed. This suggests mothers wish to discourage crying behavior, but they recognize the need to make some response.

Two mother-infant behavioral systems appeared to be operating. The first system included infant distress and proximity seeking, and maternal gentle physical stimulation, holding, verbal positive, and looking at infant behaviors. The second system included infant smiling and looking at mother, and maternal smiling and vigorous physical stimulation. Crying behavior was not related to maternal behaviors, whereas infant verbal distress activated numerous maternal behaviors. Infant verbal positive did not relate in any consistent manner with maternal behaviors and there were no apparent patterns of maternal-infant interaction from examining the across month matrices. The correlations suggested that specific frequencies and durations of maternal behaviors were not major contributors to the infant cognitive assessment results.

In reviewing the correlations between maternal responsiveness and latency measures with infant behavior, there was little evidence that maternal responding ratios increased the frequency or infant behaviors. Latency appeared to have more effect on infant behaviors than ratio of responding. Infants of responsive mothers tended to explore and manipulate the environment less, and follow and touch their mothers more.

Previous research has indicated infants of less responsive caretakers were more inhibited with exploratory behavior (Ainsworth, Bell, and Stayton, 1972). The present study does not necessarily negate the past evidence as an important difference is the environmental conditions when observing attachment behaviors. The infant of a responsive mother is more secure and therefore more confident when confronted with novel stimuli such as new toys or strangers. However in the infant's own home, the most novel and interesting stimulus is a responsive and stimulating care-

taker. The insecure infant lacks this confidence to explore unknown stimuli, therefore remains in near proximity to the caretaker when facing a new situation or environment. In the insecure infant's home, a toy may be a more consistent and secure stimulus than an unresponsive and erratic caretaker. In other words the secure child can seek novelty to understand and assimilate, the insecure child is seeking stability and relief from stimulus change. The insecure infant still has needs to explore new environments but the presence of the usual caretaker will prevent overstimulation and fear. The secure and insecure infant do not differ so much in their exploratory systems, but in their tolerance levels for novel stimuli. The results from the correlations between maternal responsiveness and latency measures with infant behaviors was most adequately explained by an ethological format that placed infant behavior into two systems with differing goals. One system, the proximity seeking system, included crying, following the mother, and touching the mother. The end goal for the proximity seeking system is physical closeness to the caretaker. The other system, affiliative or social stimulation system, included smiling, gestural signals, verbal distress, and verbal positive behavior. The end goal for the affiliative system is positive social interaction with the caretaker. Maternal slowness in responding to infant proximity seeking behaviors encouraged more proximity seeking behaviors and affiliative behaviors, whereas slow responding to affiliative behaviors appeared to decrease infant emission of affiliative behaviors.

No evidence was found for selective responding as the maternal variable responsible for infant cognitive growth, nor was there any evidence that maternal responsiveness and latency were related in a systematic way

to infant cognitive growth. Notation was made regarding the appropriateness of several of the maternal measures, and the small number of subjects in the sample implies caution in generalizing the results to other studies.

One of the problems in attachment research is the attachment measure. Separation protest has been used most widely, but findings from the studies conducted by Ainsworth and her associates (e. g. Ainsworth, Bell, & Stayton, 1972) indicate that crying to short term loss of the caretaker may be more representative of the quality of the bond between mother and child than attachment strength, Ainsworth et. al. believe that attachment behaviors exhibited by the infant are influenced by a security-insecurity dimension reflecting the infant's confidence that the mother is a stable, reliable, and efficient caretaker. An examination of the attachment literature shows that most social behaviors emitted by the infant, have at one time or another, been considered legitimate indices of the attachment bond. One of the major findings from the present study is the need to distinguish between attachment or proximity seeking behaviors and affiliative or social stimulation behaviors. Infant positive verbalizations and smiling did not load on the proximity seeking factors which provides evidence for this differentiation. The responsiveness data on the mothers as related to infant behavior showed that slow responsiveness to proximity seeking behaviors resulted in greater emission of these behaviors, while quick responding to affiliative behaviors resulted in greater emission of these behaviors. This would indicate that attachment behaviors and affiliative behaviors function under different environmental restraints and obey different laws regarding ante-

cedents and consequences. Affiliative behaviors appear to function as operants while attachment behaviors function according to ethological principles.

Bretherton and Ainsworth (1974) have recently suggested that attachment behaviors need to be distinguished from affiliative behaviors. They define attachment behaviors as those actions exclusively emitted by the infant to the attachment object, whereas affiliative behaviors are those which are directed not only to the primary caretakers but to other friendly adults. Bretherton and Ainsworth did not clearly specify behaviors in either system. Rather their definition followed from those behaviors an infant did or did not exhibit toward a friendly stranger. The difficulty with this method of delimiting behaviors is that the infant has had little experience with this stranger and is basically functioning under behavioral trial and error. It would appear that an infant's affiliative behaviors shown to a stranger may be different from those shown to the primary caretaker. Lamb (1976) has defined affiliative behaviors as smiling, looking, vocalizing, and laughing, whereas attachment behaviors include reaching for, touching, and seeking to be held by the attachment object. The results from this study are in close agreement with Lamb's definitions of attachment and affiliative behaviors.

Of concern throughout this study is the reality and viability of the security typology of attachment behavior. If there is a security-insecurity dimension of attachment, the question then is how does this security dimension relate to the attachment and affiliative systems. Evidence from the present study suggest that insecure infants differ little from secure infants in daily and non-stress interaction with their caretakers,

but there is a tendency for insecure infants to exhibit more attachment behaviors than the secure child. The secure child has more stress coping abilities, and is free to exhibit more affiliative and exploratory behaviors than the insecure infant. Secure and insecure infants do not differ greatly on attachment behaviors, but rather on the circumstances and stress levels that stimulate attachment. Laboratory studies using carefully deinfed stimulus conditions have found subtle differences in expression of attachment behaviors between secure and insecure infants (e. g. Stayton, Ainsworth, & Main, 1973). As yet unresolved is how behaviors shown under the tested stimulus conditions relate to behavior in the home.

A construct found useful in the present study, but not considered by Ainsworth and her associates, is the concept that infants have a repetoire of behaviors to achieve their wants, and these behaviors can be placed on a continuum. For example, if the infant wants maternal attention the first behavior exhibited may be minor verbal irritation. If no response is forthcoming, the infant then travels toward the mother. Failure to elicit a response results in the infant touching the mother and then crying loudly. It is possible that the rather elaborate typology devised by Ainsworth et. al. reflects not so much differences in attachment behavior but the level of security of the infant and the initial step on the continuum. For example, one infant cries when mother leaves, the other moves toward the mother's exit. Rather than assuming these infants are attached in a different manner, one could argue that the infants differ only on the security dimension. Thus the most insecure infant will cry when separated from the primary caretaker, but a

more secure infant will seek out the attachment object. Ainsworth's typology of proximity-avoiding does not fit the model described here, although it may be a viable independent dimension of attachment behavior. Only longitudinal studies can clarify whether the various proposed attachment typologies will be reflected in later adjustment patterns. However, the typology of security and the constructs of attachment and affiliative systems can be observed in mature and adult organisms. Most adults speak of persons they love, enjoy contact with and find stimulating. Adult insecurity or dependency upon a love object is a common topic in adult psychology. It is interesting to note that the affiliative system has not been considered subject to a security dimension by developmental and attachment theorists. However, a comparison with adult behavior shows that adults are often characterized as being social isolates or social extroverts.

The major finding regarding maternal responsiveness was that latency appeared more important than degree of responsiveness as a consequence of infant behavior, and that responsiveness did not factor into one or two clusters. The stream of behavior is very complex. An infant only rarely emits one behavior for the mother to respond to. Rather there is much overlap with one behavior leading into another. Although the data from this study are not conclusive, it appears that when an infant emits a chain of behavior such as crying, following, and touching, the infant does not react as if all behaviors have been reinforced. Rather the infant's reaction occurs at that location in the sequence where the consequence occurred. The basis for this argument follows from the scoring system for the Esterline-Angus charts that allowed maternal responding

to multiple and overlapping infant behaviors. The correlational analyses indicated that infants were not reacting to this maternal response as a reinforcer for the overlapping behaviors, but to the last behavior of the chain. If this had not been the case, latency should have been less powerful in the correlations than the responsiveness ratios. This argument suggests that temperol sequencing is a major determinant of maternal control. Whether or not a mother responds is less important than when she responds. It follows that when an infant is behaving according to a continuum of alternatives, and begins the chain of behavior with the less mature actions, a mother who delays responding until the infant emits more mature behaviors is actually as responsive as the mother who responds immediately to the first behavior emitted. The difference is at the level of infant behavior responded to by the mother. If the assumption is made that crying is the most immature behavior, verbal distress somewhat more mature, and verbal positive the most mature behavior, and if the assumption is made that whether an infant moves toward the mature or immature end of the continuum is based on the urgency of the infant's needs, the effective caretaker will delay responding when the stress is minimal because the infant will emit more mature behaviors if verbal distress fails to gain a response. But if the urgency is great, and the infant moves from verbal distress to crying, the mother should respond immediately to prevent reinforcing the less mature behavior.

The results from this study concur with the Clarke-Stewart (1973) findings that maternal stimulation is important, perhaps more so, than maternal responsiveness. Only one responsiveness measure, latency to respond to infant touching, clustered in the maternal factor that reflected

acceptance and sensitivity. However, the maternal-infant intercorrelations suggested the infant dominated the relationship. Integrating these findings, it appears that the infant exerts the most controls when an interaction occurs, but the influence of the mother is strongest in mode of responding. A mother can stimulate her child when the infant is distressed or passively pick-up the infant. Optimal maternal care should not be judged by the level of the mother's responding to the child, but rather how she responds and whether she actively encourages affiliation behaviors. The optimal mother responds slowly to attachment behaviors if the child is not extremely unhappy and quickly to affiliation behaviors. Given that mothers may find it hard to judge whether their infant, when distressed, will proceed to mature or immature reactions, general responsiveness to all behaviors will have more positive effects on the infant than a selective position of ignoring distress and reinforcing only affiliation behaviors. The results showed no evidence that selective responding encourages infant cognitive growth or more mature vocalizations, although Clarke-Stewart (1973) found some evidence that selective responding encouraged infant socialization in the second year of life. Perhaps by the second year of life, the affiliation system is functioning with enough efficiency that the infant can gain most of its needs without resorting to verbal distress. In summary, the Ainsworth (1972) position on the importance of general responsiveness was more strongly supported than the operant position of selective responsiveness.

Another important result is validation of the concept that infant behavior re-organizes with development. Werner's (Langer, 1970) concept of re-organization into more differentiated sub-systems seems to fit the

data quite well. Werner proposed that development proceeds from a state of relative globalness and lack of differentiation to a state of greater differentiation, greater efficiency, and hierarchic integration. For example, gestural signals were initially a part of the system of distress contact with mother, but towards the end of the first year, gestural signals seemed to be integrated within the positive communication system directed toward caretakers. Crying behavior factor analyzed into a distal form of communication at 12 months, but at earlier observations, crying functioned as a disorganized emotional response that was not directly related to other systems of infant behavior. The correlational analyses suggested that behavior was often cross-organized. That is, a particular behavior may be organized into disparate behavioral systems. For example, infant touching behavior was a member of both the distress contact and positive contact systems. On the basis on Werner's theory (Langer, 1970), the three infant behavioral systems of distress contact with mother or attachment behaviors, positive contact or affiliation behaviors, and exploratory behaviors, will mature into more discrete systems with less overlapping among behavioral components. Behaviors that are less efficient for one system will gradually enter another system where they are more efficient in achieving the needs of the infant. Why a select behavior is a member of one system rather than another is a matter of speculation. Reactions of the caretaker undoubtedly affect what behaviors are in a system. The physiological maturity of the organism is another factor. Using gestural signals as an example, initially gestures are rather primitive and provide little information for the mother. As the infant achieves greater physiological mobility, gestures provide more informa-

tion, and thus enter the positive contact system which appears to be based upon reciprical information gathering as well as social stimulation. One could assume that originally gestures were a behavioral manifestation of the crying and emotional disorganized responses of the infant. With maturity, gestures became a aspect of verbal distress, and finally a part of the positive verbalization behaviors. Research from the Piagetian school of thought, Werner's theory, and other developmental orientations have focused on this concept of developmental change. The findings that this pattern occurs for infants in this study is certainly not new, but it does suggest that investigators of maternal-infant interaction must be conscious of the fact that what appears to be the similiar behaviors in infants of differing developmental stages may be different behaviors because of different system membership.

Evidence was presented that both the operant position, as defined in this study, and the ethological position can explain select portions of the findings. A compromise theory would be to explain the maternal-infant dyad in terms of a motivational reinforcement theory with reciprical control and communication between members of the dyad. A motivational reinforcement theory simply assumes that infants and mothers have certain needs that must be satisfied by the behavior of the other member. Consequences or reinforcers do have an impact on behavior, but this impact is related to need satisfaction not just mere presence of the consequence or reliable occurrence of the consequence. The infant must control and communicate to the caretaker for survival reasons. Hence the importance of the distress contact system. It follows that one major goal of infant behavior is maternal comfort and physical con-

tact when distressed. Another goal is social stimulation including gaining information and learning more competent ways of behaving. This study cannot explain the origin of these needs, although the ethological school would have little difficulty in presenting a genetic basis for these needs. As infants have goals, they have alternative behaviors to use if initial behaviors do not result in goal satisfaction. Behaviors used to attain goal satisfaction are not immune to environmental consequences. The caretaker's behavior determines which behavioral system is used in selected situations, and the caretaker helps determine at what maturity level the goal is achieved. In pathological cases, adverse consequences can disrupt goal seeking so that the infant no longer seeks a particular goal. Mothers can also be characterized as having an attachment system (i. e. love bond to the infant), an affiliative system (need for stimulation and social responsiveness from the infant) and an exploratory system (which for mothers would best be defined as relief from caretaking activities to pursue personal needs). Mothers tend to encourage infant maturity to increase their effectiveness as caretakers, and to increase infant maturity to allow the caretaker more time for personal activities. Therefore, it seems reasonable to characterize the maternal-infant interaction as a continuous growth sequence directed toward more discrete and efficient communication and control over the other member of the dyad. The end result is psychological growth and maturation of the child's competence. Mothers respond to attachment behaviors and, in our society, usually desire some attachment behaviors from the child until the child has reached adulthood, and beyond if adult love is considered a manifestation of attachment. But the crucial task of caretaking

is the encouragement and growth of the child's affiliation and exploratory systems. This writer observed mothers responding to their infants' attachment needs with great regularity, but rarely did a mother initiate an interaction where proximity to the infant was her only goal. Almost always, the goal appeared to be stimulation and teaching the infant aspects of his/her environment. Mothers are very versatile caretakers. In responding to their infants' attachment needs, they reinforce, teach, stimulate, and model appropriate affiliative and explorative behaviors. The literature in child development in replete with studies on the attachment between mother and child. Although this relationship is important, attachment is but one aspect of the caretaker and infant relationship. A distrubed affiliative or exploratory system can be as disruptive to infant growth as a disturbed attachment relationship.

The infant correlational tables suggested three organized systems of infant behavior--the distress contact with mother, positive contact with mother, and exploratory system. The maternal-infant correlations indicated the two major goals for the infant were proximity contact or attachment to the mother and social stimulation or affiliation with the mother. The question now is to integrate these findings. One approach is to assume attachment behaviors and the distress contact system are the same. But this negates the research of Ainsworth and her associates (Ainsworth, 1972) who have argued the attachment bond is a relationship that transcends infant relief from distress. Ainsworth and her co-workers have noted that the infant's behavior upon reunion is a more accurate expression of the attachment bond than the infant's separation protest. Findings from this study showed that touching mother behavior, an attach-

ment behavior, was also a component of the positive contact system. Attachment behavior may be viewed, then, as a preference for the attachment object, whether the infant is in distress or seeking stimulation. Attachment is not so much a prescribed set of behaviors, but a goal preference for the caretaker over other potential social objects. It follows that some behavioral differences will occur when the infant is seeking comfort for distress from an attachment object as opposed to a friendly stranger. Therefore one might find differences in the expression of social affiliation behaviors between an attachment object and a friendly stranger. The security-insecurity dimension should affect not only attachment behaviors but all behaviors including social affiliation. An insecure infant will emit more distress behaviors, and should reflect this insecurity during exploratory activities. The insecure infant will explore less competently unless the caretaker is present, and behave differently when engaging in social affiliative behaviors with the caretaker than the secure infant. At present these hypotheses are more theoretical than empirical. More research is needed to understand and carefully define the relationships between infant systems of behavior, goal preference for the attachment object, and the effect of the infant's level of security on behavioral systems.

Maternal-infant interaction is a complex series of interpersonal behaviors that affect and change each member of the dyad. To thoroughly understand this complexity, the dyad must be examined from different theoretical viewpoints using appropriate statistical techniques. Hopefully, the present study and similiar studies will be repeated using different coding schemas, more sophisticated observational procedures, and quantification of the appropriateness of the mother and infant's behavior.

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Appendix A

Example of Attachment Report

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1. Mother will be asked to leave the room. If child does not notice, have mother look at child and speak. Observe and report child's behavior at mother's leaving. Note what child does in mother's absence.

2. After five minutes or until separation distress is too great (or child is locomoting toward mother's exit), have mother enter room. Mother should look at child but not speak or smile. If child doesn't notice, then have mother speak. Observe and report child's greeting behavior. Give child time to locomote toward mother if child is so inclined.

3. Have mother approach child (if child does not approach mother) and pick-up and hold infant. Mother should smile and talk to infant as she initiates contact. Report child's behavior toward mother. Have mother then put child on floor. Report child's behavior to his/her mother's relinquishing contact.

4. After mother has let child down, present an attractive object for the child, approximately five feet away. Observe whether the infant goes to the object or remains close to mother.

Date_____ Infant's name_____

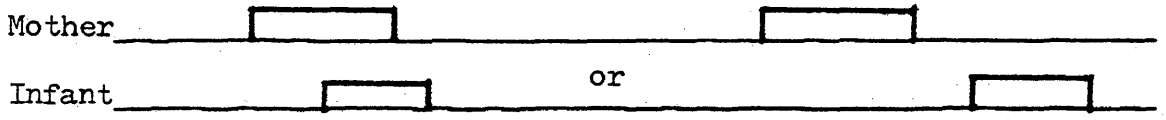
Observer's name_____

Appendix B

Rules for Analyzing Esterline-Angus Charts for Maternal Responsiveness and Latency Measures.

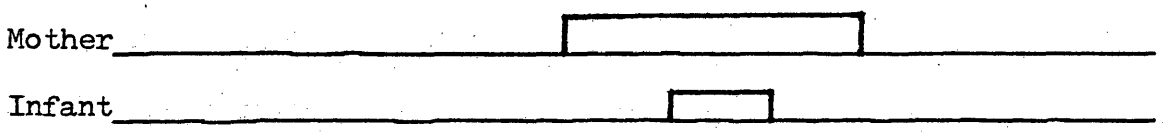
The esterline-angus charts move from right to left therefore the behavior to the right precedes the behavior to the left in time. The examples given below conform to the right to left sequence.

Rule 1: The mother's behavior must succeed the beginnings of the infant's behavior to be scored as a maternal response.

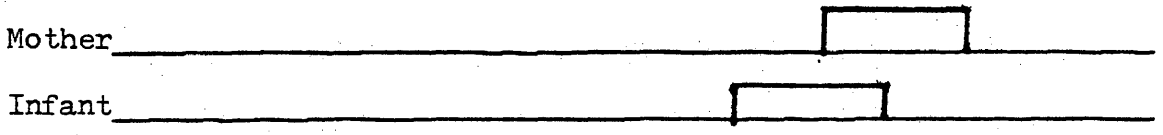


Rule 2: If the mother's behavior elicited the infant's response, the mother will be scored as responsive if her same behavior succeeds the termination of the infant's behavior.

First example:

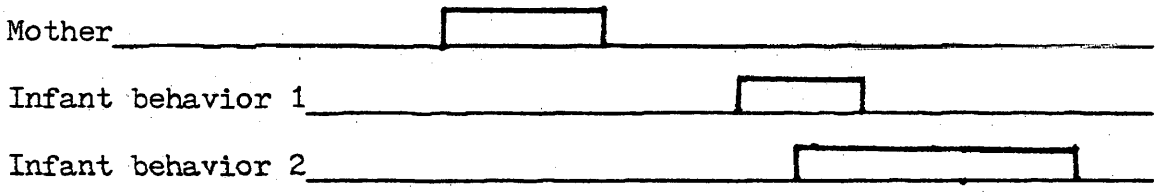


Second example:

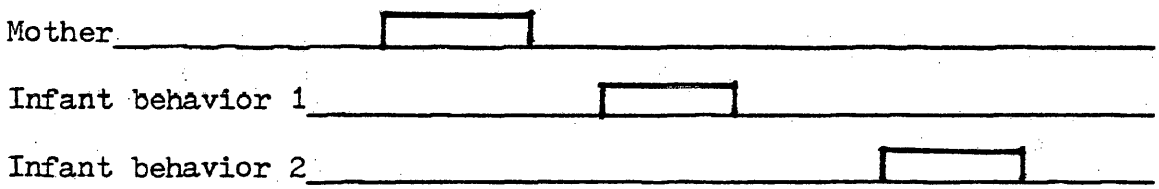


In the second example, the mother's behavior terminated before the infant's, therefore no score for maternal response.

Rule 3: If two or more infant behaviors occur at the same time, the mother will be scored as responding to both behaviors. In the example below, the mother was scored as being responsive to both infant behaviors.



Rule 4: If the infant emits another cluster of behavior before a prior infant behavior was responded to, the previous behavior is scored as not response from the mother.

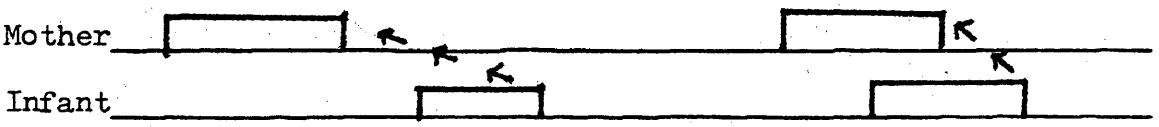


The mother is scored no response to infant behavior 2 but scored as being responsive to infant behavior 1. Had infant behavior 1 and 2 overlapped to any degree, the mother would have been scored as being responsive to both behaviors.

Rule 5: If no maternal response occurs after 60 seconds have lapsed from the time of the initial infant behavior, the mother is scored no response. After 60 seconds it is doubtful if the mother was really responding to the infant's behavior but rather emitting an independent behavior. This rule prevents extreme skewing of latency measurements.

Rule 6: If the first maternal behavior succeeding an infant behavior is verbal discouragement, physical punishment, or changing items, the mother is scored no response. The reasons for this rule are given in the text.

Rule 7: Latency to respond is determined by the duration of time between the beginnings of the infant behavior and the mother's response.



Duration in the above examples is shown by the arrows. For a situation as rule 2, when mother elicits and responds to the same infant behavior, duration would be 0 time. In conjunction with rule 5, the possible range for a latency measure is 0 seconds to 60 seconds. The mother must respond to recieve a latency measure.

Appendix C

Dimensions and Anchor Points for Measuring Maternal Sensitivity.

The following dimensions and anchor points provide a theory and rationale for construction of measuring instruments, from observation rating scales to attitude inventories, designed to quantify the concept of maternal sensitivity. For the present study, the dimensions were reconstructed into an attitude inventory, or, more correctly, into a self-report behavioral inventory (See Appendix D). The anchor point of one denotes a low sensitive mother, a mother who places her own needs first and is unwilling to modify her wants and desires to meet those of her child's. Three is a mother who compromises between her needs and the child's. Five denotes a highly sensitive mother, a mother who judges situations from the infant's perspective. The highly sensitive mother modifies her behavior as much as possible to insure the child is happy and content. There is no assumption of optimal maternal care implied in these dimensions or anchor points, whether sensitivity as measured by these dimensions is related to effective caretaking is an empirical question. The anchor points then simpily reflect degrees not an inherent judgment regarding the quality of the mother's behavior.

Dimension 1: Sensitivity to infant's distress.

1. Mother is indiscriminate in her techniques, is trial and error at each distress call.
3. The second or third technique is successful.
5. Usually the first, sometimes the second technique is successful.

Dimension 2: Sensitivity to infant's physical needs.

1. Mother has no anticipation of needs, schedules according to her needs, no attempt to minimize distress rather forges ahead to finish task.
3. Mother does not anticipate needs often, variance of her behavior is a compromise between her needs and infant's. Mother minimizes distress by slowing procedures, some stimulation.
5. Mother can anticipate infant's needs, she varys her schedule to meet the infant's needs. If child is distressed by necessary

diapering, etc., mother varies the procedure to minimize the distress, provides stimulation and games.

Dimension 3: Sensitivity to infant's interest in the environment.

1. Little or no awareness of child's likes, indiscriminate giving of toys to play with. Home is accommodated to mother's convenience, toys taken away for inconsequential reasons. If a toy is taken away, no object is given in replacement, no attempt to interest child in replacement object.
3. Mother has some idea of what infant likes but choices of toys, situations, placement of objects in the environment is compromise between her needs and infant's. Mother may substitude objects for infant, under conditions less than danger, makes some attempt to interest child in replacement objects.
5. Mother knows what objects, situations, that interest her child. She plans her home to accommodate infant's likes. Only objects taken away under duress are danger items, mother makes a strong attempt to interest child in replacement items.

Dimension 4: Sensitivity to infant's fears.

1. No awareness of fear situations, little attempt to reduce fear if such encountered.
3. Is aware of some fears, but attempts to prevent encountering the object or situation are subject to mother's schedule. Mother makes some attempt to reduce infant's fear but rarely re-schedules the situation if fear not reduced.
5. Is aware of infant's fears and attempts to prevent the child from encountering the object or situation, or if infant must face situation, mother makes a strong attempt to reduce the fear value of the stimulus.

Dimension 5: Sensitivity to infant's positive communication, including pre-speech, gestures, and vocalizations.

1. Mother is trial and error on interpretation, makes no attempt to understand such, is more likely to use present situation for interpretation rather than past use of such signal.
3. Mother correctly interprets most signals, some failures noted,

knows signal has been used in past but sometimes vague as to meaning.

5. Mother correctly interprets most all signals, has good understanding of meaning of signals from past usage, she does place past meaning in present context to more fully understand what the infant is attempting to communicate.

Appendix D

Maternal Self-Report Sensitivity Attitude Scale. *

The following is a series of situations mothers commonly find themselves in, you are asked to select the response you usually make. Obviously the responses mothers' make is determined by the baby's behavior, consequently mothers differ on their handling of their babies. There are no right or wrong answers. Place select (put a check mark beside) either 1, 2, or 3, as the response you usually do. If you waiver between 1 and 2 or 2 and 3, feel free to check them both, however never check all three or 1 and 3. Please answer "on what you do" not "on what you would like to do."

A. As for feeding the baby:

1 (5) I try to anticipate the baby's feeding, feed him before he lets me know he is hungry.

2 (3) I feed the baby as soon as he lets me know he's hungry (he fusses, pulls on my skirts, etc.)

3 (1) I let the baby fuss a little to insure he is hungry when I feed him.

B. As for diapering:

1 (5) I check frequently to see if he needs a new diaper.

2 (3) If I have some clue he needs changed (odor, pulls at pants), I do so.

3 (1) I change the baby as soon as he lets me know he is in discomfort.

C. As for length of feeding:

1 (1) If baby starts to dwadly and play with his food, I try to hurry him up by giving his food faster or encouraging him to eat faster.

2 (3) If I'm not pressed for time I let the baby take his own time at eating otherwise I encourage him to eat faster.

*Numbers in paranthesis refer to actual score gained if particular alternative is chosen. Theoretically the mean should be 3.0 in large sample of mothers.

3 (5) The time baby takes to eat is up to the baby, even though this may put me behind schedule for my work.

D. If the baby is upset and I give him some toys to play with:
1 (5) I try to find the one or two toys that really interests him.
2 (3) I bring out three or four toys he seems to spend some time with.
3 (1) The baby doesn't have any preferences, so I give him any toys that are handy.

E. As for placement of toys:
1 (1) I keep the toys in one room, but if he is in another and starts to fuss, I transfer the toys to where he is at.
2 (3) I try to keep toys in the two or three rooms the baby most likely will play in.
3 (5) There are toys in about every room the baby would enter.

F. If I must take something away from the baby, and he doesn't object:
1 (5) I try to give him something that will interest him, in replacement.
2 (3) I show him three or four near toys and ask him to play with them.
3 (1) I let the baby decide what to play with next.

G. As for who chooses play time:
1 (1) I believe I should start most interaction, considering how busy I am, this guarantees I spend some time playing with the baby. If baby objects, I try to find some game he likes.
2 (3) I believe interaction should be a compromise, if I am free I will start play time knowing that I may be busy later on. If baby lets me know he wants to be alone then I abide by his wishes.
3 (5) I believe that interaction is the choice of the child, even if I'm free I won't interact until he lets me know he wants to play.

H. If my child is confronted with a fear such as that of a stranger (not a close relative but a friend or neighbor):
1 (5) I tell the person not to worry and let the child make up to this

person when he is ready.

2 _(3)_ I try to encourage the child to make up to the stranger.

3 _(1)_ I make a strong attempt to get the child to make up to the stranger, if necessary I tell the stranger to say "hi" or have the stranger give the baby a toy, etc.

I. When the baby seems to be using a gestural signal such as pointing:

1 _(1)_ I try to ignore gestures, feeling this will encourage the baby to learn to talk earlier.

2 _(3)_ I notice them but wait until his verbalizations indicate that the gesture is important, thus encouraging the baby to talk.

3 _(5)_ I try to find out what he means by the gesture and comply with it, feeling gestures are as important as words for communication.

J. If baby is playing with some of his food and I'm busy trying to prepare him something else (some more food):

1 _(5)_ I go ahead and let the baby play as long as he doesn't get too messy.

2 _(3)_ I clean up the tray and give him a toy.

3 _(1)_ I clean up the tray and then hurry to finish the food I'm preparing.

K. If the baby is fussy:

1 _(1)_ The baby is difficult to quiet, I usually must do several things (such as giving toys, picking up the baby, etc.) before he stops fussing.

2 _(3)_ I must do two or three things before I find out what the problem is.

3 _(5)_ The first thing I do is usually enough to quiet the baby.

L. As for choice of feeding time: (sleeping time also)

1 _(5)_ The baby is fed whenever he is hungry, in effect the baby chooses when to eat and sleep.

2 _(3)_ The baby is fed when hungry but I've arranged feedings to set up some sort of schedule.

3 (1) I believe the baby is best with a schedule and feed according to a set schedule.

M. During feeding, if baby stops and begins to play:

1 (5) I play a little with him and then see if he'll take a little more, if necessary will stop feeding and start later.

2 (3) I play a little with him and then see if he'll take a little more, if he doesn't, I terminate feeding.

3 (1) Once the baby loses interest in the food, I stop feeding.

N. During necessary maternal acts, such as diapering, which the baby is objecting to:

1 (1) I hurry up so the diapering is over, and the baby is out of discomfort.

2 (3) I stop the diapering and play some, but if he continues to fuss, I hurry up so the diapering is over quickly.

3 (5) I will play with him until he stops fussing, then continue the diapering.

O. As for house space:

1 (5) All rooms are available for the baby to play in.

2 (3) I have several rooms that are off limits, other than that the baby has free roam over the house.

3 (1) I believe its best-for several reasons including cleaning-that the baby spend his time in two or three rooms, such as the kitchen, dining room, etc., and restrict him to these.

P. As for playing with kitchen pots and pans:

1 (1) I restrict him from the drawers, but if there is a special pot or pan he likes, I take it out for him.

2 (3) I have one special drawer that is his, and show this to him if he ever forgets.

3 (5) The baby is allowed to play in any kitchen drawer he wants to as long as it doesn't contain poisons, etc.

Q. If I must take something away and the baby begins to fuss about it:

1 (5) I give him a replacement object, if he still fusses, I make the object move, play a game with him with the object.

2 (3) I give him a replacement object, if he still fusses, I give him three or four more objects until I find one that quiets him.

3 (1) I give him a replacement object, if he still fusses, I then let him choose what he wants to play with next.

R. If my baby is afraid of a common household object such as the vacuum cleaner or can opener, etc.

1 (5) I try not to vacuum when he's around even if this is an inconvenience to my work schedule.

2 (3) I go ahead and vacuum but try to play some games with the cleaner so he'll lose his fear.

3 (1) I go ahead and vacuum feeling that exposure alone is the best cure for this, obviously if he gets too upset I stop and play some.

S. As for listening to baby's babbling, etc. (sounds and syllables):

1 (1) I feel its best to pay close attention to distress calls only, as these are communications to me and important for me to act upon.

2 (3) I pay close attention only when he's excited or in distress, the other is verbal play for the baby and not meant for communication.

3 (5) I pay close attention to the baby's talk however nonsensical, and try to figure out what he is attempting to say even though it does not appear to be communication with me. This includes distress calls also.

T. If the baby happens to be objecting to the bib:

1 (1) I go ahead and use it, and immediately start to feed so he'll get his mind off of it.

2 (3) I verbally encourage him to use it, show it to him, etc., so he'll forget his discomfort.

3 (5) I don't use it even though this means he will get his shirt dirty.

U. Between feedings, if the baby appears hungry:

1 (5) I go ahead and feed him a short snack, bottle of milk, if necessary, a full meal.

2 (3) I'll give him a cracker, or bottle of juice--something to hold him off until regular feeding.

3 (1) I try to keep him occupied or let him play until regular feeding.

V. As for re-arranging our living rooms, etc.:

1 (5) We have re-arranged our home so that all nice things are out of reach of the baby, this has meant an arrangement that doesn't look as nice as previously.

2 (3) We have put many things up but there are a few nice things we have left out, the baby must learn to stay away from these things.

3 (1) We have arranged our house little, feeling that the baby must learn what things to touch, what things not to touch.

W. As for object taken away: (things such as pieces of string that are not of value as toys)

1 (1) I take it from him gently and tell him why.

2 (3) I won't take an object away, but if its of no value I try to interest him in a toy, etc.

3 (5) I only take objects that are obviously danger items such as things he might swallow.

X. As for timing of play time:

1 (5) The baby can choose when he wants interaction, even though this means interrupting my work throughout the day.

2 (3) If the baby wants to play and I've got work to do I try to keep him occupied with objects until I'm free for a while, I play, then continue my work.

3 (1) I set up a schedule to get all my work done and try to keep the baby occupied until I'm completely through, this way I know I'll have a good two or three hours set aside to be with the baby.

Y. We are planning to go out but the only baby sitter we can get is

very competent and good with the baby but the baby is afraid of her (his fear of strangers):

1 (5) We have the sitter come early so that the child can adjust to her with our presence as a help.

2 (3) When the sitter comes we encourage the child to be friendly, and try to allay his fears, if this doesn't work we then leave for them to work it out.

3 (1) We quickly leave once she arrives, feeling that our presence may hinder the sitter's attempts to make up to the baby.

Z. If I must finish something in the kitchen such as washing dishes and the baby wants to play at my feet:

1 (5) I allow him to do so, watching where I walk.

2 (3) I set him in a corner of the kitchen, with some toys until I can finish.

3 (1) I put him in the next room, where he can see me, with some toys, until I can finish.

AA. If there is a food the baby should eat but he doesn't like:

1 (1) I encourage him to eat it, with encouragement and several tries, he comes to like the food.

2 (3) I mix in the food with something that he does like.

3 (5) I try to substitute another food of equal nutritional value that he desires.

BB. When the child uses a gesture such as pointing:

1 (5) I usually know what he wants.

2 (3) I sometimes know, other times I need some verbalizations to be able to interpret them (such as distress and pointing means I want something).

3 (1) My baby does not use gestures in any controlled way for communicating, I depend upon verbalizations.

CC. You have a new sitter and much to your unhappiness, she appears

too young and not very competent, you go out anyway and:

1 (1) Call home frequently, if she appears to be doing a poor job, you tell her over the phone exactly how to handle the situation.

2 (3) Call home frequently, if she seems to be having a few problems, you come home early.

3 (5) Call home frequently, even if she seems to be doing all right, you come home early anyway.

DD. The baby is about to destroy the newspaper or a current magazine:

1 (5) I take the newspaper and give the child an old newspaper or old magazine.

2 (3) I give the child one of his more preferred toys and take the newspaper.

3 (1) I tell the child that he cannot play with newspapers and encourage him to go find a toy to play with.

Appendix E

Correlational Tables of Across Month Infant Behavior.

TABLE E-1

Correlations of Infant Behavior at 9 and 10 Months. [1]

9-Month Infant Behavior	10 Month Infant Behavior																			
	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-IM															46			-55		
D-IM													48							
F-Sm																				
D-Sm		53	73	65																
F-Cry													49	50					50	53
D-Cry													64	55						
F-VD																			47	44
D-VD		-47																		
F-VP																				
D-VP																				
F-GS					-52															
D-GS																				
F-FM							-54						45	51						
D-FM							-44													
F-TM		-54											61							
D-TM	-48	-48						49							53	54				
F-VE																				
D-VE																			-48	
F-MO					53															
D-MO	52											49							65	

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 19 $\underline{r}$'s of the 400 computed would be expected to reach the .05 level of significance.

TABLE E-2

Correlations of Infant Behavior at 9 and 11 Months. [1]

9-Month Infant Behavior	11 Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-LM									48		58				65	50	63			
D-IM			66	63											71	51	75			
F-Sm					-59	-60														
D-Sm				60								64								
F-Cry				45											47	62				
D-Cry			55	69											44	46				
F-VD			54	48																
D-VD	-64		47																	
F-VP				-45									48							
D-VP									53											
F-GS	-57	-61																		
D-GS		-45						46	-47				46	45						
F-FM																48				
D-FM																				
F-TM			54	52											46		57			-55
D-TM									59	52					52					-69
F-VE				-46																62
D-VE			-57	-57				46						45	-48		-49			
F-MO							62	61												54
D-MO																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 19 r's would be expected to reach the .05 level of significance.

TABLE E-3

Correlations of Infant Behavior at 9 and 12 Months. [1]

9-Month Infant Behavior	12 Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-LM									45						70	72				
D-LM															80	68				
F-Sm																				51
D-Sm					72	54								61						
F-Cry	51														61					
D-Cry															74					
F-VD															53					
D-VD																				
F-VP			55						55	47										
D-VP			57	49					70	64										
F-GS			49	63								56								
D-GS			44	54													-47			
F-FM	54												65		52					
D-FM													53							
F-TM								45							73	61				
D-TM								53							68	72				
F-VE															-47	-47				
D-VE															-53	-53				
F-MO																				
D-MO			-51	-47																

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 19 $\underline{r}$'s would be expected to reach the .05 level of significance.

TABLE E-4

Correlations of Infant Behavior at 10 and 11 Months. [1]

10-Month Infant Behavior	11 Month Infant Behavior																			
	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-IM																			47	
D-IM	66	69										54							57	
F-Sm												59	46					-51		
D-Sm												44	57	54				-61		
F-Cry			-61																	
D-Cry			-46																	
F-VD																				
D-VD																				
F-VP									44											
D-VP										52										
F-GS	50	47													57	77				-48
D-GS																47				
F-FM		46	62	66											46					
D-FM		60	44	53																
F-TM											63									
D-TM											53									
F-VE											-66	-63								
D-VE	-59	-65									-74	-78			-66	-52		68		
F-MO																				
D-MO		52																-58		

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 19 r's would be expected to reach the .05 level of significance.

TABLE E-5

Correlations of Infant Behavior at 10 and 12 Months. [1]

10-Month Infant Behavior	12 Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-LM																				51
D-LM																				53
F-Sm					68	62											-45	-51		
D-Sm					60	53											-52			
F-Cry	-59	-56												-46						
D-Cry	-51	-49												-50						
F-VD	-50	-50											-62	-62						
D-VD		-45						58					-49	-47						
F-VP		70			-47	-49							66							
D-VP		63											61					-47		
F-GS																				
D-GS			-62	-64																
F-FM								45			-45	-44			46					
D-FM													58							
F-TM							64	75								59		-45		
D-TM							60	67								59				
F-VE						-49					-60									-46
D-VE					-50	-56														
F-MO			-46	-46		50	46													
D-MO	50				46	52														

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 19 r's would be expected to reach the .05 level of significance.

TABLE E-6

Correlations of Infant Behavior at 11 and 12 Months. [1]

11-Month Infant Behavior	12 Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-LM																				
D-LM				-56																
F-Sm					52	53									48	45				
D-Sm		48			49								45	44	49					
F-Cry																		55		-46
D-Cry																		67		-46
F-VD														-53						
D-VD																				
F-VP									46							48				
D-VP										44										
F-GS					59	65			55	44	55					49				
D-GS					76	75			45		53									
F-FM	50																			
D-FM																				
F-TM															62	57				
D-TM	55														50					
F-VE															50	52			-54	
D-VE																			-44	
F-MO																-48				45
D-MO															-48					45

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 19 $\underline{r}$'s would be expected to reach the .05 level of significance.

Appendix F

Correlational Tables of Infant Behavior with Infant Assessment Data.

TABLE F-1

Correlations Between Infant Behavior at 9 Months and Infant Assessment Data. [1]

9-Month Infant Behavior	Infant Assessment Data							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
F-LM		50						-60
D-LM								
F-Sm								
D-Sm								
F-Cry								
D-Cry								
F-VD								
D-VD								
F-VP								
D-VP			47	48				
F-GS								
D-GS								
F-FM								
D-FM						51		
F-TM					47			
D-TM			48					
F-VE								
D-VE								
F-MO								
D-MO			-57		-61			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, seven r's of the 160 computed would be expected to reach the .05 level of significance.

TABLE F-2

Correlations Between Infant Behavior at 10 Months and Infant Assessment Data. [1]

10-Month Infant Behavior	Infant Assessment Data							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
F-LM								
D-LM								
F-Sm								
D-Sm								
F-Cry				-45				
D-Cry								
F-VD				-47				
D-VD								
F-VP								
D-VP				59				
F-GS	-68		-55		-66			
D-GS	-82		-73		-82			
F-FM								
D-FM								
F-TM								-47
D-TM								
F-VE		-48						
D-VE		-49						
F-MO			-47					
D-MO								

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, seven r's would be expected to reach the .05 level of significance.

TABLE F-3

Correlations Between Infant Behavior at 11 Months and Infant Assessment Data. [1]

11-Month Infant Behavior	Infant Assessment Data							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
F-LM								
D-LM					-48			
F-Sm								
D-Sm								
F-Cry				-56				
D-Cry				-52				
F-VD						-52	-50	
D-VD						-51		
F-VP							48	
D-VP	46		56				48	
F-GS		54				45	54	
D-GS		57				47	47	
F-FM								
D-FM							-49	
F-TM							44	
D-TM	-45				-49	45		
F-VE								-61
D-VE								
F-MO	-47		-56					
D-MO								

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, seven $\underline{r}$'s would be expected to reach the .05 level of significance.

TABLE F-4

Correlations Between Infant Behavior at 12 Months and Infant Assessment Data. [1]

12-Month Infant Behavior	Infant Assessment Data							
	Bay-9	Bay-12	Means-9	Means-12	Caus-9	Caus-12	Comm	Att
F-IM		44		61				
D-IM								
F-Sm	51		49		53			
D-Sm					53			
F-Cry								
D-Cry								
F-VD								
D-VD								-47
F-VP		79					65	
D-VP		69					64	
F-GS		52				62		
D-GS								
F-FM				52				
D-FM	52		55					
F-TM							47	-54
D-TM							48	-61
F-VE								
D-VE				-58	-49			
F-MO		50						
D-MO		47						

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, seven r's would be expected to reach the .05 level of significance.

Appendix G

The infant factor analysis resulted in seven factors, of which two were tabled in the main text. The remaining factors are tabled in this appendix.

Factor 3: Behavioral components of Non-Verbal Distal Contact

Variable	Factor Loading
Duration-smiles-9	.912
Frequency-cry-12	.905
Frequency-smiles-10	.827
Duration-cry-12	.794
Duration-gestural signals-11	.774
Duration-smiles-10	.737
Duration-smiles-11	.558

Factor 4: Behavioral Components of Distress Contact at 11 Months.

Frequency-follows mother-11	.910
Duration-follows mother-11	.910
Duration-verbal distress-11	.827
Frequency-verbal distress-11	.723
Duration-visual exploration-11	-.710
Frequency-verbal positive-11	-.528

Factor 5: Behavioral Components of Development of Means.

Frequency-cry-11	-.931
Duration-cry-11	-.899
Duration-manipulation of objects-12	.663
Frequency-smiles-9	.650
Development of means-12	.590
Duration-visual exploration-12	-.542

Factor 6: Communication and Positive Verbal Behavior.

Variable	Factor Loading
Frequency-verbal positive-12	-.897
Duration-verbal positive-12	-.892
Bayley language scale	-.774
Communication scale	-.679
Duration-verbal positive-9	-.636
Frequency-gestural signals-11	-.474
Frequency-gestural signals-12	-.420

Factor 7: Organized Infant Cognition at 9 Months.

Duration-gestural signals-10	-.941
Bayley language scale-9	.903
Development of causality	.887
Development of means-9	.869
Frequency-gestural signals-10	-.768
Frequency-smiles-12	.639
Duration-smiles-12	.585

Appendix H

Correlational Tables of Within Month Maternal Behavior

and

Correlational Tables of Across Month Maternal Behavior

H-1

Correlations Between Maternal Behaviors at 9 Months.[t]

Maternal Behavior	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			
F-CI											84	64							
F-GS				55									63	56					
D-GS										-51									
F-GPS						77											66		
D-GPS												-45				53	49		
F-VPS								80	52								-50		-62
D-VPS																	-48		-87
F-Hold										68								58	
D-Hold																		56	
F-VD												93	58						
D-VD													62						
F-VP														68					50
D-VP																			
F-Sm																88		50	
D-Sm																			
F-LB																			54
D-LB																			
Time																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, eight r's of the 171 computed would be expected to reach the .05 level of significance.

H-2

Correlations Between Maternal Behaviors at 10 Months. [1]

Maternal Behavior	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP											61	72							-66
F-CI															-52	-49			
F-GS				84	53				54	65			66					57	
D-GS					75	48			70	79			74	61				64	
F-GPS						75			74	84			77	69				61	
D-GPS									60	69			56	61				55	
F-VPS								81						56	51				
D-VPS														58	64	49			
F-Hold										75			68	79					
D-Hold													69	61				50	
F-VD												97							
D-VD																			-44
F-VP														83	52			70	
D-VP																		62	
F-Sm																89		62	
D-Sm																			
F-LB																			
D-LB																			
Time																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, eight r's would reach the .05 level of significance.

H-3

Correlations Between Maternal Behaviors at 11 Months. [1]

Maternal Behavior	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sn	F-LB	D-LB	Time
F-PP		77																	
F-CI																			
F-GS				92	75						51		87	81				76	60
D-GS					89		58	50			50		52	74				72	58
F-GPS							69	56					66	60				50	
D-GPS													52					44	
F-VPS								97	44										
D-VPS																			
F-Hold												44					-53		
D-Hold																			
F-VD												68							
D-VD																			
F-VP														87				77	45
D-VP																		77	51
F-Sm																92		63	56
D-Sm																			
F-LB																			
D-LB																			49
Time																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, eight r's would reach the .05 level of significance.

H-4

Correlations Between Maternal Behaviors at 12 Months. [1]

Maternal Behavior	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			
F-CI					-47	-46			-52				-46	-49				-47	
F-GS				87	51	82			57	69								48	
D-GS					48	77			65	83			51	46				49	
F-GPS						75			47		-55					58			
D-GPS									74	69	-55		48	55				48	
F-VPS								54			45								
D-VPS																			
F-Hold										63			56	62				57	
D-Hold													55	60				67	
F-VD												81							
D-VD																			
F-VP														86				75	
D-VP															46			74	
F-Sm																60		46	
D-Sm																			
F-LB																			
D-LB																			
Time																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, eight r's would reach the .05 level of significance.

TABLE H-5

Correlations Between Maternal Behavior at 9 and 10 Months. [1]

9-Month Maternal Behavior	10-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			
F-CI																			
F-GS		52	57																
D-GS					51			57											
F-GPS			66	66	48				53				57						
D-GPS	-55		46																
F-VPS																			
D-VPS																			
F-Hold								-47											
D-Hold								-56											
F-VD																			
D-VD	61										58	62							
F-VP			50		52								60						
D-VP				44	47		60	54	54				62	79					
F-Sm			44	77	66				59	56			54	59				71	
D-Sm				66	59				65	44			52	75	56			62	
F-LB																			
D-LB	47		54	55														47	
Time					49													48	

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 17 r's of the 361 computed would be expected to reach the .05 level of significance.

TABLE H-6

Correlations Between Maternal Behavior at 9 and 11 Months. [1]

9-Month Maternal Behavior	11-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			
F-CI			78	68	63								68	54					
F-GS			48	61	53		53	55										59	46
D-GS																			
F-GPS			46								57				53	45		46	
D-GPS															57	61			
F-VPS																			
D-VPS																			
F-Hold	69											58							
D-Hold	54	51																	
F-VD			67	59	51								74	51				44	
D-VD			58	56	47	56							76	51				45	
F-VP			76	75	59						50		75	71				72	59
D-VP			53	59	51		49						51	78				59	56
F-Sm														46	62	61		45	
D-Sm														58	65	70		45	
F-LB											48								
D-LB															47			50	
Time																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

[1] On the basis of chance, 17 r's would be expected to reach the .05 level of significance.

TABLE H-7

Correlations Between Maternal Behavior at 9 and 12 Months. [1]

9-Month Maternal Behavior	12-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			
F-CI											54	50	51						
F-GS			56		55	50													
D-GS			56			45				47									
F-GPS									45										
D-GPS																			
F-VPS							53								70	50			
D-VPS															45				
F-Hold																			
D-Hold																			
F-VD											70	65	53						
D-VD											59	64	48						-47
F-VP													72	59					
D-VP					57	60		57					53	76	52				
F-Sm			45	71		52			58	70				56	49				
D-Sm				61		63			62	65		-49		69	62				
F-LB																			
D-LB			64															48	
Time		-49					-46						52						

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 17 r's would be expected to reach the .05 level of significance.

TABLE H-8

Correlations Between Maternal Behavior at 10 and 11 Months. [1]

10-Month Maternal Behavior	11-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			
F-CI		49																	
F-GS															61	57		63	
D-GS			46											52	70	68		65	
F-GPS		-46	52										61	71	55	53		64	
D-GPS																			
F-VPS							70	71		57									45
D-VPS											-51	-55							
F-Hold		-47												58					
D-Hold														51	46	46		47	
F-VD						55			-47	-54	48								
D-VD						65					46								
F-VP			64	55									61	72	64	54		69	51
D-VP														69	55	53			
F-Sm											-54	-75			61	60			
D-Sm										48	-65	-67							
F-LB																	47		
D-LB									-66			-47			82	73		52	
Time						-58													

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 17 r's would be expected to reach the .05 level of significance.

TABLE H-9

Correlations Between Maternal Behavior at 10 and 12 Months. [1]

10-Month Maternal Behavior	12-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																			-76
F-CI																			
F-GS			56			46							44						
D-GS			65	82		66			57	71			57	56	49				
F-GPS				60		53			55	70			85	81				62	
D-GPS			46			45				70			73	79				70	
F-VPS					46											59			
D-VPS								45											
F-Hold						52			45				49	65	62				
D-Hold			50	64		50				65			63	59				50	
F-VD										-46		52							-84
D-VD												50							-86
F-VP										45			66	68	48				
D-VP						45				49									
F-Sm																			
D-Sm																			
F-LB																			
D-LB																			
Time																			

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 17 $\underline{r}$'s would be expected to reach the .05 level of significance.

TABLE H-10

Correlations Between Maternal Behavior at 11 and 12 Months. [1]

11-Month Maternal Behavior	12-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-PP																	53		
F-CI									-49	-48				-45					
F-GS													69	49					
D-GS					61								58						
F-GPS					54														
D-GPS																			-73
F-VPS					70											67			
D-VPS					71											70			
F-Hold																			46
D-Hold							-50				-55						-57		
F-VD								-58				52							
D-VD																			
F-VP												50	77	61					
D-VP									45				75	79					
F-Sm				60						65				50	53				
D-Sm			53	70		56				72				47	50			44	
F-LB		44				-55			-50										
D-LB			56	65		47			51				71	61					
Time																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 17 r's would be expected to reach the .05 level of significance.

Appendix I

Correlational Tables of Maternal Behavior with Maternal Responsiveness and Latency Measures.

TABLE I-1

Correlations Between Maternal Behavior at 9 Months and Responsiveness and Latency Measures. [1]

9-Month Maternal Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-PP																	
F-CI																	
F-GS			58	62	50	66	49	66	60			-51					
D-GS	47					60	46	44	61								
F-GPS			55	52							-56					-48	
D-GPS										60	-61						
F-VPS							44										
D-VPS																	
F-Hold	-44												-44				
D-Hold	-49																
F-VD																	
D-VD																	
F-VP				67		50	47					-61					
D-VP				66		57	45	48		56		-62					
F-Sm															68		
D-Sm										48					55		
F-LB																-56	
D-LB																	
Time																	

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 15 r's of the 323 computed would be expected to reach the .05 level of significance.

TABLE I-2

Correlations Between Maternal Behavior at 10 Months and Responsiveness and Latency Measures. [1]

10-Month Maternal Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-PP											46						
F-CI									55				58		-47		
F-GS			67	70		49	54	63				-45					
D-GS			50	69		46	60	56									
F-GPS				65			50					-58					
D-GPS	45			55			52					-57					
F-VPS										46							-45
D-VPS																	-59
F-Hold				54			58			53							
D-Hold				60			50										
F-VD																	
D-VD		-45															
F-VP			57	75			68	63				-61					
D-VP				66			54			57		-56					
F-Sm																	-54
D-Sm																	-44
F-LB		49															
D-LB			65									-52					
Time																	

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 15 $\underline{r}$'s would be expected to reach the .05 level of significance.

TABLE I-3

Correlations Between Maternal Behavior at 11 Months and Responsiveness and Latency Measures. [1]

11-Month Maternal Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-PP			-55								46						
F-CI															-48		
F-GS				72		45	53	56				-49					
D-GS				63	49		52	56				-47					
F-GPS										52							
D-GPS					54												
F-VPS										44							
D-VPS																	
F-Hold																	44
D-Hold														-72			
F-VD																-64	
D-VD																	73
F-VP				61	47		52	56				-56					
D-VP				69		45	51	52		53		-60					
F-Sm		54	59	61				53				-65					
D-Sm			47	60				53				-54					
F-LB										-49							-63
D-LB			59	73	58	50	50	69				-70					
Time				51	60												

$\underline{r}$ Values: .05 > .4397; .01 > .5888; .001 > .7124

[1] On the basis of chance, 15 $\underline{r}$'s would be expected to reach the .05 level of significance.

TABLE I-4

Correlations Between Maternal Behavior at 12 Months and Responsiveness and Latency Measures. [1]

12-Month Maternal Behavior	Maternal Responsiveness and Latency Measures																
	R-Sm	R-Cry	R-VD	R-VP	R-GS	R-FM	R-TM	R-Mean	L-Sm	L-Cry	L-VD	L-VP	L-GS	L-FM	L-TM	L-Mean	Sens
F-PP																	
F-CI												49					-51
F-GS				50		59		53	57								
D-GS				51			44	51							68		
F-GPS																	
D-GPS				54		59	48	46	47								
F-VPS																	
D-VPS																54	
F-Hold				45		69						-45			53		49
D-Hold							48								65		
F-VD																	
D-VD															-44	-56	
F-VP				80		54	59	57				-74					
D-VP				74		59	52	50				-76					
F-Sm		68		46			46										
D-Sm							56	44									
F-LB													-44	69			
D-LB		46		55		46					56	-58					
Time		49															

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1 On the basis of chance, 15 r's would be expected to reach the .05 level of significance.

TABLE I-5

Correlations Between Maternal Attitude Measures and Demographic Data.

Maternal Attitude Measures	Maternal Demograhpic Data			
	Age	SES	IQ	# Children
Sn-Sc				
Roth-Acc				
Roth-OP	45		-69	
Roth-OI				
Roth-Rej				

r Values: .05 > .4397
.01 > .5888
.001 > .7124

Appendix J

The maternal factor analysis resulted in eight factors, of which the first and major factor was tabled in the main text. The remaining factors are tabled in this appendix.

Factor 2: Overindulgence

Variable	Factor Loading
Roth Scale-Overindulgence	-.783
Latency-infant crying	.715

Factor 3: Maternal Verbal Factor

Frequency-gives stimulation-11	-.940
Frequency-verbal positive-11	-.912
Duration-gives stimulation-11	-.844
Frequency-changes items-9	-.842
Frequency-verbal discouragement-9	-.829
Duration-verbal positive-11	-.797
Duration-verbal discouragement-9	-.744
Duration-looks at baby-11	-.717
Frequency-gentle physical stimulation-11	-.708
Frequency-verbal positive-12	-.677
Responsiveness-infasnt verbal positive	-.602
Frequency-verbal discouragement-12	-.543
Duration-verbal discouragement-12	-.517
Frequency-verbal positive-10	-.504
Latency-infant verbal positive	.494
Duration-verbal positive-12	-.467
Frequency-verbal positive-9	-.428

Factor 4: Slow Responsiveness

Variable	Factor Loading
Latency-infant smiling	.871
Latency-infant gestural signals	.861
Frequency-changes items-10	.793
Mean Latency	.789
Responsiveness-infant smiling	.606

Factor 5: Maternal Sensitivity

Frequency-holds-11	.733
Sensitivity mean	.703
Duration-verbal discouragement-11	.657
Frequency-looks at baby-11	-.607
Frequency-holds-12	.548
Responsiveness-infant following	.522

Factor 6: Slow Responsiveness to Infant Following Mother

Latency-infant following mother	.833
Frequency-looks at baby-12	-.800
Duration-holds-11	.776

Factor 7: Maternal Responsiveness to Infant Verbal Distress

Roth Scale-Overprotection	.725
Frequency-gentle physical stimulation-9	.719
Duration-gentle physical stimulation-9	.699
Frequency-gives stimulation-10	.680
Responsiveness-infant verbal distress	.628
Latency-infant verbal distress	-.587

Factor 8: Maternal Rejection

Variable	Factor Loading
Per cent time with infant-12	-.956
Duration-verbal discouragement-10	.880
Frequency-physical punishing-10	.853
Frequency-verbal discouragement-10	.815
Duration-gentle physical stimulation-11	.791
Per cent time with infant-10	-.624
Frequency-looks at baby-10	-.513
Responsiveness-infant crying	-.505
Roth Scale-Rejection	.486

Appendix K

Correlational Tables of Across Month Maternal and Infant Behavior.

TABLE K-1

Correlations Between Maternal Behavior at 9 Months and Infant Behavior at 10 Months. [1]

9-Month Maternal Behavior	10-Month Infant Behavior																			
	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-PP																				
F-CI											70	47								
F-GS																				
D-GS																			-54	
F-GPS								52												
D-GPS																				
F-VPS																				
D-VPS																				
F-Hold		-46																		
D-Hold							48	47												
F-VD											50									
D-VD																				
F-VP																				
D-VP			48	44														-56		
F-Sm							52	74							79	78		-45		
D-Sm			51					51							68	64		-64		
F-LB													-44							
D-LB		-54						45						-46		48			-44	
Time																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's of the 380 computed would be expected to reach the .05 level of significance.

TABLE K-2

Correlations Between Maternal Behavior at 9 Months and Infant Behavior at 11 Months. [1]

9-Month Maternal Behavior	11-Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-PP																				
F-CI	54	54			52	52										81				
F-GS			60	54													61			
D-GS																				
F-GPS																	46			
D-GPS			51	46							58	58					45			
F-VPS									49	46										
D-VPS																				
F-Hold															45				-47	
D-Hold					-44			-47												
F-VD	57	49			62	74										77				
D-VD	57	49			58	76										68				
F-VP						45									55	68				-44
D-VP				46							49	60			57					
F-Sm									68	65	70	53								
D-Sm									54	46	80	78								
F-LB					44															
D-LB		-45																	-55	
Time																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-3

Correlations Between Maternal Behavior at 9 Months and Infant Behavior at 12 Months. [1]

9-Month Maternal Behavior	12-Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-PP																				
F-CI	62									57										
F-GS															46					
D-GS																				
F-GPS											58	57			47					
D-GPS											52	55								
F-VPS														51						
D-VPS														49			49			
F-Hold													44		59	52				
D-Hold																				
F-VD	60									49								45		
D-VD	49																	54		
F-VP											54	44								
D-VP					47						44									
F-Sm								56								46				
D-Sm					58	59	49	59												
F-LB				55					49		82	76								
D-LB			47																	
Time														-47	46	46	-68			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-4

Correlations Between Maternal Behavior at 10 Months and Infant Behavior at 11 Months. [1]

10-Month Maternal Behavior	11-Month Infant Behavior																			
	F-IM	D-IM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-PP																			-51	
F-CI																				
F-GS																				
D-GS											47									-51
F-GPS	51										60	45			47	46		-45		
D-GPS													58	56				-52		
F-VPS				69																
D-VPS				45																
F-Hold											48	45								
D-Hold																				
F-VD																				
D-VD									44											
F-VP	50														49	49				-48
D-VP											54	59								
F-Sm				45								52								
D-Sm						-47														
F-LB									-52					45						
D-LB											53									
Time																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-5

Correlations Between Maternal Behavior at 10 Months and Infant Behavior at 12 Months. [1]

10-Month Maternal Behavior	12-Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-PP																		47		-50
F-CI																				
F-GS												55	-47							
D-GS								55												
F-GPS													-44							
D-GPS													-52				-64			
F-VPS		46																		
D-VPS		51			47															
F-Hold																				
D-Hold		-45											-68	-60						
F-VD							-51													
D-VD																				
F-VP																				
D-VP																				
F-Sm		58			57	58												-72		
D-Sm		49			53	56												-63		
F-LB	54																			
D-LB											46	47						-51		
Time					-45															

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-6

Correlations Between Maternal Behavior at 11 Months and Infant Behavior at 12 Months. [1]

11-Month Maternal Behavior	12-Month Infant Behavior																			
	F-LM	D-LM	F-Sm	D-Sm	F-Cry	D-Cry	F-VD	D-VD	F-VP	D-VP	F-GS	D-GS	F-FM	D-FM	F-TM	D-TM	F-VE	D-VE	F-MO	D-MO
F-PP			45																	
F-CI				53																
F-GS															47					
D-GS															60					
F-GPS															48					
D-GPS																		55		
F-VPS													44		45					
D-VPS															48					
F-Hold									-52											
D-Hold			-46	-52			59	45	-49	-48										
F-VD					-74	-69														
D-VD					-69	-48												48		-49
F-VP	46																			
D-VP																				
F-Sm											45	52				47		-46		
D-Sm					53	68	55	54							45	58		-52		
F-LB		59						-59												
D-LB															47	47				
Time																				

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-7

Correlations Between Infant Behavior at 9 Months and Maternal Behavior at 10 Months. [1]

9-Month Infant Behavior	10-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-IM					51								45						
D-LB												45							
F-Sm							56												
D-Sm							76	81						59	56				
F-Cry																			
D-Cry																			
F-VD																			
D-VD																			
F-VP																			
D-VP																		46	
F-GS																	61		
D-GS																	56		
F-FM																		-45	
D-FM																		-57	
F-TM		55																	
D-TM				60															
F-VE																			
D-VE																			
F-MO									48										
D-MO																51			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-8

Correlations Between Infant Behavior at 9 Months and Maternal Behavior at 11 Months. [1]

9-Month Infant Behavior	11-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM				50	49						51					46		51	
D-LM				65	62		59	58			49							48	
F-Sm												-55							
D-Sm							54	50			-53	-45							
F-Cry			57	65	74		58	48											
D-Cry			47	67	74		78	76	45										
F-VD	50				48		52	45	55										
D-VD	68								59										
F-VP							-56	-58											-58
D-VP					-54				-55	-51									
F-GS	46	57															46		
D-GS																			
F-FM	47			50	54		55	49	55			60							
D-FM	59								57										
F-TM							52	57											
D-TM																			
F-VE															-46				
D-VE				-54	-52		-56	-51											-53
F-MO		-47							47										
D-MO																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-9

Correlations Between Infant Behavior at 9 Months and Maternal Behavior at 12 Months. [1]

9-Month Infant Behavior	12-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-IM		-50			65														
D-IM					77											56			
F-Sm									-51			-49							
D-Sm							70								51				
F-Cry																			
D-Cry					59											51			
F-VD																			50
D-VD																			48
F-VP																		51	
D-VP																		48	
F-GS																			
D-GS												47							
F-FM												49				45	63		
D-FM							75										75		
F-TM			67	53	72	63										44			
D-TM			65	70	64	62				48									
F-VE					-56										-49	-70			
D-VE					-49														
F-MO																			
D-MO																	-53		

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-10

Correlations Between Infant Behavior at 10 Months and Maternal Behavior at 11 Months. [1]

10-Month Infant Behavior	11-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM																			
D-LM												-61							
F-Sm										49	-62	-60							
D-Sm										55	-57	-54							
F-Cry																			
D-Cry																			
F-VD							-47												
D-VD																		44	
F-VP											46								
D-VP								47											
F-GS			76	55	44								73	79				53	
D-GS			48										47	55					
F-FM					49		62	63											
D-FM		-50																	
F-TM		-49													62	69			
D-TM		-46													64	66		45	
F-VE												54			-56	-63			
D-VE		60											-52	-70	-47	-49		-50	
F-MO																			
D-MO																			

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-11

Correlations Between Infant Behavior at 10 Months and Maternal Behavior at 12 Months. [1]

10-Month Infant Behavior	12-Month Maternal Behavior																	
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-LM			-47																
D-LM			-60																
F-Sm														57				46	
D-Sm														57				47	
F-Cry																			
D-Cry																			
F-VD																	-55		
D-VD			48	69		53				57									
F-VP																51	54		
D-VP																54	53		
F-GS							45						63	51					
D-GS																			
F-FM					58														
D-FM																			
F-TM			57	80		67			63	87				48				51	
D-TM			58	78		53			56	85				44				55	
F-VE													-47	-50				-47	
D-VE		62							-59				-62	-74				-53	
F-MO																			
D-MO		-68																	

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.

TABLE K-12

Correlations Between Infant Behavior at 11 Months and Maternal Behavior at 12 Months. [1]

11-Month Infant Behavior	12-Month Maternal Behavior																		
	F-PP	F-CI	F-GS	D-GS	F-GPS	D-GPS	F-VPS	D-VPS	F-Hold	D-Hold	F-VD	D-VD	F-VP	D-VP	F-Sm	D-Sm	F-LB	D-LB	Time
F-IM													50	46					
D-IM																			
F-Sm					55											60			
D-Sm					73						-44					74			
F-Cry																			
D-Cry											45								
F-VD																			
D-VD																			
F-VP																			
D-VP																			
F-GS				46		49			50	51			47	58	46			49	
D-GS								57						60	49				
F-FM												52	44					54	
D-FM																		50	
F-TM					65	46			47				57	47					
D-TM							45				51	53	66						
F-VE					57														
D-VE		62											-45	-52				-48	
F-MO			-62	-50															
D-MO			-47	-55										-49					

r Values: .05 > .4397; .01 > .5888; .001 > .7124

1. On the basis of chance, 18 r's would be expected to reach the .05 level of significance.