MATERNAL ATTACHMENT TO INFANTS DURING POSTNATAL PERIOD: EFFECTS OF ADDITIONAL INFANT-MOTHER CONTACT AND INFORMATION ABOUT INFANT COMPETENCY

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I wish to dedicate this research to my family. . . .

my husband, Fred

and our children, Pam, Judi and Bradley

*Mead Johnson Laboratories were suppliers of infant formula which was provided for the mothers who participated in the study.

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CHAPTER I

STATEMENT OF THE PROBLEM

Recent investigations indicate there is a period shortly after birth that is uniquely important for mother-to-infant attachment in human beings (Barnett, Leiderman & Grobstein, 1970; Klaus & Kennell, 1970, 1972; Salk, 1960, 1973). Such a phenomena has long been known in animal studies (Hersher, Richmond & Moore, 1963; Klopfer, Adams & Klopfer, 1964; Moore, 1968). Characteristic and species-specific maternal behavior such as nesting, retrieving, grooming and exploring have been observed in nonmammalian mothers immediately after delivery (Rheingold, 1963). If the animal mother is separated from her young during this period for as short a time as one to four hours, deviant mothering behavior, such as failure of the mother to care for her young, often results.

It is acknowledged that the mothering role of the human female derives from a complexity of factors such as her native endowment, culture and long history of interpersonal relations within her family of origin. However, Klaus and Kennell (1970) have observed behavior common to mothers at the first postnatal contact with their unclothed infants as they establish affectional ties. This behavior involves an orderly, progressive transaction by the mother with the infant, such as seeking eye contact, touching (first with fingertips on the infant's extremities followed by palm encompassing contact of the trunk) along with smiling and

vocalization.

Such "species-specific" behavior in humans is tied to animal studies through Bowlby's ethological theory of attachment. Bowlby (1958) theorized that in the early life of the human infant there matures a complex array of instinctual responses, which insures he obtains parental care sufficient for survival. Thus Bowlby proposed that the nature of a child's tie to his mother is a psychological attachment and although this is related to physiological satisfactions, the two are fundamentally different phenomena. Bowlby posed that instinctual responses to the infant (crying, smiling, sucking, clinging and following) evoke maternal behavior in the mother. Robson (1967) added eye-to-eye contact to Bowlby's list as another innate "releaser" of maternal caretaking responses.

As a result of Harlow's (1958) imaginative research on rhesus monkeys, which demonstrated the independent need of the infant for maternal contact apart from receiving food, the emotional and social development of the human infant was brought out of the field of theoretical and clinical inference. It is now widely agreed that babies do not attach to their mothers only because they feed them (Stone, Smith & Murphy, 1973).

However, despite the deluge of studies investigating the effects of maternal-infant separation in humans that followed Harlow's work, the focus has been on the consequences of separation on the infant, rather than the mother (Barnett, Leiderman, Grobstein & Klaus, 1970). There are no comparable data regarding what might be the most critical time for the human mother to undergo separation from her infant. Considering the cultural expectancies built up in the human mother and the physiological changes she has undergone in preparation for establishing a

relationship with her infant, it is reasonable that the immediate postpartum period may be a time of maximum sensitivity for the mother. Separation from her infant in the neonatal period may not permit the mother to develop maximum attachment to her infant at the time she is most sensitized to be responsive to him.

A related factor possibly obscuring consideration of the importance of mother-infant interaction in the postnatal period has been the notion that the newborn as an organism is underdeveloped and has limited perceptual and sensory capacities. Only in the past decade with the advance of physiological instrumentation has there been a dramatic spurt of interest in infant studies. The results of these investigations increasingly reveal the infant to be complexly organized and perceptually sensitive and thus capable of participating (responding and eliciting responses) in interaction with the mother in the newborn period (Stone, Smith & Murphy, 1973).

Further, investigation of maternal-infant interaction in the postnatal period is hampered by present hospital lying-in practices. In almost all American hospitals mothers are partially separated from their full-term infant for a short and possibly critical time. They see them only at regular feeding periods. When the infant is ill or premature, separation is usually complete. Care is provided in another division of the hospital or even another building. In the vast majority of nurseries, although the mother may come to see her premature baby, she is denied the opportunity to touch or care for him until he is large enough to go home. Barnett, Leiderman, Grobstein & Klaus (1970) conducted a preliminary study to determine the effects of interactional deprivation of the infant and mother in the neonatal period on maternal attitudes

and behavior. The findings indicate that mothers having extended physical contact with their premature infants during three days following delivery demonstrate significantly greater responsiveness (eye contact, fondling and stroking) to their infants than control mothers when evaluated after 30 days. This study and others (Brazelton, 1963; Kaye & Brazelton, 1971; Richards & Bernal, 1972; and Thoman, Barnett & Leiderman, 1971) suggest that present hospital procedures and pediatric practices significantly affect the establishment of such ties or affectional bonds between a mother and her infant in the postnatal period.

The purpose of this investigation is to measure the responsiveness of the primagravida mother (the mother who faces childbirth for the first time) to her full-term infant under two experimental conditions: 1) Additional contact with her infant over routine hospital procedure during the hospital confinement period of the mother, and 2) Additional information received by the mother over routine hospital procedure about the general sensory capabilities of the neonate.

CHAPTER II

REVIEW OF THE LITERATURE

Hospital Practices

For decades a major criticism of hospital practice has been the separation of mother and baby (Bakwin, 1945, 1951, 1966, & 1972; Barnett, Leiderman, Grobstein & Klaus, 1970; Grulee, 1939; Klaus, Jerauld, Kreger, McAlpine, Steffa & Kennell, 1972; Klaus, Kennell, Plumb & Zuehike, 1970; McBryde, 1951; and Powers, 1948). Separate hospital care facilities for mother and infant following delivery are not universal. According to Strong (1949) European hospitals as well as those in Japan and China, have always had the rooming-in plan. Dr. Clicord Barnett, an anthropologist, notes there is no precedent for separation of the infant and mother following birth (Klaus & Kennell, 1970). Dr. Barnett searched for variations in the Human Relations File which lists 220 cultures. He found in most cultures the mother and infant are secluded together and the mother has little or no responsibilities other than the infant during the 3 to 7 days while the naval heals. In the socialistic communities known as kibbutzim in Israel this is also true. In the early days after delivery the mother-infant pair are kept together part of the day through the fifth day and then are separated only part of each 24 hours. In Russia, mothers are not separated from their infants in the early weeks of life.

The separation of mother and infant in Western hospitals did not

occur until about the turn of the century. The New York Hospital in 1898 still had rooming-in, The Nursery and Children's Hospital did so until 1896, and The Johns Hopkins Hospital, built without a nursery, continued rooming-in as standard procedure until 1890 (Klaus & Kennell, 1970; Powers, 1948). By the early 1900's the high mortality and morbidity of infants (usually resulting from epidemic diarrhea, respiratory infection and inadequate equipment) as well as high incidence of maternal sepsis led to stricter isolation and the development of separate wards for all patients including infants who were free from infection. An additional need for nurseries was that most of the mothers hospitalized for obstetric care in that era were too ill to care for their babies. Further, pediatrics began to take a special position in Germany late in the 19th and beginning of the 20th centiry with the development of a scientific approach to the problems of the newborn. Before that time the clinical aspects of pediatrics had advanced in many countries, but usually only as part of obstetrics or of internal medicine (Grulee, 1939). Nurseries were invented by nurses, obstetricians or possibly by pediatricians, although there were very few of these at that time.

The most famous of the early neonatologists, Pierre Budin, gained recognition for his premature nurseries (1895) through a young Alsatian student, Martin Cooney. Cooney displayed the survival techniques of premature babies used by Budin in his Kinderbrutanstalt (child hatchery) at the Berlin Exposition of 1896 and subsequently at Coney Island in the United States. Cooney's handling of infants in the exhibits was similar to that of Budin, except mothers did not participate in the care of infants. Despite Cooney's commercialism many of his methods were adopted in the first premature nurseries in hospitals in the United States.

The first of these was started at Sarah Morris Hospital in 1923 by Hess, who like Budin, encouraged breast milk be expressed by the infant's mother and brought to the hospital for bottle feeding.

The establishment of asceptic technics led to more and more hospital deliveries of babies. Powers (1948) reported that as many as 95% of newborns were delivery in hospitals in some states with about 80% of these considered to be normal births. Yet, in view of the improved asceptic conditions and greatly reduced pathology of infant and maternal hospital patients, the importance of cross-infections, while deserving reasonable concern, remained exaggerated (Bakwin, 1966). The recommendations for the hospital care of full-term and premature infants written for the Children's Bureau in 1943 outlined special measures to protect the infant from infection and specified that visitors should be excluded from the nursery, limiting the mother to viewing her premature infant through the glass windows (Klaus & Kennell, 1970). Standard textbooks on newborn care from 1945 to 1960 by Parmelee, Crosse and Hess, as well as the newborn manual of the American Academy of Pediatrics, continued to recommend minimal handling, strict isolation and the exclusion of all visitors from the nursery.

Both the advance of specialized medicine in the areas of maternal and infant care and the effort around the turn of the century to reduce the mortality rate in infants and mothers in hospitals through separate care facilities are seen as contributing factors to the current emphasis on <u>individual</u> rather than <u>integrated</u> care of the infant-mother dyad in American hospitals. The obstetrician is charged with responsibility for the mother, while the pediatrician's responsibility is to the child (Audrey McMaster, M.D., personal communication, July 3, 1975).

Facilities are separate and under the administration of separate departments in most hospitals.

The mother of a full-term infant who gives birth in a hospital may have some contact with her infant when he is placed on her abdomen in the delivery room and when he is brought to her for a short time during the day. She will not be permitted to spend long intervals with him, nor will she be allowed to feed him for the first 24 hours (unless she is breast feeding him in which case he is sometimes brought after 12 hours). When the infant is ill or premature, separation is usually complete; care is provided in another section of the hospital or even another building. In the vast majority of nurseries, although the mother may come to see her premature baby, the usual care routine requires that she be separated from her infant immediately after birth for a period of time ranging from 3 to 12 weeks, depending on the weight and health of the infant (Barnett, Leiderman, Grobstein & Klaus, 1970; Klaus & Kennell, 1970). The timing and duration of mother-infant separation past the first day of birth are determined by the birth situation which is under the control of pediatricians, obstetricians, hospital administrator and state laws (Barnett et al., 1970).

While the work of the obstetrician is facilitated in the hospital, there is no consensus by writers (Bakwin, 1966; Powers, 1948) that indiscriminate hospitalization for delivery of infants is causally related to maternal or neonatal mortality or that separate care facilities within the hospital for mother and infant are truly necessary for prevention of infection.

Miller's three-year study in England at Newcastle-on-Tyne (1945-47) of 379 infants of 2500 gm (5½ pounds) or less, born and cared for in the

home, and 537 similar infants born and cared for in the hospital showed that with special home care no difference in mortality rate was found.

For more than 30 years Bakwin (1966) noted sick babies at Bellevue Hospital were handled freely by nurses, physicians, students and visiting hours were increased. Despite this the cross-infection rate decreased rather than increased and the fatality rate for infants under one year fell to about one-fourth its previous level.

At Baragwanath Hospital in Johannesburg, South Africa, Kahn (1954, 1961) arranged for mothers to remain in the hospital and with supervision care for their premature infants because of a shortage of nurses, with satisfactory results. Recent studies (Barnett et al., 1970; Klaus & Kennell, 1970; and Smith, 1969) have demonstrated that it is possible to introduce mothers into the premature nursery without clinically endangering the infant or disrupting the organization of care.

Conversely, the practice of separation of infant and mother during the hospital stay does appear to result in difficulties for the mother or parents, when they are dismissed from the hospital with their infant who is a stranger to them. Along with others (Bakwin, 1966; Moloney, 1946) a major concern by Edith Jackson (1946), a psychiatrist, on the pediatric staff at Yale, was that the practice of mother-infant separation in the hospital offers no opportunity for the mother to become acquainted with her baby, gain knowledge of how to interpret or meet his demands or acquire confidence in her ability to care for him. Dr. Jackson designed a program to foster parent-child intimacy in the hospital from birth to discharge by the establishment of a rooming-in unit. There the mother and baby could be together, mother could care for her child (in part) and share these experiences with her husband during his

daily visits to her and the baby.

Another objection to separate hospital care facilities for mother and infant is that it fails to promote or delays breast feeding, which increases difficulty in the mother-child relationship. When Duke Hospital adopted a compulsory rooming-in plan their breast feeding rate rose from 35% to 53% and phone calls from anxious mothers the first week after discharge from the hospital decreased 90% (Bakwin, 1966).

Rooming-in is now planned for or already functioning in several medical centers and hospitals and provides evidence in a concrete form of an integrated approach to maternal and child health care within the requirements of modern medical and hospital techniques.

Animal Studies

Studies of maternal behavior in nonhuman mammals have suggested that the degree of interaction permitted between mother and infant in the postpartum period will influence later maternal attachment and infant development.

As in other areas of neonatology, it has been useful to study mothers and infants during the neonatal period. In a review of animal studies Klaus and Kennell (1970) discern three patterns or trends of maternal behavior which deserve consideration here because of the possibility of their extension to comparable species-specific behavior in humans.

The first pattern relates to the effects of early separation on mothering behavior. In goats, sheep and cattle, when a mother is separated from her young in the first hour or the first few hours after delivery and then the two are reunited, the mother will show disturbances of mothering behavior, such as failure to care for her young, butting

her own offspring away, and feeding her own and other babies indiscriminately (Hersher, 1963; Klopfer, 1964; and Moore, 1968). However, if the mother and infant are kept together for the first four days and are separated on the fifth day for an equal period of time, the mother quickly returns to the maternal behavior characteristic of her species when the pair is reunited. Klaus and Kennell (1970) conclude there is a critical period immediately after delivery; if the animal mother is separated from her young during this interval, deviant maternal behavior may result. Hersher, Richmond, and Moore induced sheep and goats to adopt strange lambs and kids--between as well as within species, but this required delicate arrangements of timing to prevent the mother from destroying the infant. Rosenblatt (1963) found in experiments with mice and rats that when mother and young are reunited following separation the first hours after delivery, the mother will care for her young, but not as skillfully. The effects of early separation on later maternal behavior appear to vary with the species. It is known that infant dependency increases with the increase in level of the species on the phylogenenetic scale. Harlow (1963) studied rhesus monkey mothers deprived of tactile contact but allowed to see and hear their infants. After two weeks without any tactile contact these mothers rapidly decreased the amount of time they spent viewing their infants.

The second pattern of behavior disorder appears to develop following delivery if the mother herself has received abnormal care as an infant (Birch, 1956; Harlow, 1962) or if the normal sequence of behavior is altered. An example of this is Birch's experiments with rats. He fashioned high collars which were placed on the necks of pregnant rats to prevent self-licking. The collars were removed shortly before birth.

The maternal behavior of these rats was markedly abnormal. They waited a long interval before initial licking of the pups, consuming them once licking began, and in the instance of pups surviving the licking period, refused to allow them to suckle. No offspring survived the nursing period. Control mothers and mothers wearing collars similar to those described but notched to permit self-licking did not exhibit this aberrant behavior.

Thirdly, it was observed that for some period after delivery, usually weeks or even months, animal mothers have characteristic patterns of behavior and orders of behavior. For example, Harlow (1963) found that the rhesus monkey grooms her infant more at one month than at other times. Careful observations by Ainsworth (1967) in Uganda suggest that repeating sequences are also found in human mothers.

Much of the above material can be placed in a theoretical context by discussing the ethological position of Bowlby explaining the attachment process of a child to its mother.

Bowlby's Theoretical Basis of Attachment

The earliest exposition of Bowlby (1958) states:

> The attachment behavior which we observe so readily in a baby of 12 months old is made up of a number of component instinctual responses which are at first relatively independent of each other. The instinctual responses mature at different times during the first year of life and develop at different rates; they serve the function of binding the child to mother and contribute to the reciprocal dynamic of binding mother to child. Those which I believe we can identify at present are sucking, clinging, and following, in all of which the baby is the principal active partner, and crying and smiling in which his behavior serves to activate maternal behavior. (By 'following' I mean the tendency not to let mother out of sight or earshot, which is readily observed in human infants during the latter half of their first year and throughout their second and third years of life and in the young of other species sometimes almost from birth.) Whereas sucking

> is closely related to food-intake and crying may be so, the remaining three are non-oral in character and not directly related to food. In the normal course of development they may become integrated and focused on a single mother figure: as such they form the basis of what I shall call 'attachment behaviour'.

Subsequently, Bowlby grouped the more specific forms of behavior making for attachment into two main classes:

i. signalling behavior, the effect of which is to bring mother to child;
ii. approach behavior, the effect of which is to bring child to mother.

Additionally he found two variables that have proved to be significantly related to development of attachment behavior:

i. sensitivity of mother in responding to her baby's signals
ii. the amount and nature of interaction between mother and baby.

The position of the ethologists is that in animals there are many built-in responses which are comparatively independent of physiological needs and responses, the function of which is to promote social interaction between mothers of a species. In keeping with the ethological viewpoint Bowlby theorizes that as in the young of all primates there matures in the early months of life of the human infant a complex and nicely balanced equipment of instinctual responses, the function of which is to insure that he obtains parental care sufficient for his survival. To this end the equipment includes responses which promote his close proximity to a parent and responses which evoke parental activity. The three main concepts of his ethological instinct theory are: 1) the presence of species-specific behavior patterns, or instinctual responses, 2) the activation and termination of these responses by various conditions internal and external to the organism and 3) their integration into more complex behavior sequences.

Though there has been controversy over some aspects of Bowlby's

theory of attachment (Yarrow, 1970), it has been considered of signal importance in conceptualizing and consolidating the field, organizing literature and mobilizing scientific and public concern (Stone, Smith & Murphy, 1973). Bowlby's ethological viewpoint gathered dramatic support through Harlow's early studies (1958) with the infant rhesus at the University of Wisconsin. As expected Harlow demonstrated that contact comfort was an important basic affectional variable. Unexpectedly he found it overshadowed completely the variable of nursing to the extent that the primary function of nursing is to insure frequent and intimate body contact of the infant with the mother. Harlow's work was instrumental in resolving the theoretical controversy of attachment that prevailed at the time. The alternate popular position based on learning theory was rejected in favor of the ethological viewpoint. It is now widely agreed that babies do not love their mothers because their mothers feed them (Ainsworth, 1969; Bowlby, 1958, 1969, 1970, 1973; Cairns, 1966, 1969; Escalona, 1953; Gewirtz, 1961, 1969; Maccoby & Masters, 1970; Murphy, 1964; Rheingold, 1969; and Yarrow, 1967, 1969, 1970).

Both Ainsworth (1964) and Robson (1967) have added variables to Bowlby's list of five behaviors--crying, smiling, following, clinging and sucking--as innate "releasers" of maternal caretaking responses. Ainsworth identified thirteen patterns of behavior in infants from 8 to 30 weeks of age which seemed to mediate the attachment of the infant to his mother and soon afterwards to other favorite figures, and considered the catalogue of behaviors incomplete. Robson (1967) added the variable of eye-to-eye contact, which is cited by Wolff (1963) as occurring by the fourth week of life. More recent studies (Goren, Sarty & Wu, 1975) demonstrate visual proficiency in newborn infants, 9 minutes of age.

These developments speak to the forethought of Bowlby (1958) in not strictly limiting the number of instinctual responses as well as his interest in the infant as a potential source of investigation. He states:

> Those I am postulating are sucking, clinging, following, crying and smiling, but there may well be many more.

And further he adds:

> Since a main point of my thesis is that no one of these responses is more primary than another and that is, therefore, a mistake to give preeminence to sucking and feeding, it may be useful to consider the evidence for such a view. Unfortunately, studies of human infants are inadequate for our purpose and the hypothesis, therefore, remains untested.

In moving from the theoretical considerations of mother-infant attachment to a review of the literature it will become apparent that most studies of attachment are negative, that is they are investigations of the separation of the mother and infant. Further, despite the theoretical recognition that separation involves both the mother and infant, little attention has been paid to its effects on the mother (Barnett, et al., 1970). Additionally, an effort has been made in the infant studies to establish critical time periods, or the period in which the child is especially sensitive to the attachment process. This focus is maintained by the writer. According to Caldwell (1962) the critical period hypothesis is a useful measure in determining the development and maturation of the mother/infant bonding process. Questions pertain to whether:

> (1) there are periods during which the human infant is maximally sensitive to the social contacts with its mother, and during which affectional bonds are most easily cemented; and
> (2) whether, in the absence of mother-infant contact during the sensitive period, a durable infant-mother attachment can ever be established.

A period is interpreted by Caldwell as critical because of the events that occur therein, because of the state of the organism at the time, and because of the sequence in which developmental events occur. To

paraphrase Caldwell, all periods are critical, only some are more critical than others.

Attachment - Infant Component

The historical approach to designation of a critical period for infant attachment has essentially been negative. Investigations initially were based on cases in which the infant-maternal relationship either did not have a chance to develop or else was disrupted after a time. For this reason many early studies classified as those of attachment are actually investigations of infant separation. They have demonstrated that separation from the mother produces distress, developmental disruption and mourning with some variation in degree depending on the extent of separation (Stone, Smith and Murphy, 1973). Thus negative proof of the importance of the mother to the infant implies a positive relationship with the mother of considerable power and pervasiveness which generally is recognized as attachment.

Reviews of the literature (Bowlby, 1946; Caldwell, 1962; Nash, 1970; and Stone, Smith & Murphy, 1973) cite various ages in infants critical for maternal attachment to take place, depending on the investigator. Nash (1970) suggests there are two critical periods. The first, an imprinting period, lasts from about six weeks to six months (Gray, 1958) and the second, in which more affectional and social relationships are formed, lasts from about three months to three years (Bowlby, 1946). Bowlby's age period is based on his review of literature on children deprived of normal parental relationships by being placed in orphanages during the early years of life. Nash notes the periods overlap in their ranges for groups, but do not necessarily do so in individual cases.

The Spitz studies (Spitz, 1945; Spitz & Wolf, 1946) reveal the dramatic damage produced by separation from the mother once a tie has been formed. The closer the tie the more intense is the effect of separation. Interpretation of Spitz' studies suggests the second six-month period of the first year is more critical than the first six months, but Spitz later concluded serious damage was often done by a change of mothers as early as three months. Scott (1950), according to a review by Caldwell (1962), originally set a critical attachment period that ranged from 15 months to three years, but in a more cautious revision in 1958 suggested attachment may take place as early as one month or six weeks or as late as five to six months. Yarrow and Goodwin (1965) in a careful study investigated the effects of transferring infants from one (foster) mother to another (adoptive) one. The authors point out their approach does not confound separation with the effects of multiple caretaking of institutional care. On the other hand, the study is not one purely measuring maternal deprivation as the infant shifts from his whole familiar setting to a new home. With this limitation Yarrow and Goodwin clearly find that the great majority of separated infants show disturbance increasing from minimal at three months to intense and nearly universal at the age of six months.

Based on their review of the attachment literature since the separation studies, Stone, Smith and Murphy (1973) present a scheme for the development of infant attachment.

In the first stage of attachment the baby is "addicted" to social objects--possibly for no other reason than they are perceptually and cognitively the most interesting and dependably responsive ones in the infant's world. This development takes place during the first third of

the first year. The early indicators of attachment are generally taken to be visual following and concentration on the human face, especially the eyes, special alerting to the human voice and social smiling (Ambrose, 1961; Bowlby, 1969; Brackbill, 1958; Dewey, 1935; Emde & Harmon, 1972; Gewirtz, 1965; Hunt & Uzgiris, 1964; Kagan, 1970; Moss & Robson, 1968; Robson, 1967; Robson, Pedersen & Moss, 1969; Spitz & Wolf, 1946; and Wolf, 1963).

The second stage of infant attachment occurs during the second third of the first year. As the infant distinguishes others from mother she remains, as a rule, the most responsive, as well as the source of varied and multiple pleasures. All evidence from investigators suggests that about three months of age the infant is selectively responsive to mother (Ainsworth, 1969; Ainsworth & Bell, 1969; Bell, 1968, 1971; Brody, 1956; Fries, 1944; Harper, 1971; Prectl, 1963; Richards, 1971; and Sears, Maccoby & Levin, 1957). Spitz (1966) has termed this period the "intricate ballet between mother and infant".

The third period of attachment in the infant takes place during the last third of the first year when the realization that mother is different from strangers is sharpened and generally includes guardedness or fear of strangers. Additionally mother is used as a "safe base" from which the infant gains emotional refueling. Spitz used the label "eight-months-anxiety" and called attention to both separation stress and fear of strangers. Other studies have similarly emphasized the phenomena of separation distress, fear of strangers and the secure base behavior as the prime indicators of attachment to the maternal figure (Ainsworth, 1963; Rheingold, 1969; Schaffer & Emmerson, 1964; Stevens, 1971).

In summary, the work of Stone, Smith and Murphy represents the

most encompassing review of the infant attachment research to date. It is further seen as a major effort toward organizing the extensive literature findings into a schema depicting the attachment stages of the infant within the first year of life. However, the writer wishes to remind the reader that the literature in general gives little or no attention to the infant/mother interaction or attachment process before one month of age, nor is this period given other than cursary consideration in the developmental schema of infant attachment.

Competence of The Infant

Until recently the human neonate was considered to be a decorticate creature, whose activities and experiences seemed chaotic and unimportant. Infant behavior held little interest for the investigator. That situation has been dramatically reversed largely as a result of advancements in technology and instrumentation in the past decade. It is now recognized that an infant is not just "something that is to become developmentally" but from his earliest days is an active, perceiving, learning and information-organizing individual (Stone, Smith & Murphy, 1973). Other breakthroughs in understanding the infant have come about through simple extended observations or vigils of the neonate without neurological preconceptions or fixating on single responses. Additionally it has been recognized that our very way of handling the newborn plays into the assumption of neonatal incompetence (Ambrose, 1969; Leboyer, 1975). Wrapping the infant and placing it in a supine position in a bassinett obscures its behavioral repertoire. On the skin of its mother, without clothes but at warm temperature, it shows rooting, crawling, grasping and numerous antigravity responses.

Wolf (1959) found infants have many behavioral states, such as drowsiness, random startles, reflex smiles, sleep, sucking, and alert activity (which usually follows the feeding period). The work of Escalona (1962) and Prechtl (1965) partly parallels Wolf's work. Emde & Koenig (1969) found that smiling comes in bursts, will probably be seen after feeding and usually accompanies rapid eye movements (REM). Newborns are especially responsive to touch. Wolf (1959) has experimentally established that responsiveness to tactile stimulation is, during the first five days of life, greater than to auditory or vestibular stimulation. Tactile sensitivity can be detedted as early as the eighth or ninth week of prenatal life (Minkowski, 1926) in the oral-nasal region, but by birth skin sensitivity is widely distributed.

Snug swaddling (wrapping which may insure temperature stability as well as the type of constriction experienced in the womb) of the newborn has been found to be a dependable soother (Brackbill, 1971; Lipton, Steinschneider & Richmond, 1965; and Thoman & Korner, 1971). Other research suggests a way of reducing the arousal level in infants is to bombard them with continuous auditory stimulation (Birns, Blank, Bridger & Escalona, 1965; Brackbill, Adams, Crowell & Gray, 1966; Irwin, 1941; Irwin & Weiss, 1934; Lipton, Steinschneider & Prichmond, 1960). Brackbill demonstrated pacification of the infant is cululative across four sensory modalities (sound, light, swaddling and temperature). In a related finding Korner and Grobstein (1966) found that babies are quieted by being held vertically, possibly because it gives them vantage for visual searching. Orth and Brown (1961) found not only significantly less crying in infants to whom five hours of extra handling was administered during the first four and a half days of life, but alsoothat

handled infants showed more visual attentiveness.

Visual processing in the infant is apparent at birth (Goren, Sarty & Wu, 1975). If alert and the light is not too bright the neonate will open his eyes, or if the eyes are open but he sees no light he searches. He searches for configuration--edges and patterns. Even within minutes of birth infants show preference for following a human face over a geometric design. It was through the investigations of Frantz (1963) and Berlyne (1958) that infants were discovered to have visual, sensory and perceptual capabilities far beyond those once accorded them. Frantz's 1963 paper summarized his early findings on neonatal pattern discrimination and has been followed (Miranda & Frantz, 1971) by a study showing neonatal preference for high complexity. Studies by Sackett (1963); Bronson (1969); Salapatek and Kessen (1966); and Hershenson, Munsinger and Kessen (1965) call attention to the importance of edges and contours rather than complexity of design as primary factors of infant visual discrimination and encoding.

According to Eisenberg (1970) the neonate has broad auditory discrimination capabilities along every simple dimension as well as some ability to distinguish simple tonal patterns. Bartoshuk's contribution (1964) shows that the infant's sensitivity to sound follows the adult power function, Stevens' amendment to Fechner's law. According to the review of Stone, Smith and Murphy (1973):

> .....It now seems fairly certain that most infants, including prematures and those with known abnormalities of the CNS (Eisenberg, 1966a; Field et al., 1967), can differentiate sound on the basis of at least these variables: 1) band-width (Eisenberg, 1965; Field et al., 1967); 2) duration (Eisenberg, 1965; Lipton and Steinschneider, 1964); 3) repetition rate (Bartoshuk, 1962a; Beadle, 1962); 4) interstimulus interval (Bartoshuk, 1962b; Lipton & Steinschneider, 1964; Lipton et al., 1961); 5) frequency; 6) sound pressure level (SPL); and 7) dimensionality. However, only the last three parameters have been explored sufficiently to afford an insight into the organization of auditory behavior.

Andre'-Thomas and Autgaerden (1963) report that by the tenth day of life the infant responds to the mother's voice calling him by name and can distinguish his own name from another sound. Hammond (1970) has shown that this behavior can often be elicited at five days.

The fetus is capable of responding to sounds outside the mother's body by the 30th week (Sontag, 1944). According to Gesell and Amatruda (1947) premature infants, at a fetal age of 30 weeks react to the sound of a tinkling bell by active movement or by cessation of movement. Additionally infant reactions to sound consist of facial grimmacing, a startle, crying, cessation of crying, displacement of a single finger, pupillary dilatation, change in heart rate and rarely, a turning of the head in association of visual search.

Engen, Lipsitt, and Kaye (1963) showed either habituation or sensory adaptation to odors in thirty-two- to sixty-eight-hour-old neonates.

The results of studies by Richmond and Lustman (1955) show that there are qualitative and quantitative individual differences in autonomic function apparent in infants within the first days of life.

Other investigators have attempted to establish the importance that certain forms of exteroceptive stimulation available to the human fetus in utero might have in adapting the newborn infant to its postnatal environment. Recent work in this area by Salk (1960, 1962, and 1966) and Simner (1966a, 1966b) has called attention to the possibility that the rhythmic pulsations provided by the fetus' own heartbeat or the mother's heartbeat in utero might contain such properties. Following birth, when in proximity of such a stimulus the infant can be expected to show relatively less anxiety than is otherwise the case.

Summarizing the competence of the infant, Stone, Smith and Murphy

(1973) state:

> The infant, although limited in its response repertoire, is a highly complex and sophisticated organism. And while growth characterizes all living things, the rapid rate of growth most characterizes these early years. At no time in history will the human being again experience more dramatic, intense and dynamic change. To consider it a steady state organism, looking at single responses at single points in time can be folly.

Attachment - Maternal Component

Motherhood as a Developmental Milestone

Several theorists have focused on the developmental significance of the birth process. In pregnancy a number of new adaptive tasks confront the individual which are often diametrically opposed to the central tasks and functions of the earlier developmental periods. It is in pregnancy that the affectional bonds between the infant and mother are initiated. According to Bibring (1961) the maturational goal of motherhood is the establishment by a woman of a special relationship to her child in which she is able to view the child as part of herself, and at the same time part of the outside world and part of her sexual mate. Bibring set up an investigation around the longitudinal study (three trimesters of pregnancy, labor and delivery and one year postpartum follow-up) of 15 primagravida admitted for obstetrical care in the prenatal clinic of a general hospital. Findings show that symptoms of the maturational crisis especially become apparent after quickening and include an increase in previous signs of conflict and a regressive shift in which earlier patterns of behavior, attitudes and wishes emerge. A potential complication of resolving the developmental crisis is the gravida's relationship to her own mother, a characteristic of the conflict earlier cited by Deutsch (1945) and Benedek (1959). Bibring's study

suggests the maturational integration of motherhood occurs later and more gradually than expected. It does not come to completion with the arrival of the baby, but rather evolves slowly, in reciprocity with the child's development and with the growth of the family as an independent social unit.

Maternal Attitudes Toward the Child

The problem of what causes a mammalian mother to accept or reject her newborn is beginning to be investigated. Knowledge on the subject is still fragmentary, but a few factors are beginning to emerge. Newton and Newton (1962) found women "greatly pleased" or "indifferent or disgusted" at the first signt of their babies. The mother most likely to be very pleased was the mother who had stayed calm and relaxed in labor, cooperated with her attendents and more frequently desired to breast feed her baby.

Based on an analysis of complaints and questions of 100 mothers Carithers (1954) found they are more concerned with caretaking activities (regurgitation, stools, crying, and weight) than physical problems (crossed eyes, crooked feet, hernia or shape of nose, ears or mouth).

Other investigators have found that how a mother will treat her baby is to some extent predictable before the baby is born. Ferreira (1960) found that deviancy in the baby's behavior the first five days of life on five parameters (amount of sleep, crying, degree of irritability, bowel movements and feeding) was statistically associated with a negative maternal attitude prior to delivery.

Moss (1967) found that a woman rated two years earlier as accepting of a nurturant role and as dwelling on the rewarding aspects of having a baby of her own was more likely after her baby arrived to be

responsive to his crying than was a woman who had earlier been rated lower on these scales.

Based on interviews with mothers of premature babies Mason (1963) predicted the mother's subsequent mother-child relationships. The predictions were 90% accurate when compared with outcome ratings based on observations of mother-child behavior two months after the baby was discharged. Factors which appeared significant in prediction were the amount of anxiety the mother felt about her baby, whether she actively sought information about the baby, the supportive relationships she had, and her previous experience with a premature baby. No single characteristic was predictive by itself.

Some mothers following delivery must seek resolution of the wished-for child. Significant deviations, such as gross retardation or obvious congenital defects may limit the mother's developing capacity to accept the new child (Solnit & Stark, 1961). In both the birth of a defective child and death of a child there are feelings of loss, intense longings for the desired child, resentment of the cruel blow life has dealt and guilt. The main difference between the two reactions is the process of mourning has less opportunity to be effective when the retarded child survives (Provence, 1961).

According to Lax (1972) even in the birth of a normal child the mother can experience a sense of personal loss and depression to the extent the child does not coincide with the image of her hoped-for-baby (Solnit & Stark, 1961; Sperling, 1950, 1970). Such a discrepancy can be due to the child's sex, looks, temperament or feeding response.

The birth of a premature infant often represents the loss of a wished-for full-term baby. Kaplan and Mason (1960) and others (Mason,

1963; Solnit & Stark, 1961; and Wortis, 1960) have viewed the maternal reactions to the birth of a premature as an acute emotional crisis and note four psychological tasks which the mother must complete: (1) prepare for possible loss (anticipatory grief); (2) acknowledge and face maternal failure to deliver a full-term infant; (3) resume the process of relating to the infant; and (4) learn how the premature differs from a full-term infant and understand his special needs.

Blau (1963) noted that mothers who deliver premature infants have more negative attitudes toward their pregnancies, greater emotional immaturity and more body narcissism. Prugh (1953) cites two emotions, anxiety and guilt, that may be particularly prominent for the mother of the premature during the early period of waiting for the time she can care for her baby.

However, Smith, et al., (1969) found that in the early postpartum period mothers of prematures are not different from mothers of full-size infants with respect to their mood, concern about the baby in the postpartum period of acceptance of the pregnancy or of the baby. These findings are at variance with the view expressed by Caplan (1960) and Solnit and Stark (1961) that premature babies constitute a psychological crisis for the mother. The author is inclined to give more weight to Smith's findings because of his use of stricter statistical controls.

Broussard (1970) found a relationship in maternal perceptions and later child behavior. At one month of age babies rated as "high-risk" according to whether their mothers rated them better or worse than average, were more likely by age four and a half to require intervention for developmental and emotional deviations. The accuracy of the mother's ratings was not measured.

Support is given Broussard's findings by parents of older children. Told by physicians that their child at a much younger age was likely to die, Solnit and Green (1964) found these parents considered their children after recovery to be vulnerable to serious illness or accident. Disturbances were evident in the child's psychosocial development and parent-child relationship.

Kennell, Slyter and Klaus (1970) sought to measure another dimension of loss of child to the parent. The investigators observed the reactions of mothers to the loss of a newborn infant and explored the strength of emotional ties between mothers and their infants before the first physical contact. Mourning was present in the mother of each infant who died, whether the infant lived an hour or for 12 days and whether the mother had touched the baby or not. This implies a substantial degree of affectional bonding precedes tactile contact between mother and infant. Longer and more intense mourning was seen in mothers who had tactile contact with their infants and for whom the pregnancy was a positive experience. This indicates that both pleasurable anticipation of a pregnancy and physical contact with the baby may be important factors in the bonding response.

Maternal Behavior Toward The Child

Breast feeding has been investigated as a factor influencing the acceptance or rejection of the infant. Duke Hospital (Bakwin, 1966) noted that as the breast feeding by mothers increased the phone calls from anxious mothers the first week after discharge from the hospital decreased.

Other investigators contend data regarding breast versus bottle feeding, self-demand versus schedule, or early weaning versus late, even

if accurate, are seen to be of little relevance. Brody (1956) demonstrated the practice of breast-feeding offers no guarantee of maternal sensitivity to a baby's signals, nor does holding a baby during a feeding insure either rapport or intimacy.

Nevertheless, according to Ainsworth and Bell (1969) and Sander (1969) the feeding situation, especially during the early months, constitutes a principal occasion for mother-infant interaction and thus provides an excellent opportunity to gauge a mother's sensitivity to her baby's signals, her ability to time her interventions to suit his rhythms and her willingness to pay heed to his social initiatives, which may well prove predictive of how his attachment behavior is going to develop.

It has been noted by many investigators (Bishop, 1951; and David & Appell, 1966, 1969) that at the time of the first birthday mothers play a much larger part than do infants in determining how much interaction takes place. Yarrow (1963) found infants' capacity to cope with frustration and stress during their first six months of life was fairly highly correlated with 1) the amount of physical contact the mother gave the child, 2) the extent to which a mother's way of holding her infant was adapted to his characteristics and rhythm, 3) the degree to which her soothing techniques were effective, 4) the extent to which she encouraged him, 5) the extent to which materials and experiences given an infant were suited to his individual capacities and 6) the frequency and intensity of expression of positive feelings toward him by mother and others.

Ainsworth (1969) along with others (Bettelheim, 1967; David & Appell, 1966, 1969; and Sander, 1962, 1964) notes maternal behavior

similar to that cited by Yarrow which appears to contribute to the development of secure attachment infants showed at 12 months.

Early Critical Attachment Period

There is increasing support for the concept that close continual contact between mother and infant during the first days of life may facilitate mothering behavior and represent a critical period of attachment for the mother.

Klaus, Jerauld, Kreger, McAlpine, Steff & Kennell (1972) placed primaparous women in two study groups (routine contact or extended contact) shortly after the delivery of their normal full-term infants. Thirty days later extended contact mothers were more reluctant to leave their infants to the care of others and showed greater soothing behavior and sensitivity to the babies' cries.

Klaus and Kennell (1970) investigated mothers a half-hour to 13½ hours following delivery with their normal full-term infants undressed and placed beside them and other mothers during their first three tactile contacts with their premature infants. An orderly progression of behavior was observed in mothers of full-term infants. The mothers started with fingertip touch and proceeded in 4 to 8 minutes to massaging palm contacts on the infants' trunks. Mothers of premature infants followed a similar sequence but much slower. The intensive interest of mothers in their infant's eyes matched with the unusual ability of the newborn to attend and follow, especially in the first hour of life, suggested that the period immediately following birth may be uniquely important.

Barnett, Leiderman, Grobstein & Klaus (1970) conducted a study in which over a two-year period mothers were permitted to enter the nursery

and touch or handle their premature infants in incubators as early as the second day after birth. A comparison group of mothers who were not allowed to enter the nursery were followed in similar fashion. On a case basis differences in the two groups of mothers appeared to center in three areas: 1) committment to the infant, 2) self-confidence in the ability to mother the infant, and 3) behavior toward the infant (e.g. stimulation and skill in caretaking).

Salk (1960) noted a left lateral holding preference by mothers not separated from their infants after birth. The holding preference of mothers separated from their infants (prematures) was at chance level. These findings suggest that the mother probably does go through a critical period immediately postpartum. Theoretical speculations have attributed this left lateral preference of the nonseparated mother to an enhanced comfort and decreased anxiety resulting from the presumed stronger stimulation from the adult's heartbeat received as a result of left chest contact.

Weiland's study (1970, 1973) supports Salk's contention that the preferred site of body contact is a psychologically meaningful choice. Weiland experimentally examined the role of anxiety and those specific emotions associated with babies. The findings strongly support the explanation that emotions associated with involvement with infants, and to some degree anxiety about valued objects alone determine placement choice for holding infants or other objects against the chest. The results provide a basis for elucidating the special emotional pull on the human adult of the human baby, and for separating these emotions from the different influence of anxiety on behavior.

The purpose of this investigation is to measure the responsiveness

of

of the primagravida mother (the mother who faces childbirth for the first time) to her full-term infant under two conditions: 1) Additional contact with her infant over routine hospital procedure during the hospital confinement of the mother and 2) additional information received by the mother over routine hospital procedure about the general sensory capabilities of the neonate. The studies above have only looked at contact, one aspect of the maternal attachment process. How informed a mother is about the perceptual capabilities of the neonate is information that has not been considered in previous studies. Given the fact that a vast amount of research in the past twenty years disputes previously accepted notions that the newborn infant is perceptually unable to respond at an interpersonal level, this study proposes to examine this variable.

The following hypotheses were examined in this study:

Ho 1. A mother having additional information about the sensory competence of infants in general is more responsive to her infant by the time of her hospital discharge.

Ho 2. A mother having additional contact with her infant during her hospital stay is more responsive to her/him by the time of her hospital discharge.

Ho 3. A mother having additional information in general about the sensory competence of infants and having additional contact with her infant during her hospital stay is more responsive to her infant by the time of her hospital discharge than a mother receiving only additional information or additional contact.

CHAPTER III

METHOD

Subjects

Forty primaparous well mothers and their well babies were selected from the clinic patient population of a South-Central United States urban hospital. The mothers were between the ages of 17 and 23, well in respect to diabetes, kidney disease, drugs (no addiction), serology, delivered vaginally, and planned to keep their infants. The infants were term, between 2550 to 3800 grams (or 5 pounds, 10 ounces to 8 pounds, 6 ounces) in weight, without clinical evidence of intrauterine malnutrition or Rh isoimmunizations, free from birth anomaly and with an Apgar one minute greater than four; Apgar five minutes greater than seven (Appendix A). Multiple birth infants were excluded from the study. The mothers were generally of lower socioeconomic background. All mothers received routine obstetric care within the Postpartum Hospital Unit (Appendix B). The infants were cared for in the Newborn Nursery according to Standard Newborn Orders (Appendix C).

Equipment

All videotaping was done in the Research Nursery, a room adjoining the Newborn Nursery. Temperature and illumination of the room approximated the conditions of the Newborn Nursery. The room arrangement (See Appendix D) included a chair, an examining table and a Sony Cardioid

Table Mount Microphone located on a permanent wall shelf within arms length of the chair in which the mother was seated. Behind a curtain (8 to 12 feet from the subject) was located a Sony Video Camera (AVC 3260 ACI20V 50/60Hz 27W) with Sony TV Zoom Lens (f16-64mm), SonyMatic Videocorder (CV2100 ACII7V 60C/S 80W) and Admiral VTR Playback Record Camera (20V 60C/S) with 18" Screen. A hospital public address system transmitter within the Research Nursery intermittently issued announcements during the videotaping procedure.

Dependent Variables

The following demographic information was obtained for all mothers:

Age of mother
Race
Marital status
Birth date of infant
Sex of infant
Age of infant when named

The following variables were obtained from the videotaping of the experimental sessions:

Physical Exam Check List

Distance of mother from infant
Questions of mother regarding care of infant
Questions of mother regarding condition of infant
Physical contact of mother with infant
Mother assists physician
Behavioral responsiveness of mother
Mother leaves chair to approach infant
Verbal responsiveness of mother to infant
Verbal responsiveness of mother to physician
Infant distress

The dependent variables represent total scores for behavior over five observations obtained from the videotaping. Observations were made at 1-1½ minutes, 2-2½ minutes, 3-3½ minutes, 4-4½ minutes and 5-5½ minutes after a tape began and the mother's behavior was rated on the

PHYSICAL EXAM BEHAVIOR CHECK LIST (See Appendix E).

Nursing Session Behavior Check List

Lateral preference for infant following midline presentation
Number of times mother kissed infant during session
Breast vs. Bottle feeding
Manipulation of bottle or breast by mother
Infant actively feeding
Mother burping infant
En face position of mother to infant
Lateral trunk contact of infant to mother
Mother fondles infant
Mother vocalizes to infant

The dependent variables represent total scores for behavior over five observations observed from the videotaping. Observations were made at 1-1½ minutes, 3-3½ minutes, 5-5½ minutes, 7-7½ minutes and 9-9½ minutes after the tape began and the behavior rated on the NURSING SESSION BEHAVIOR CHECK LIST (See Appendix F).

The percentage of agreement between independent behavior ratings by the experimenter and another observer was determined on a random sample of 10 subjects (See Table I). The percentage of agreement is based on the assigned value of any given item in the PHYSICAL EXAM and NURSING SESSION CHECK LIST. The item Behavioral Responsiveness of Mother was the only one measuring degree as well as presence of behavior which is considered to account for lowered rater agreement. All coded scores were rated by the experimenter.

Conditions

At the time of selection, the 40 primaparous mothers of term infants were randomly assigned (Appendix G) to one of the following four groups (10 mothers per cell):

RI-RC The mother received routine information and had routine contact with her infant.

AI-RC The mother received additional information and had routine contact with her infant.

RI-AC The mother received routine information and had additional contact with her infant.

AI-AC The mother received additional information and had additional contact with her infant.

In the information condition the mother received information from the physician about the sensory capabilities of neonates. This information was given within 24 hours of assignment of the mother to the study (Appendix H).

In the contact condition the mother received instruction from a nurse on how to administer the RISS Treatment--how to stroke her infant (Appendix I). This instruction was given within 24 hours of assignment of the mother to the study. The mother administered the RISS Treatment after feeding her infant or four times a day for 15 minutes; 10 minutes of stroking followed by 5 minutes of holding. If confined to the nursery, the infant was stroked there by the mother. If not confined to the nursery, the mother selected the treatment site (nursery or mother's bed).

Procedure

Selection of subjects was made by the experimenter following delivery of the infant and when the mother had been admitted to the Postpartum Unit (See Appendix G for assignment of subjects). Subjects were randomly assigned to conditions. The experimenter was blind as to assignment of specific subjects. Only the physician who informed the mother and the nurse who instructed the stroking treatments knew subject assignment.

The mother's consent to participate in the study was obtained on a

form approved by the Human Experimentation Committee of the Oklahoma Health Sciences Center (Appendix J). Approximately 10% of the subjects eligible for the study refused. The two reasons most generally given for refusal were that their husbands did not want them to participate or that they were too shy to be filmed. Three subjects were discharged before filming could be accomplished and were replaced by the next eligible subject who was assigned to the appropriate condition.

During her hospital stay or confinement, the mother in the information condition received information from the physician (about the sensory capacity of neonates) within the first 24 hours after delivery. Hospital care was identical to that given the control group until videotaping took place and subsequent discharge.

The mother assigned to the contact condition during confinement received instruction by a nurse within the first 24 hours after assignment on the RISS Treatment. The nurse demonstrated the stroking technique to the mother, the mother in turn demonstrated the stroking technique to the nurse. The mother continued to stroke and hold her baby four times a day following every feeding until filming and discharge.

On the day of discharge, 3 to 6 days following delivery of her infant, the subject's behavior was videotaped in an experimental situation. On the morning the mother's name was posted for discharge, the experimenter accompanied her to the Research Nursery and talked with her informally until the physician arrived with her infant. Upon arrival of the physician and infant the experimenter stepped behind the curtain, which enclosed the videotaping equipment, to commence filming. The mother was videotaped while observing a routine physical examination of the infant by the physician. During the standard examination, which

lasted approximately 6 minutes, the infant was undressed by the physician and placed on the examining table. A routine examination was performed and neurological reflexes were checked. Questions by the mother were encouraged by the physician.

Following the examination, the infant was reclothed by the physician and presented mid-line to the mother. The infant at presentation was held in a supine position by the physician, with head toward the mother. The physician then handed the bottled formula to the mother, stated, "You may feed your baby now", and left the room. The mother was videotaped while feeding, nursing or holding her infant for 10 minutes. Continuation of the feeding was optional upon termination of the filming. Following the feeding a nurse returned the infant to the nursery.

CHAPTER IV

RESULTS

The independent variables were INFORMATION - Additional Information (AI) and Routine Information (RI), and CONTACT - Additional Contact (AC) and Routine Contact (RC). Two x two ANOVAS were utilized to assess the effects of these conditions upon the following 14 dependent variables:

1. Physical Exam Total (*DIST + CARE + COND + BRES + CH + VINF + VPHY)
2. Distance of mother from infant
3. Questions about care of infant
4. Questions about condition of infant
5. Contact of mother with infant
6. Behavioral responsiveness of mother
7. Verbal responsiveness to infant
8. Verbal responsiveness to physician
9. Distress of infant
10. Nursing Session Total (*MANIP + ACTF + BURP + ENFACE + TRUNK + FONDLE + VOCAL)
11. En face position of mother to infant
12. Lateral trunk contact of infant to mother
13. Mother fondles infant
14. Vocalization of mother to infant

No significant main effects were found for the contact or information conditions (See TABLES II-XV). None of the original hypotheses were supported. Mothers having 1) additional information about the perceptual capabilities of neonates and 2) increased contact with their infants during hospital confinement were not significantly more responsive to their infants upon discharge from the hospital.

The percentage of mothers whose preference it was to take their

*The key to the computer symbols representing each of the dependent variables utilized in the study is included in TABLE XVI.

infant from the physician and first place that infant on the left side is 88%, a similar percentage to that reported in the literature. Of mothers in the RI-RC and AI-RC Groups, 80% displayed left lateral preference. The percentage is 100% for the RI-AC Group and 90% for the AI-AC Group. (See TABLE XVII). These differences were assessed with Fisher's Exact Test. No significant differences were found (See TABLE XVIII).

The Pearson Product-Moment Correlation was utilized to assess the relationship among the following 28 variables:

1. Age of mother
2. Race
3. Marital status
4. Sex of infant
5. Age of infant when named
6. Handedness of mother
7. Days of instruction of mother at filming
8. Age of infant when filmed
9. Distance of mother from infant
10. Mother's questions about care of infant
11. Mother's questions about condition of infant
12. Contact of mother with infant
13. Mother assists physician
14. Behavioral responsiveness of mother
15. Mother leaves chair to approach infant
16. Verbal responsiveness to infant
17. Verbal responsiveness to physician
18. Distress of infant
19. Lateral preference of mother to infant presented midline
20. Infant breast fed
21. Infant actively feeding
22. Mother manipulates bottle or breast
23. Mother burps infant
24. En face position of mother to infant
25. Lateral trunk contact of infant to mother
26. Mother fondles infant
27. Vocalization of mother to infant
28. Mother kisses infant.

The results of the correlational analyses are found in TABLE XVI. The Physical Exam and Nursing Session behavioral values cluster into an identifiable group of variables that have a highly significant relationship with each other. Items in each of these lists would therefore seem

to be sampling in part the same behavior. The most notable finding is the significant relationship found between the age of the mother and maternal responsiveness. Other correlations were not remarkable.

Fisher's Exact Test was applied to the data to determine if age variance of the subjects within groups confounded the main effects of information and contact in the study. The tests comparing the control group (RI-RC) to the three experimental groups (AI-RC; RI-AC; and AI-AC) yielded no significant differences (See TABLE XIX). The age variance did not confound the main effects of information and contact.

Post hoc, the 40 subjects were reclassified into three groups according to age as follows:

GROUP	AGE S's	NO S's	PREVIOUS GROUP ASSIGNMENT Control	I	C	I-C
Low Age Group N=10	17	10	3	4	1	2
	18	7	1	3	1	2
Middle Age Group N=10	19	5	2	1	1	1
	20	5	0	0	2	3
High Age Group N=13	21	7	2	1	3	1
	22	2	1	0	1	0
	23	4	1	1	1	1

One-way ANOVAS were utilized to assess the effects of age upon the 14 variables previously examined in the 2 x 2 ANOVAS discussed above (TABLES II-XV). These analyses revealed significant main effects of

age on five dependent variables: 1) Distance of mother from infant during physical exam of infant, 2) Distress of infant during physical exam, 3) Lateral trunk contact of infant during the nursing session, 4) Total of all maternal behavior scored during the infant exam, and 5) Total of all maternal behavior scored during the nursing session (See TABLE XX). Mothers 19 years of age and above were significantly more responsive to their infants on the lateral trunk contact variable than mothers age 18 and below. On the other four dependent variables older mothers were significantly more responsive to their infants than younger mothers (See TABLE XXI for means and standard deviations for these age groups).

Post hoc, the left lateral preference data was examined for possible age effects. The percentage of mothers who first place their infant on their left side does differ by age. Of mothers in the 17-18-year-old age group 76% displayed left lateral placement; 100% of 19-20-year-old mothers placed their infants on the left; and left placement was preferred by 92% of 21-23-year-old mothers. (See TABLE XXII). This difference, however, is not significant as assessed by a Proportions Test for Independent Samples (See TABLE XXIII).

CHAPTER V

DISCUSSION

The hypotheses that maternal responsiveness would be significantly greater for those mothers who received information about the sensory capacities of neonates and/or stroked their infants were not supported.

There are three possible explanations for the lack of significance found for the contact condition. One, the short confinement period of the mother (3-6 days) may have not provided sufficient time for the experimental condition to create results. In the extreme case the mother, who was assigned to the study the day after delivery, received instruction the following day and was filmed and discharged the morning of her third day in the hospital, had only one day to stroke her infant. The average period of time mothers had in the experimental condition was 2-2½ days. One could not conclude that increased contact does not affect maternal responsiveness. One can only conclude that in a relatively short period of time--2 to 2½ days--increased contact does not affect maternal responsiveness.

Two, in the case of the contact condition, it cannot be assumed that mothers had even the 2-2½ days alloted in the study. The regular hospital nursing staff involved in providing the contact conditions for the mother were serving on a voluntary basis. Because of the heavy demands of the nurses' schedules and the hospital's three daily shift changes, there was lack of available personnel, committment and

organization required to carry out the instruction, supervision and follow-through in the contact condition. As a result no documentation of the stroking of infants was possible. All mothers in the contact group stroked their infant at least once, when they demonstrated the procedure to the nurse who instructed them. Because of the above-mentioned problems it cannot be stated with confidence that any mother was exposed to more than this minumum additional contact with her infant. If the study is replicated, adequate research staff to insure full control by the experimenter of all aspects of the research conditions would be essential. One can only conclude, therefore, that stroking an infant one time during confinement does not increase maternal responsiveness by the time of hospital discharge, not a surprising finding.

Thirdly, the stroking procedure itself was a technique experimentally employed in this study to facilitate mother-infant interaction. Previously the tactile contact technique was employed by Rice (1976) to stimulate growth and development of premature infants following hospital discharge. Preliminary studies (Klaus, Kennell, 1970; Rubin, 1972) report an orderly progression of exploratory tactile behavior by mothers during their first contact with their unclothed infants, beginning with fingertip touch of the infant's extremities and progressing to massaging palm contacts of the infant's trunk. The vigorous body strokes required in the RISS treatment may be intrusive of the slower, more tenuous natural pattern of first contact. Further, it may unfairly present the mother with a new learning task at the same moment she is "learning" to familiarize herself with her new infant. She may "feel more adequate" in performing the stroking on her infant if she had previously learned the task, such as during prenatal care.

Given these three possible problems, it is not believed that this experiment was a good test of the stated hypotheses regarding early effects of additional contact within the confinement period. Replication with more control over the stroking condition is recommended.

In this study it was decided to measure the early effects of the experimental conditions. Although one preliminary study by Klaus and Kennell (1972) found significant delayed effects of this experimental condition, no previous attempt to measure early effects has been reported. Early effects according to this experimenter are those present at the time of hospital discharge, or when the infant is 3 to 6 days of age, while delayed effects, according to Klaus and Kennell occur when the infant is one month or 28-32 days of age. In their 1972 study, Klaus and Kennell looked at 28 primaparous mothers who had additional early contact with their full-term infants (16 hours of additional contact within the first three days of life). Measuring delayed effects they found that the extended contact mother demonstrated significantly greater "en face" and fondling behavior toward their infants compared to the control group.

Klaus and Kennell found the importance of delayed effects of maternal responsiveness in an earlier study of the separation of mothers and their premature infants (Klaus and Kennell, 1970). Non-separated mothers (mothers having tactile contact with their infants within five days of birth) demonstrated more maternal responsiveness than separated mothers (mothers having no tactile contact with their premature infants up to 40 days after birth). These effects did not appear until a month after the infant was discharged from the hospital or when the infant was 2 to 2½ months of age. Not only does the experimenter recommend

that in future studies the controls be placed on personnel but that maternal responsiveness be measured for both early and delayed effects.

There are two possible explanations for the lack of significance found for the information condition. It was observed that mothers were very interested in the physical exam of their infants. Mothers appeared especially intrigued as the physicians measured the baby's various neurological reflexes, such as the startle, rooting and stepping responses. It is believed that the information given to the mother by the physician about the perceptual capabilities of a neonate would have more impact if given as the infant is examined.

On the other hand, it is possible that the physical examination of the infant, which all mothers observed, could have obscured or "washed out" the effects of the information given by the physician to 20 mothers about the physical competency of neonates. The rationale for employing both procedures needs to be carefully examined and understood before they are repeated in future studies.

The measures that were utilized in this study appear to be valid and reliable. The results of the correlational analyses show that within and between the physical exam and nursing sessions certain variables correlate highly with each other. Total scores for the physical exam and nursing sessions were found to significantly discriminate age effects. Variables that correlate highly with each other and with the total scores are considered to be ones that validly tap maternal responsiveness. Within the physical exam these variables are: distance of mother to infant, contact with infant, verbalization to infant, questions about condition of infant, behavioral responsiveness of mother, moving chair, contact with infant, distress of infant, questions about

care of infant, and verbalization to physician. Within the nursing session the variables are: infant actively feeding, "en face" position of mother to infant, fondling infant, trunk contact of infant to mother and vocalization. Variables which correlate highly between the physical exam and nursing session are: questions about condition of infant and fondling infant, infant actively feeding and questions about condition of infant and distance of mother to infant, questions about condition of infant and kissing infant, verbalization of mother to infant during physical exam and vocalization during nursing session and verbalization to physician and kissing infant. Many of these dependent variables have been cited in the literature as measures of maternal responsiveness.

The most interesting and important finding of the study is that the age of the mother plays a role in how maternally responsive she is to the infant. Mothers over 18 demonstrate significantly more maternal responsiveness than mothers under 19. The results suggest there is a "critical" age when a mother may develop a maternal readiness. Before age 19 a mother may or may not hold her infant close against her own body some time during nursing, but from age 19 on all mothers in the study do so. We can question whether the increased tendency of the mothers below age 19 to hold their infants close may reflect incomplete attachment or diminished maternal responsiveness. In animal studies the maternal affection of monkeys appears to wane progressively as the frequency of close ventral contacts between mother and infant decrease (Leifer, Leiderman and Barnett, 1970). Possibly maternal responses "emerge" in human mothers on the average at the age of 19. These responses serve to "bind the mother to her child and the child to his mother" (Bowlby, 1956). Support is given this interpretation by other

findings within this study. The younger the mother, the more likely her infant will be fussy during the infant physical exam, yet it is the older, not the younger mother, who seeks proximity to her infant irrespective of whether the infant is distressed. Thus it seems that the mother's age itself is a factor in determining, 1) the signaling behavior of the infant, 2) the sensitivity of the mother in responding to her infant and 3) the amount and nature of the interaction between mother and baby.

According to the complete review made of the literature by this experimenter, the age of the mother as a factor influencing maternal responsiveness has not previously been examined or always controlled. Based on the findings of this study, some of the results researchers are reporting may be due to age factors and not condition. In all future studies age must be accounted for, manipulated or controlled.

In summary, given that motherhood is a developmental stage in the normal maturation of a woman (Bibring, 1961) the question becomes what are the adverse psychological implications for both mother and child should motherhood occur at too early an age. It is known that the too young mother places her infant and herself at risk physically. In what way does the too-young mother become at risk psychologically in fulfilling the maturational goal of motherhood, which according to Bibring is the establishment of a special relationship to her child? What are other behavioral criteria of maternal responsiveness, and more specifically, in what other ways does the young mother differ from her more mature counterpart who may be ethologically ready for mothering? Questions such as these raised by this study offer direction for future research.

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TABLE I

PERCENTAGE AGREEMENT BETWEEN TWO RATERS OVER TEN SUBJECTS ON PHYSICAL EXAM AND NURSING SESSION CHECK LIST ITEMS

Item	% of Agreement
Distance of Mother from Infant	90
Questions of Mother Care	90
Questions of Mother Condition	90
Physical Contact	90
Mother Assists Physician	100
Behavioral Responsiveness Mother	40
Mother Leaves Chair	100
Verbal Responsiveness of Mother to Infant	100
Verbal Responsiveness of Mother to Physician	70
Infant Distress	80
Lateral Preference for Infant	100
Mother Kisses Infant	100
Breast vs. Bottle Feeding	100
Manipulation of Bottle or Breast	80
Infant Actively Feeding	90
Mother Burps Infant	100
En Face Position of Mother to Infant	80
Lateral Trunk Contact Infant to Mother	100
Mother Fondles Infant	90
Mother Vocalizes to Infant	90

TABLE II

ANALYSIS OF VARIANCE - PHYSICAL EXAM TOTAL

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.025	0.000
Contact	1	9.025	0.262
Information-Contact	1	24.025	0.698
Residual	36	24.414	

TABLE III

ANALYSIS OF VARIANCE - DISTANCE FROM INFANT

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	6.400	1.910
Contact	1	0.900	0.269
Information-Contact	1	0.100	0.030
Residual	36	3.350	

TABLE IV

ANALYSIS OF VARIANCE - QUESTIONS ABOUT CARE

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	1.225	1.271
Contact	1	0.625	0.648
Information-Contact	1	0.225	0.233
Residual	36	0.964	

TABLE V

ANALYSIS OF VARIANCE - QUESTIONS ABOUT CONDITION

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.025	0.031
Contact	1	0.625	0.784
Information-Contact	1	0.625	0.784
Residual	36	0.797	

TABLE VI

ANALYSIS OF VARIANCE - CONTACT WITH INFANT

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.625	0.503
Contact	1	2.025	1.631
Information-Contact	1	0.625	0.503
Residual	36	1.242	

TABLE VII

ANALYSIS OF VARIANCE - BEHAVIORAL RESPONSIVENESS OF MOTHER

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.100	0.012
Contact	1	14.400	1.736
Information-Contact	1	2.500	0.301
Residual	36	8.294	

TABLE VIII

ANALYSIS OF VARIANCE - VERBAL RESPONSIVENESS TO INFANT

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.025	0.071
Contact	1	0.225	0.638
Information-Contact	1	0.025	0.071
Residual	36	0.353	

TABLE IX

ANALYSIS OF VARIANCE - VERBAL RESPONSIVENESS TO PHYSICIAN

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	1.600	0.914
Contact	1	6.400	3.657
Information-Contact	1	2.500	1.429
Residual	36	1.750	

TABLE X

ANALYSIS OF VARIANCE - DISTRESS OF INFANT

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	8.100	2.618
Contact	1	10.000	3.232
Information-Contact	1	3.600	1.163
Residual	36	3.094	

TABLE XI

ANALYSIS OF VARIANCE - NURSING SESSION TOTAL

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	11.025	1.116
Contact	1	11.025	1.116
Information-Contact	1	1.225	0.124
Residual	36	9.875	

TABLE XII

ANALYSIS OF VARIANCE - EN FACE POSITION OF MOTHER

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.900	2.282
Contact	1	0.400	0.014
Information-Contact	1	0.000	0.000
Residual	36	01394	

TABLE XIII

ANALYSIS OF VARIANCE - LATERAL TRUNK CONTACT

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.900	0.470
Contact	1	0.900	0.470
Information-Contact	1	1.600	0.835
Residual	36	1.917	

TABLE XIV

ANALYSIS OF VARIANCE - MOTHER FONDLES INFANT

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	0.625	0.470
Contact	1	0.225	0.169
Information-Contact	1	1.225	0.921
Residual	36	1.331	

TABLE XV

ANALYSIS OF VARIANCE - VOCALIZATION OF MOTHER

Source	Degrees of Freedom	Mean Square	F Ratio
Information	1	10.000	2.711
Contact	1	0.400	0.108
Information-Contact	1	0.400	0.108
Residual	36	3.689	

TABLE XVI

CORRELATION OF DEMOGRAPHIC, PHYSICAL EXAM AND NURSING SESSION VARIABLES

	AGE	BLK	MAR	HAND	SEX	FILM	DINS	NAM	DIST	CARE	COND	CONT	ASST	BRES
AGE	1.000	-.209	.043	-.105	-.210	-.006	-.091	.264	.317	.284	.362*	.307*	-.028	.259
BLK		1.000	-.348*	.040	-.137	.122	-.048	-.146	-.088	.030	-.130	.031	-.118	-.007
MAR			1.000		.091	-.174	.077	-.047	-.028	.044	-.177	.025	-.145	-.104
HAND				1.000	-.038	.040	.022	-.240	-.169	-.108	-.317*	-.112	-.061	-.013
SEX					1.000	-.103	.038	-.259	-.169	-.165	-.061	-.112	.177	-.104
FILM						1.000	.329*	.061	.119	-.228	.032	.064	-.119	.112
DINS							1.000	.141	-.099	.153	.022	-.004	.035	.134
NAM								1.000	.414**	.250	.304*	.252	.007	.325*
DIST									1.000	-.058	.242	.766**	-.090	.741**
CARE										1.000	.103	.043	-.113	.058
COND											1.000	.020	.236	.299*
CONT												1.000	-.077	.682**
ASST													1.000	-.006
BRES														1.000

CODE OF VARIABLES

AGE	Age	DTSS	Infant Distress	
CAUC	Race-Cauc	EXAMT	DIST + CARE + COND + ASST + BRES + CH + VPHY + VINF	
BLK	Race-Black	LPREF	Lateral Preference	
MAR	Marital Status, Married	KIS	Kissed Infant	
SING	Marital Status, Single	BREST	Breast Feeding	
HAND	Hand Preference	MANIP*	Manipulating Bottle	
SEX	Sex of Infant	ACTF*	Infant Actively Feeding	
FILM	Age Infant Filmed	BURP*	Burping Infant	
DINS	Days of Instruction	ENFACE*	En Face Position	
NAM	Age Infant Named	TRUNK*	Lateral Trunk Contact	
DIST*	Distance of Mother to Infant	FONDL*	Fondling Infant	
CARE*	Care Questions	VOCAL*	Vocalization	
COND*	Condition Questions	NURST	MANIP + ACTF + BURP + ENFACE + TRUNK + FONDL + VOCAL	
CONT*	Mother Touches Infant			
ASST*	Mother Assists Physician			
BRES*	Behavior Response-Mother			
CH*	Mother Leaves Chair			
VINF*	Verbal Response-Infant			
VPHY*	Verbal Response-Physician			

*Dependent Variables

*p < .05

**p < .01

TABLE XVI (Continued)

	CH	VINF	VPHY	DTSS	LPREF	BREST	ACTF	MANIP	BURP	ENFACE	TRUNK	FONDL	VOCAL	KIS
AGE	.086	.218	.209	-.416**	.219	.162	.147	.088	-.002	.152	.411	-.258	.236	.293
BLK	-.019	.078	.019	.141	.119	-.277	-.353*	-.204	.514**	-.211	.514**	.288	-.293	-.045
MAR	-.006	-.004	.167	.091	.038	.114	-.187	.039	-.048	-.040	.134	.047	.180	.130
HAND	-.023	-.017	.125	.010	-.314*	.086	-.202	-.029	.401**	-.455**	.084	.110	.180	.033
SEX	-.006	-.093	-.315*	.036	.038	.266	.150	-.039	.139	-.121	-.052	.092	-.138	-.130
FILM	.023	-.045	-.020	-.042	.067	.361*	.006	.124	.105	.014	.176	.134	.166	.198
DINS	.165	-.053	.179	.278	.097	.022	.101	-.162	-.188	-.087	.048	.036	.103	.128
NAM	.225	.017	.179	.143	-.080	.144	.209	-.016	-.469	.187	.230	-.009	-.114	.055
DIST	.703**	.540**	-.155	.207	-.085	.042	.298*	.098	-.063	.090	.291*	-.150	.214	-.072
CARE	-.067	.180	.303	.014	-.049	.049	-.241	.030	-.120	-.094	.076	.177	.244	.191
COND	.171	-.077	.261	-.132	.142	.120	.318*	-.034	-.170	.244	.120	-.309	-.002	.385*
CONT	.616**	.853**	-.063	.248	-.026	.112	.181	.133	.047	.009	.250	-.036	.278	-.088
ASST	-.086	-.063	.148	-.277	.061	-.061	.032	.062	-.033	.064	.083	-.183	.093	-.069
BRES	.897**	.486**	-.013	.192	-.148	-.121	.158	-.014	.065	-.157	.283	-.144	.251	.061
CH	1.000	.418**	-.077	.317*	-.158	-.204	.197	.070	.053	-.168	.147	.186	.186	-.026
VINF		1.000	.040	.136	.017	-.149	.048	.017	.118	-.194	.206	.099	.345*	.170
VPHY			1.000	.349*	-.014	-.153	-.132	.000	.104	-.133	.151	-.120	.204	.365*
DISS				1.000	-.137	-.031	.004	-.117	.041	-.165	-.161	.188	-.220	.201
LPREF					1.000	.143	.146	-.265	-.060	.213	-.197	.025	-.180	.033
BREST						1.000	.021	-.147	-.213	.030	.197	.178	-.180	-.163
ACTF							1.000	-.064	-.308*	.332*	.195	-.559**	-.049	-.087
MANIP								1.000	.026	.250	.058	-.548**	.155	.000
BURP									1.000	-.354*	-.129	.051	-.085	-.010
ENFACE										1.000	-.090	-.260	.021	.104
TRUNK											1.000	-.271	.316*	.224
FONDL												1.000	.001	-.072
VOCAL													1.000	.341*
KIS														1.000

*p < .05
**p < .01

TABLE XVII

PROPORTION OF MOTHERS IN RI-RC, AI-RC, RI-AC AND AI-RC GROUPS WHO SHOW LEFT LATERAL PREFERENCE

Condition	No. of Subjects	Left Side — Right Side
RI-RC	10	
AI-RC	10	
RI-AC	10	
AI-AC	10	

100 75 50 25 0 25 50 75 100

Percent

TABLE XVIII

RESULTS OF FISHER'S EXACT TEST-MEASUREMENT OF LATERAL PREFERENCE BETWEEN INFORMATION AND CONTACT CONDITIONS

	RI	AI
RC		NS
AC	NS	NS

NS (Not Significant)

TABLE XIX

RESULTS OF FISHER'S EXACT TEST - MEASUREMENT OF AGE VARIANCE BETWEEN INFORMATION AND CONTACT GROUPS

	RI	AI
RC		NS
AC	NS	NS

NS (Not Significant)

TABLE XX

ANALYSIS OF VARIANCE - LOW, MIDDLE AND HIGH AGE GROUPS

Source	Degrees of Freedom	Mean Square	F Ratio
Physical Exam Total	2	12.836	5.29**
Distance From Infant	2	12.836	4.64**
Questions About Care	2	0.624	0.65
Questions About Condition	2	2.034	2.90
Contact With Infant	2	3.091	2.74
Behavioral Responsiveness of Mother	2	19.926	2.67
Verbal Responsiveness to Infant	2	0.428	1.31
Verbal Responsiveness to Physician	2	1.030	0.53
Distress of Infant	2	14.618	5.21**
Nursing Session Total	2	26.916	3.07*
En Face Position of Mother	2	0.297	0.73
Lateral Trunk Contact	2	7.94	5.20**
Mother Fondles Infant	2	2.033	1.64
Vocalization of Mother	2	3.144	0.83

*$p < .05$
**$p < .01$

TABLE XXI

MEANS AND STANDARD DEVIATIONS OF DEPENDENT VARIABLES SHOWING AGE EFFECTS

Variable	Low Age Group 17,18 years		Middle Age Group 19,20 years		High Age Group 21,22,23 years	
	Mean	Std. Dev	Mean	Std. Dev.	Mean	Std. Dev
Distance of Mother From Infant	0.47	1.23	0.40	0.69	2.15	2.48
Distress of Infant	3.90	1.39	3.00	1.83	2.08	2.10
Lateral Trunk Contact of Infant	3.50	1.75	4.60	0.98	5.00	0.00
Total Behavior Infant Exam	16.59	5.23	19.52	2.87	19.92	3.09
Total Behavior Nursing Session	9.53	4.94	8.30	3.40	15.30	6.82

TABLE XXII

PROPORTION OF MOTHERS IN LOW, MIDDLE AND HIGH AGE GROUPS WHO SHOW LEFT LATERAL PREFERENCE

Condition	No. of Subjects	Left Side — Right Side
Low 17-18 yrs.	17	
Middle 19-20 yrs.	10	
High 21-22-23 yrs.	13	

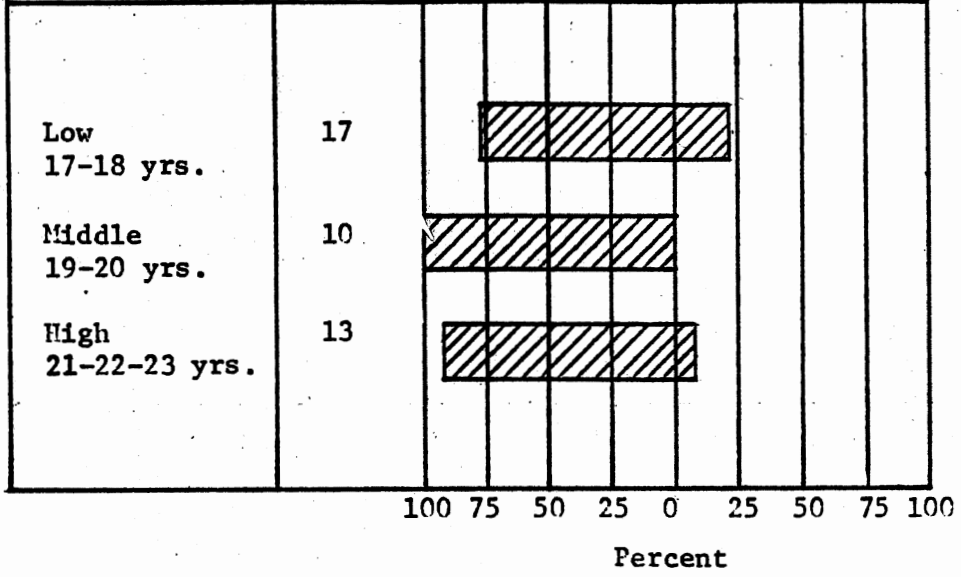


TABLE XXIII

RESULTS PROPORTIONS TEST FOR INDEPENDENT SAMPLES MEASUREMENT OF LATERAL PREFERENCE BETWEEN AGE GROUPS

Low with Middle	NS
Low with High	NS
Middle with High	NS

NS (Not Significant)

APPENDIX A

APGAR Scoring Chart

Sign	0	1	2
Heart Rate	Absent	Slow (below 100)	Over 100
Respiratory Effort	Absent	Slow, irregular	Good, crying
Muscle Tone	Flaccid, limp	Some flexion of extremities	Active motion
Reflex Irritability (Response to slap on soles of feet)	No Response	Some motion	Vigorous cry
Color	Blue, pale	Body pink, hands and feet blue	Completely pink

1. Evaluate the infant's condition by APGAR scoring system taken at 1 and 5 minutes after birth. The infant is evaluated in 5 different areas listed in rank of importance.

2. Interpretation:

   a. Apgar score of 7-10 indicates infant's condition is good.

   b. Score of 4-6 means the infant is in fair condition.

   c. Score of 0-3 indicates extremely poor condition. Resuscitation required immediately.

APPENDIX B

ROUTINE HOSPITAL PROCEDURE
Hospitals of the University of Oklahoma

(According to Audrey Hill, R.N., Service Director of Obstetrical-Neonatal Unit, personal communication, December 1, 1975.)

OBSTETRIC CARE

Labor - First Stage

1. Patient is admitted when she is in active labor. Patient admitted also when not in active labor if membranes are ruptured or bleeding.

2. The patient is weighed. A urine specimen is taken (for protein and glucose). She is put to bed and vital signs are taken every hour (pulse, respiration, blood pressure and fetal heart tones). Temperature is recorded every four hours. The quality and quantity of contractions is recorded. Notation is made if the patient is allergic or has had anything to eat or drink.

3. The patient may then be placed in semi-Fowlers position or may lay on her side (not on back) and encouraged to change her position frequently. The patient's husband (or other family member or friend to give emotional support) may be in room. The patient is informed by her physician of her progress in labor.

4. A fetal heart monitor (measuring fetal heart rate and the timing of contractions) is placed on all patients in labor. If the membranes are ruptured electrodes may be applied internally. Nursing personnel support the patient in labor. They may instruct in breathing exercises if the patient is receptive. Medication for pain during labor is ordered by the patient's physician on an individual basis. The decision for anesthesia is made conjointly by the obstetrician, anesthesiologist and patient. Various considerations include saddle, epidural, pudenal, pericervical block or local.

   The emphasis of nursing care in the first stage of labor is to observe for any abnormalities of labor pattern and offer emotional support for the patient and her husband.

Labor - Second Stage (Delivery of Baby)

Husband scrubs, gowns, sits at head of patient. Decision for the husband to remain in the delivery room is made by the physician.

Labor - Third Stage (Delivery of Placenta)

Mother and father both may hold the baby in the delivery room. If father is waiting in the labor room, baby is brought to him following delivery if baby is stable.

The stressed infant is taken immediately to the nursery. Father may enter nursery and touch infant, depending on condition of baby. Mother may join baby in nursery when she feels up to it. She may sit in nursery (rockers available) and hold infant (depending on condition of infant). Mother elects to breast or bottle feed her baby.

Transitional Period

Optional Postpartum Care - Option for Rooming-in facility (regular patient room that accomodates both infant and mother--isolated to all visitors except father). When baby's condition is stabilized the baby with his equipment is taken to the Rooming-in Unit.

Routine Postpartum Care - Infant is in Newborn Nursery and is brought out for feedings. Husband does not observe regular visiting hours (he may visit any time from 9:00 a.m. to 9:00 p.m. except when baby is with mother).

Mothers are assisted the first time to bathroom and to shower first day. Nurses routinely check patient for (1) fundus; (2) lochia; (3) condition of breasts; (4) condition of stitches; (5) elimination; (6) vital signs; (7) the patient is encouraged to have a good night's sleep.

Feeding

Breast: Every 3-4 hours including night.
Bottle: Every 3-4 hours including night. (Night feeding elected by mother,)

Mother and baby usually go home 4-5 days following delivery.

The main objective of the Routine Hospital Procedure is "the quality of life we produce".

HOSPITAL MATERNAL AND CHILD CARE INSTRUCTION

(According to Sharon White, R.N., Maternal and Child Care Worker, personal communication, December 12, 1975.)

The orientation is practical information offered for mothers on maternal and child care based on culture and economic level of the mother.

Contact is made with mothers through two individual visits by the worker to the mother's room and through group demonstration classes for mothers held in the worker's office.

The information provided centers around needs of the infant: Topic areas are:

- -Instruction in how to visually stimulate the infant
- -Instruction of how to adjust home facilities to meet baby's requirements
- -Instruction in preparation of formula
- -Instruction of how to bathe baby
- -Instruction of how to introduce infant to siblings

Community resources are identified to mothers in economic need. These are:

- -Family planning
- -Birthrights
- -Providing information regarding obtaining a caseworker or applying for food stamps
- -Infant clothing and equipment

Numerous early child development, education and child care pamphlets are distributed to mothers.

Mothers are encouraged to phone the Child Care Worker as a recourse for practical advice after discharge from the hospital.

APPENDIX C

STANDARD NEWBORN ORDERS

(According to Judy Moretz, R.N., Team Leader of the Newborn Nursery, by personal communication, December 5, 1975).

1. All infants are to be placed under an infant warmer in the delivery room and in the nursery until the axillary temperature is stable at 36.5° to 37.0°. At that time external heat may be discontinued. Initial temperature taken rectally.

2. House officer is to be notified for: infants weighing $\leq$2500g. or $>$3800g.; meconium stained infants; unsterile delivery; infants of mothers with PROM, toxemia, diabetes, infection or fever; traumatic delivery; resuscitated infants and infants with jaundice, vomiting, poor feeding, distention, jitteriness, lethargy, cyanosis or respiratory distress.

3. Note and record during initial evaluation by the nurse: rectal temperature, apical pulse, respiratory rate, obvious abnormalities, number of vessels in cord, infant's weight, OFC and length.

4. Cord blood to be sent for VDRL, blood type and Coombs. Infants of O+ and Rh negative mothers to have STAT blood type and Coombs on cord blood. Cord bilirubin to be obtained on infants of Rh negative mothers.

5. Vitamin K_1, 1.0 mg., I.M.

6. Silver nitrate, 1% to eyes for at least 15 sec., followed by H_2O rinse.

7. After infant is warm and stable he may be bathed gently with PhisoDerm and water.

8. For the remainder of the infant's stay in the nursery, the perianal region may be cleansed P.R.N. with either water or PhisoDerm and water. Alternate instructions may be for Batadine bath.

9. All infants are to be admitted initially to the observation nursery where they will remain for a minimum of 8 hours. When stable and $>$ 8 hours old, and after initial exam by pediatrician, the infant may be transferred to the normal newborn nursery or room-in with mother.

10. Vital signs (axillary temp., apical pulse, R.R.) Observation nursery--q1h until stable, then q4h. Normal newborn nursery--q shift. Notify house officer if temp. is ≤ 36.5 or ≥ 37.3; if pulse is > 160 or < 100; and if respiratory rate is < 30 or > 60. Place under warmer and/or add blankets to any infant with an axillary temp. of < 36.5.

11. Once infant is stable and before the first feeding, aspirate the gastric contents with an 8 Fr. OG feeding tube and record the quantity. If volume is > 10 ml., withhold feeding and notify house officer.

12. Note and record all stools and all urine. Notify house officer if no stool or urine is passed in 24 hours, or if blood stool is passed.

13. Infants are to be weighed daily.

14. Apply Triple Dye liberally to umbilical cord upon admission to nursery and daily thereafter. Exceptions:
    a. Do not apply to cords of infants with Rh negative mothers until negative Coombs report is received in nursery.
    b. Do not apply to cords of infants with respiratory distress without notifying house officers.

15. Nurse may administer O_2 to any infant with cyanosis or respiratory distress, but must notify house officer STAT.

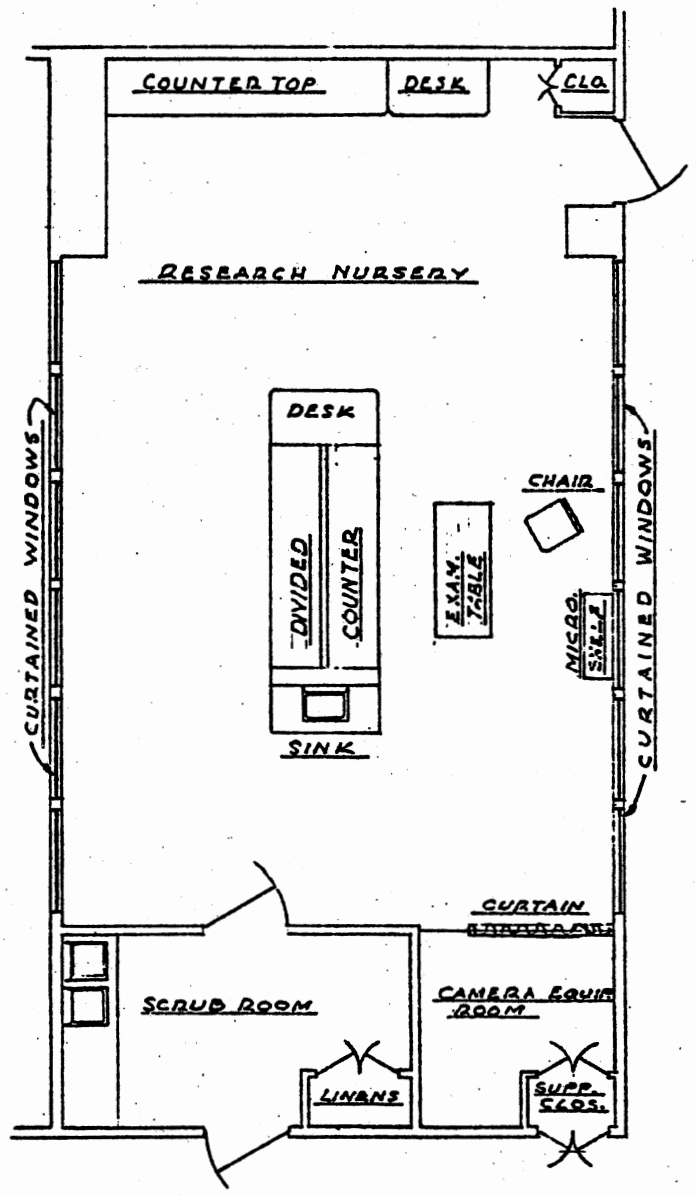
16. PKU determination to be done on fourth day of formula feeding, or on day of discharge.

17. Feeding routine for term newborn infants:
    Bottle feeding:
    a. Offer 10 ml. of H_2O as soon as infant is stable.
    b. First 24 hours offer 30 ml. of 20 cal/oz formula with Fe q4h.
    c. Second 24 hours offer 60 ml. q4h.
    d. Thereafter, offer 90 ml. q4h.
    Breast feeding:
    a. Offer 10 ml. of H_2O as soon as infant is stable.
    b. May nurse after initial H_2O feeding on demand or q4h.
    c. Offer 30 ml. of H_2O after each breast feeding for two days.
    d. Mother may elect to initiate breast feedings ad lib, water feedings optional.
    e. If mother is tired at night, may offer DSW feeding instead of breast feeding.
    Special feedings by order of physician.

18. All infants weighing < 2500 grams to have weekly CBC, UA, head circumference and length.

APPENDIX D

FLOOR PLAN - RESEARCH NURSERY



APPENDIX E

PHYSICAL EXAM BEHAVIOR CHECKLIST (Six minute examination)
Film clips: 1) 1'-1½', 2) 2'-2½', 3) 3'-3½', 4) 4'-4½', 5) 5'-5½'

____1. Mother is arms length from baby. (Circle number for yes)
1 2 3 4 5

____2. Question by mother specific to care of infant. (Circle for yes)
1 2 3 4 5

____3. Question about current condition of infant. (Circle for yes)
1 2 3 4 5

____4. Physical contact by mother with infant. (Fondling)
1 2 3 4 5

____5. Mother assists physician with examination of infant.
1 2 3 4 5

____6. Behavior responsiveness of mother.*

1	2	3	4	5	Constricted
1	1	1	1	1	Extremely
2	2	2	2	2	Very
3	3	3	3	3	Average
4	4	4	4	4	Responsive
5	5	5	5	5	Very Responsive

____7. Mother leaves chair to approach infant during session.
(yes = 1; no = 0)

____8. Verbal responsiveness of mother to infant. (Circle for yes)
1 2 3 4 5

____9. Verbal responsiveness of mother to physician. (Circle for yes)
1 2 3 4 5

____10. Infant distress. (Crying of infant)
1 2 3 4 5

*Extremely	(No movement trunk or limbs; trunk to chair)
Very	(No movement trunk; movement limbs and head)
Average	(Trunk forward from chair back; no limb movement)
Responsive	(Moves chair or extends hand with trunk toward infant)
Very Responsive	(Leaves chair to gain closer proximity to infant)

APPENDIX F

NURSING SESSION BEHAVIOR CHECKLIST (Ten minute session)
Film Clips: 1) 1'-1½', 2) 3'-3½', 3) 5'-5½', 4) 7'-7½', 5) 9'-9½'

____1. Midline presentation of baby by physician. Lateral preference of mother. (Anterior supine position of infant to mother at presentation.)
2 Left lateral preference
1 Right lateral preference

____2. Kiss (Total number of times mother kissed infant during session).

____3. Breast vs. bottle feeding.
3 Breast
2 Breast; bottle for film
1 Bottle

____4. Manipulation of breast or bottle to infant mouth by mother. (Circle for yes; X for burping)
1 2 3 4 5

____5. Infant actively feeding. (Circle for yes; X for burping)
1 2 3 4 5

____6. Mother "burps" baby. (Circle for yes; X for feeding)
1 2 3 4 5

____7. Eye contact established or "en face" position by mother and baby. (Mother's face in such a position that her eyes and those of her infant meet fully in the same vertical plane of rotation.)
1 2 3 4 5

____8. Trunk contact of infant to mother. (Circle for yes)
1 2 3 4 5

____9. Stroking, fondling infant. (Not associated with nursing)
1 2 3 4 5

____10. Talking, vocalization by mother to infant. (Circle for yes)
1 2 3 4 5

APPENDIX G

SELECTION, ASSIGNMENT AND CONSENT OF SUBJECTS

The experimenter identified eligible subjects each day at 9:00 a.m. following the hospital morning shift change.

Eligible infants were identified from Newborn Nursery records (Newborn Nursery Log and/or Infant Hospital Charts) given the following instructions:

.Weight of 2550-3800 gm.
.No multiple births
.APGAR: 1 minute - greater than 4
.APGAR: 5 minutes- greater than 7
.Public clinic patient

Eligible mothers were identified from Postpartum records. (Mother's Hospital Charts)

.17 to 23 years of age
.First child
.Vaginal delivery
.Free from diabetes, kidney disease, drug use, Rh factor, serology

The MOTHER-INFANT STUDY CONSENT FORM was signed by the mother following explanation of the study by the investigator as follows:

I'm Freda Jones. Here at University Hospital we're interested in seeing that babies get off to a good start. We're doing a study of our patients who are mothers for the first time and would like you to be included. If you decide to participate or be in the study you will be asked to fill out two questionnaire forms. You will also be filmed once as the physician examines your baby and while you feed your baby.

The purpose of our study is to learn more about new mothers and their babies. This information will increase the scientific knowledge about mothers and infants. It will be beneficial to all mothers and babies by making it possible to give them even better care in the future.

We know you will be interested in the results of this study and we

will send you a copy when it is completed. This will be in about a year. Also we have some formula available and will see that you get a six-weeks supply for your baby. You will receive the formula when you go home.

The original MOTHER-INFANT CONSENT FORM was filed in the mother's hospital chart and a copy placed in the infant's hospital chart. Additionally a Hospital CONSENT FOR USE OF PICTURE AND VOICE Form I was signed by the mother and filed in her hospital chart.

APPENDIX H

ADDITIONAL INFORMATION - CONDITION AI

(Information about sensory competence of infants given by David Krauss,M.D., or a physician instructed by him to the mother within 24 hours of assignment of the mother to study).

Good morning, I'm Dr. Krauss. I wanted to meet you personally. I'm told you have a new baby (boy/girl). At University Hospital we feel it is important to tell our new mothers as much as we can about their new baby and what (s/he) can do. In the past five to ten years we've learned a great deal about what newborns can do, and even what the fetus can do during pregnancy. I'd like to tell you about some of the exciting things we've learned.

Most new mothers, as many of their mothers and grandmothers did before them, have the notion that a baby does very little except eat and sleep and need a change of diapers and a warm bed until (s/he) is bigger, becomes more aware of what's going on around him/her and can begin to do things.

Now we know that this just isn't true. Your new baby already does a lot and senses a lot. He can see, feel and hear things that we never thought was possible before. We know that newborn babies like soothing sounds, voices and like to look at things almost from the time they are born. We were just fooled earlier because we just had no way of measuring how well they could do things.

The important thing to remember is that your baby is very

definitely a person. He is a person now who is very aware of things and who will be aware of you and the time you spend with him. Infants don't just wait around a certain length of time and then grow up; they are growing and changing already. Your baby senses you and feels you now. Before birth it was from the cozy place inside you. Now it's important for the two of you to get to know each other in a new way.

APPENDIX I

ADDITIONAL CONTACT - CONDITION AC

(Instructions on stroking of infant or RISS Treatment* given by Judy Moretz, R.N., or a nurse she trained, to the mother within 24 hours of assignment of the mother to the study. Nurse Moretz was personally trained to administer the RISS Treatment by Ruth Rice, Ph. D.)

I'm Judy Moretz, nurse in the Newborn Nursery where your baby is, and I've been told you are participating in the Mother-Infant Study. I'm here to teach you how to stroke your baby. Other studies have found that babies who were stroked, like I'm teaching you, and rocked by their mothers gained more weight, were more alert and seemed to learn quicker. Other studies have shown that skin-to-skin contact is very important between a mother and her baby. It makes a baby feel loved and wanted and makes a mother feel good about her baby. The way we do the stroking is to take the clothes off the baby and place it on its back, and repeat each stroke three times, turn the baby over on its tummy and continue the stroking three times each for a total of 10 minutes. Then we redress the baby and rock or hold it for another 5 minutes.

After the DEMONSTRATION by the nurse the mother in turn demonstrates the stroking to the nurse. The minimal qualifications of the Additional Contact condition are that the mother was instructed and adequately trained in the stroking technique.

*RISS Treatment as developed by Ruth Rice, Ph. D., University of Texas.

APPENDIX J

CONSENT FORM FOR RESEARCH PARTICIPATION
University of Oklahoma Health Sciences Center

I, _____, voluntarily consent to
(Name of patient, subject, or guardian)
participate in the following investigation:

MOTHER-INFANT STUDY

the purpose of which has been explained to me by Freda Jones, M.S., principal investigator.

At University Hospital we are trying to look at mothers and infants and how to get the infant off to a good start. If you decide to participate in this study you will fill out some questionnaire forms and be filmed once as you observe the physician giving your baby a check-up and once when you feed or nurse your baby.

I understand my participation may prove beneficial to me or useful in advancing medical knowledge and that there are no known risks. I also understand that:

1. By signing this consent form, I have not waived any of my legal rights or released this institution for liability for negligence. I may revoke my consent and withdraw from this study at any time.

2. Should any problems arise during this study, I may take them to the Research Affairs Office in Room 120 of the Medical School Building, Phone 271-4690.

_____	_____
(Obstetrician)	(Patient's Signature)
_____	_____
(Pediatrician)	(Identification Number)
_____	_____
(Witness' Signature)	(Hospital)
_____	
(Date)	

VITA

Freda Aurell Jones

Candidate for the Degree of

Doctor of Philosophy

Thesis: MATERNAL ATTACHMENT TO INFANTS DURING POSTNATAL PERIOD: EFFECTS OF ADDITIONAL INFANT-MOTHER CONTACT AND INFORMATION ABOUT INFANT COMPETENCY

Major Field: Psychology

Biographical:

Personal Data: Born in McPherson, Kansas, November 13, 1925, the daughter of Mrs. Mildred Westbrook Gamble and Mr. Harold F. Aurell. Married to Fred Jones October 8, 1945. Mother of two daughters, Pamela Dickson and Judith Davenport, and one son, Bradley Jones. One granddaughter, Evy Aurell Dickson.

Education: Graduated from McPherson High School, McPherson, Kansas, in May, 1943; attended McPherson College 1943 to 1945; received the Bechelor of Science degree in Psychology from Oklahoma State University in 1968; attended Oklahoma State University as a special graduate student in 1971 and 1972; received the Master of Science degree from Oklahoma State University in May, 1975; completed a Clinical Psychology Internship at the University of Oklahoma Health Sciences Center in April, 1977; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in May, 1977. Member of the Southwest Psychological Association and Division 12 of the American Psychological Association.

Professional Experience: Child Development Worker, Payne County Guidance Center, 1968-69; Child Development Worker, Garfield County Guidance Center, 1969-70; Staff Psychologist, University of Oklahoma Health Sciences Center, Children's Memorial Hospital and Child Study Center, 1970 to present.