Mothers and Infants; Early interaction and Consequences

A.E. Page

1979

ABSTRACT

MOTHERS AND INFANTS : EARLY INTERACTIONS AND CONSEQUENCES

A prospective study was designed to investigate Bowlby's (1958, 1969) theory that the development of the affectional bond between mother and infant - generally termed "attachment" - is the result of certain species-specific stimuli being prepotent as elicitors of instinctual responses in mothers and infants, and to contrast this approach with a reformulation by the author which attempts to include recent evidence pertaining to the receptor capabilities of neonates. In brief the author's formulation is that because of an evolutionary process the human infant discriminates certain visual and auditory stimulus dimensions more readily, these stimulus dimensions being particularly well represented by the caretaker's face and voice and thus once orientated to these stimulus sources selective attention will occur at a high rate. Initial orientation is seen as the result of the caretaker's proximity occurring because of response to infant signals and nutritional requirements.

To test the appropriateness of the two approaches thirty primiparous women between the ages of 20 and 32 were obtained at Nelson Hospital, Nelson, New Zealand,

during the first week after having given birth to a healthy infant, the group being subjected to a 17 minute film designed to teach the mothers to emit certain behaviours. These behaviours were selected as those which would provide either the infant with stimuli Bowlby (1958, 1969) suggests will elicit instinctive responses (mother's face, voice and ventral surface) or the mother with stimuli which elicit instinctive responding (infant crying, smiling and vocalizing). A second group of thirty mothers matched with the first on a number of relevant variables acted as a control group. Specific hypotheses were made which would enable the attachment relationship of the two groups to be compared, and differentiation between the two formulations to be made.

The experimental manipulation was successful in producing desired infant and mother behaviours, the outcome in terms of the quality of interaction of mother and infant, and infant and stranger clearly favouring the experimental group. Specifically the mothers and infants of the experimental group engaged in more reciprocal interaction in which each was responding in a manner complementary to that of the other, such interaction beginning early during the observation, being unbroken and relatively enduring. The mutual orientation of mother and infant which brought this about was the result of infant response to the mother's presenting of her smiling, moving, talking face within the infant's visual field, this stimulus complex rather than maternal responses to signals from the infant operating. While maternal response to signals was not a significant factor in relation to maternal orientation to the infant, none-the-less it was the mother who initiated and maintained the continuing exchange and thus maternal or infant variables other than those measured must have been responsible for maintaining maternal responding.

The infants in the experimental group were initially significantly more sociable to a male stranger, but by six months of age this positive response had changed to marked negative reaction for most of the infants, with some even having passed through this stage. This was in contrast to the control group whose responsiveness to the stranger was minimal at both three and six months and only rarely negative, none of the infants having passed through the stage of negative reactions to strangers.

The appropriateness of current models of the attachment relationship in describing attachment was tested. All were able to describe the relationship of mother and infant in a manner which differentiated the two groups, this result being considered to give evidence of their basic similarity.

The results were found to support the author's reformulation that the mother's face and voice have special stimulus characteristics in attracting high rates of attention from the infant, the resulting mutual orientation of mother and infant giving rise to attachment interaction. Thus the mother's face and voice and infant orientation towards them can be described as "precursors of attachment". Support for the mother's face, voice and ventral surface as elicitors of instinctive responses from the infant and infant signals eliciting instinctive responses from the mother was not forthcoming.

PREFACE

This study is an investigation of the developing relationship between mothers and infants. Much of the literature in this area has owed its origins to the now classic formulation of Bowlby (1958, 1969) who considered that the relationship between a mother and her child comes about through the dynamic interaction of certain environmentally stable behaviour systems. Bowlby (1958) postulated that the positive aspect of the child's tie to its mother is expressed through a number of species-specific innate behaviours, namely, sucking, clinging, following, crying and smiling, and that these component responses become integrated in the first year in to what he termed "attachment behaviour". In the absence of ability to locomote visual tracking is seen as serving the following component. In the case of sucking, clinging and following, the infant is the principal active partner, and crying and smiling serve to activate (in the ethological sense of a "releasing mechanism") maternal behaviour. In his 1969 paper Bowlby included four more behaviours (rooting, postural adjustment, listening and vocalizing) and gave emphasis to the incorporation of these behaviours in to a behavioural system which operates on a "feedback principle" whereby mother and infant maintain proximity to each other.

While there is indirect evidence for the importance of the eight behaviours to be active in maintaining interaction between mother and infant, such evidence has tended to portray a system of greater complexity than would be predicted from a system based on innate, species-specific behavours, and as yet the basic premise that "attachment" is based on a set of species-specific behaviours has not been tested directly. Instead studies have tended to be involved with the measurement of some aspect of attachment as defined by Bowlby (1969).

Accordingly a controlled prospective study was undertaken in which an attempt would be made to manipulate the infant's emitting of those behaviours Bowlby (1958, 1969) considers are species-specific and which serve to "...contribute to the reciprocal dynamic of binding mother to child" (Bowlby, 1958,p.351) and to measure the outcome of such a manipulation. Because it is not possible on practical and/or ethical grounds to manipulate directly the infant's emitting of the behaviours chosen, this was effected by teaching the mothers behaviour which the literature suggests would provide appropriate conditions for the species-specific infant behaviours to be manifest at a high rate. Postural adjustment was not included in the final group of behaviours chosen for possible manipulation because of the difficulty in influencing its occurrence, neither were sucking and rooting, again because of difficulty in influencing their occurrence and lack of evidence for their having an important role (Ainsworth, 1973). The final choice of infant behaviour to be investigated was looking, listening, clinging, smiling, vocalizing and crying.

As well as an evaluation of Bowlby's (1958, 1969) theory a reformulation was put forward by the writer which would take in to account recent findings that show the visual and auditory systems of the human infant to be sensitive particularly to a range of stimuli which are characteristic of those represented by a moving, talking human face, i.e., moving, contoured, symmetrical, complex visual stimuli, and low frequency wide-band sound. The writer in his reformulation suggests that through an evolutionary process a "fine-tuning" of the infant's auditory and visual systems has occurred, leading to their particular receptive characteristics. Caretaker response to infant signals (crying) and nutritional requirements serve to bring mother and infant in to close proximity where the infant is most likely to receive stimulation to which it is maximally sensitive, and hence high rates of attention to the mother's face and voice will occur. The result of this attending is that the mother will become readily discriminated and serve as a potent reinforcing medium and thus ensure that the infant's behaviour is elaborated in a social direction.

To measure the effectiveness of the experimental manipulation, its outcome in terms of enhancing the attachment relationship,and the appropriateness of Bowlby's (1958, 1969) and the writer's formulation in describing the relationship, specific experimental hypotheses were made against which the null hypothesis could be tested, i.e., there will be no differences in the behaviour of mothers in the experimental group attributable to their viewing of the training film, there will be no differences between the experimental and control group mothers on any measures of their attachment relationship, there will be no differences in the behaviour which the infants in the two groups display towards a stranger, and infant looking at, listening to and clinging to the mother, and maternal response to infant cries, smiles and vocalizations will not predict the attachment relationship.

Throughout the chapters which follow the term "attachment" and "attachment behaviours" are used to conform with the definition laid down in a discussion by a proponent of the ethological approach and her collegue, namely Ainsworth and Bell (1970). They define an attachment as .... "an affectional tie that one person or animal forms between himself and another specific one - a tie that binds them together in space and endures over time. The behavioural hallmark of attachment is seeking to gain and to maintain a certain degree of proximity to the object of attachment, which ranges from close physical contact under some circumstances to interaction or communication across some distance under other circumstances". Attachment behaviours "....promote proximity or contact. In the human infant these include active proximity - and contact - seeking behaviours such as approaching, following, and clinging, and signalling behaviours such as smiling, crying, and calling".

Because the content of this study requires the frequent use of the word "mother" it has been used interchangeably with "caretaker" and "caregiver", similarly both "baby" and "infant" refer to a child of less than approximately one year of age.

The dissertation has been organised in the following way. First a discussion of the major theories of the development of attachment will be presented, followed by a description of behaviours which have been considered by many writers to be "precursors" of attachment and a review of studies relating to those behaviours. In the light of these studies Bowlby's (1958, 1969) theory will be discussed and the alternative reformulation of the writer presented. Research relating to the methodology employed in studies of attachment behaviours and the validity of describing these as attachment behaviours will be reviewed, followed by a precis of current approaches to the conceptualization of attachment per se and the possibility of there being a "critical period" during which a mother and infant are maximally responsive to specific stimuli which mediate attachment. The aims of the study together with a consideration of certain control variables will be given to highlight the need for experimental control to be exercised with respect to those variables. The results are then presented and from these conclusions will be drawn as to the effectiveness of the manipulation in bringing about changes in the relationship of the mothers and infants subjected to the manipulation, and the appropriateness of the two models (Bowlby's (1958, 1969) and the writer's) discussed.

ACKNOWLEDGEMENTS

My sincere thanks are given to Professor George Shouksmith and Dr. Bill Quigley for making it possible for this study to be conducted. The pleasant stimulating environment of the Psychology Department at Massey University was greatly appreciated.

Gratitude is expressed to Deidre and Nathan for their invaluable assistance in the making of the film, and to the mothers and infants who took part in the study.

The kind permission of Mr D.W. Low, Medical Superintendent-in-Chief, Nelson Hospital, in granting access to patients is acknowledged, and the continual cooperation of the obstetricians, Charge Nurse and staff of Ward 6, Nelson Hospital, is also appreciated.

In particular thanks are due to the generous grants from the National Childrens' Health Research Foundation and the Mental Health Foundation of New Zealand. Their financial support and confidence in the project provided enormous encouragement.

Finally I must thank my wife Lyn for her unfailing faith that the project would be completed and for her meticulous typing and retyping of the script. My thanks also go to Mrs Cheryl Robertson who helped with the typing.

CONTENTS

LIST OF FIGURES

FIGURE		PAGE

LIST OF TABLES

CHAPTER 1

THEORIES OF THE DEVELOPMENT OF ATTACHMENT BEHAVIOUR

1.1 PSYCHOANALYTIC APPROACHES:

In the literature there have appeared a number of approaches to the development of a child's attachment to its mother. The first of these is the psychoanalytic viewpoint in which the origin of the infant's tie to his mother is considered to be associated with gratification of needs with particular emphasis on the feeding relationship. At this earlier stage the infant obtains pleasure from relief from tension (Freud, 1954) and is not attached to the mother or to the breast, but merely to the feeling of satisfaction. During the next stage the infant develops attachment towards the milk, breast, or bottle and thus the relationship between the child and its mother still depends on the need for food. Finally the infant's attachment shifts from the breast to the mother herself. This concept of the development of mother-infant attachment in which the infant-mother tie is considered secondary to a primary drive for gratification has received little support from research. For example, Cairns (1966) showed that lambs would become attached to a T.V. set and when separated from it they immediately sought contact with it again, Shipley (1963) noted that guinea pigs, isolated from their mother four hours after birth, responded to the movement of a flat wooden object in a manner similar to that which young guinea pigs show towards their natural mother. Harlow's experimental studies (e.g. 1958, 1961, 1963) of rearing rhesus monkeys, in which the infant's attachment behaviours - featuring clasping and clinging in this species - led him to seek proximity and contact more often with an inanimate surrogate mother figure which is soft and claspable rather than with a mother which yields milk, demonstrated attachment more to that figure, with the infant being able to use it as a secure base from which he could explore strange and otherwise fearful situations. In these studies no physiological gratification was associated with the development of the attachment. Studies of human beings have also indicated that infants will develop attachments to familiar persons who play no part in the routine care or feeding (e.g. Ainsworth, 1963, 1967, 1969; Schaffer and Emerson, 1964a). Thus the evidence that the development of attachment depends upon the infant's "oral" experiences or the gratification of primary physiological drives has received little support.

1.2 SOCIAL LEARNING APPROACHES:

Another approach has been that of the learning theorists such as Sears (1965) and Dollard and Miller (1950). Dependency or attachment is viewed as an acquired drive due to the infant's being dependent on the mother for the gratification of his basic physiological needs, or stated another way, the reduction of his primary drives. Thus crying and other behaviours which occur when the infant is in a state of physiological need or in a primary drive state, are reinforced through his mother's feeding him and reducing the drive, or state of need. At the same time the stimuli provided by the mother's face and her presence become signals of the gratification to come, and thus the infant learns to seek these stimuli. In time this brings about behaviour which has the goal of being close to the mother and of seeking her attention. This behaviour or "drive" has been termed a "dependency drive". In the course of learning new behaviours are added producing a cluster of dependency behaviours through which the drive is expressed. In time these behaviours come to include not only seeking physical contact and proximity but also the seeking of attention, help, and approval. Again, the studies of Cairns (1966b), Shipley (1963), Harlow (1958, 1961, 1963), Ainsworth (1969) and Schaffer and Emerson (1969a) offer little support for the importance of the satisfaction of physiological needs as being the basis for the development of attachment.

1.3 OPERANT LEARNING APPROACHES:

A third theoretical position emphasises the mother's role as a provider of positive reinforcers to the infant and a remover of negative ones. The theories of Gewirtz (1956, 1961, 1972a, 1976) and Bijou and Baer (1961, 1965) characterize this approach. Behavioural elaboration and the shaping of new behaviours come about in the following way. Initially environmental stimuli evoke or arouse the infant. This is distinct from the psychoanalytic and secondary reinforcement paradigms because the infant is viewed as being in active interaction with his environment even when his organic needs are satisfied. Some stimuli are considered to make the emitting of certain behaviours more probable, and once they have been evoked they are able, at least potentially, to be reinforced. These stimuli which "set up the occasion" are called discriminative stimuli. In the words of Bijou and Baer (1965, page 123) "the mother herself will, as a stimulus object, become discriminated as a "time" and a place for either the addition of positive reinforcers to the baby's environment or the subtraction of negative reinforcers from it". The mother "sets up the occasion" for a wide range of potentially reinforcing stimuli, e.g., the provision of food, warmth, rest and sleep, tactile stimulation, stimulus change, etc. Thus the infant rapidly learns that responses emitted in the presence of the mother are likely to be reinforced. If these discriminative stimuli, which set up the occasion for reinforcement, are in fact followed by reinforcement which varies widely, then its conditioned reinforcing power becomes long lived and effective under a wide range of conditions. It then becomes what Skinner (1953) terms a "generalized reinforcer", that is, it acquires reinforcing power for a wide variety of responses emitted from the infant. However, the fact that the child's behaviour is maintained by conditioned generalized reinforcing stimuli does not in itself constitute attachment behaviour to the person dispensing these stimuli. Attachment would be considered to have occurred only when the child consistently seeks from a particular person various reinforcing stimuli even when these are available from other people. It is the conditioned generalized reinforcers based on the specific appearance characteristics of the care giver which differentiate general social dependence from attachment, i.e., those based on the specific characteristics rather than the general characteristics shared by all other persons of the infant's acquaintance. As the basis for attachments the caregiver is the central medium for providing almost all of the stimuli which can serve as reinforcers contingent on his behaviour. Thus the presence of the caretaker would be a precondition for these stimuli. In this way the physical characters of the caretaker would come to function as discriminative or controlling stimuli for the child's behaviour, and so would become the major discriminative stimulus for reinforcement for the child because it provides an occasion when many of his responses are likely to be reinforced.

Direct evidence for the operant control of infant behaviour by adults in such a way as to promote the infant's "social" or other responses comes from a number of studies. Brackbill (1958), Schwartz et al. (1970) and Tautermannova (1973) have indicated that adult responsiveness to infant smiling increases the duration and frequency of smiles; Bloom (1974, 1975), Bloom and Esposito (1975), Rheingold et al. (1959), Todd and Palmer (1968) and Weisberg (1967) have all shown that response contingent stimulation increases vocalization rates of infants; Papousek (1967) and Siqueland and Lipsitt (1966) achieved operant control over head-turning; Watson (1969) obtained increases in visual fixations when these fixations were followed by response contingent reinforcement; Watson and Ramey (1972) reported that the turning of a mobile contingent on infants'head movements successfully effected an increase in head movements: Sameroff (1968) was able to modify the occurrence of the "suction" and "expression" (pressure on the nipple) components of sucking when performance of these led to nutritional consequences; and Papousek and Papousek (1974, 1977) provided evidence that attention to a stimulus object may be enhanced by the infant's viewing a picture in which the picture moved in continguity with the infant's own behaviour (a contemporaneous video playback of the infant's own behaviour was used).

In the same manner the child is learning (through contingent reinforcement) to approach, follow, and orientate to the caregiver. Other adults and children would also become attachment figures on the same basis, but because the caregiver is more "sensitive" to her own infant, i.e. contingently reinforces the child's behaviour more often with potent reinforcers, then the child is most "attached" to that person.

Of course at the same time the child is equally able to bring about changes in the behaviour of his caretakers which increases their "attachment" to him, i.e., by responding contingently to their behaviours, and thereby increasing the likelihood of the caretakers being in close proximity, giving smiles, attending, etc.

Only two studies have been found which demonstrate unequivocally mother behaviour under operant control of reinforcing stimuli from the infant. Gewirtz and Boyd(1976) described a study in which mothers were on the lighted side, and therefore mirror side, of a one-way screen, the infant being on the other side. Mothers were cued to respond to their infant's head-turning by vocalization. At the same time supposedly incidental vocalization from the infant was played. In fact this was played contingent on mothers following their phrases with a smile. This procedure increased reliably the mothers' emitting of vocalization with a smile. In a second experiment mothers were cued to respond because their infant had made a head-turn. This cuing was done on the basis that the mothers had emitted a predetermined facial expression. This procedure was found to increase the frequency with which the facial expression occurred.

In an extension of this study Gewirtz and Boyd (1977a) again had a mother on one side of a one-way screen (the lighted side) and her infant was (supposedly) on the other side. The mother was instructed to say a phrase to her infant using at least one of four or six words printed on a card (e.g., "what", "where", "good", "nice"), after which the mother was told an intercom between mother and infant would be opened through which she could hear her infant's voice. In fact a tape of infant sounds or silence was played. During the baseline phase infant vocalizations were presented at random on 30 per cent of occasions, and silence on 70 per cent. The lowest occurring maternal verbalization with an accompanying smile was then selected for conditioning, this behaviour only being followed by infant vocalization. For all women a systematic change in their verbalizations with a smile occurred in the predicted direction. In a second study mothers were this time told that when they talked to their infant that one of two lights in front of them would flash, a red if the infant turned towards them, a yellow if it did not. Mothers were told to ignore these as they were being used for another experiment but could not be disconnected. Mothers were asked to verbalize to their infants using a particular selection of words immediately after their infants had supposedly vocalized (again this was merely a tape recording of infant sounds). In this situation the red light (simulating infant headturns) was flashed contingent on selected facial expressions (e.g. full smiles, non-smiles) and the infant vocalization was played contingent on verbal behaviour followed by a particular facial expression. Conditioning was again found to be successful, inquiry revealing that in both studies subject's awareness of the contingencies was lacking.

Thus there is some evidence for maternal behaviour being, at least potentially, under the control of infant behaviour.

1.4 EXPECTANCY MODEL APPROACH:

Lewis and Goldberg (1969) presented a theoretical approach which goes beyond that of Gewirtz (1956, 1961, 1972a, 1976) and Bijou and Baer (1961, 1965). While Lewis and Goldberg (1969) would agree that the function of the mother is to be a source of reinforcement, with the infant tending to repeat those behaviours which are reinforced by her within his memory span (relatively short, e.g. at 3 months it is only 5 seconds (Watson, 1967)) they extended this formulation by suggesting that not only does contingent reinforcement bring about the acquisition of new behaviours, but it also enables the child to develop a "motive" which is the basis for all future learning. "The main characteristic of this motive is the infant's belief that his actions effect his environment". (Lewis and Goldberg (1969 , page 82). In this context the mother is important because it is the contingency between the infant's behaviour and her responses that enable him to learn that his behaviour does have consequences. Lewis and Goldberg (1969) believe that from this kind of experience the infant develops a "generalized expectancy" model of his environment and in particular about the outcome of his own behaviour, i.e. he has learned that the likely outcome of his behaviour is reinforcement. In this manner he develops a "motive" to emit behaviours other than those which have been already reinforced. Thus the behaviour of the infant is increasingly intentional and motivated by the expectation of producing a desired result.

Lewis and Goldberg (1969) consider that the operant model, which assumes that initially behaviour is emitted accidentally or at random, does not adequately account for the rapidity with which new behaviours occur, nor the complexity of the infant's repertoire. They believe that a second level needs to be added to the model namely, the expectation of the infant that his behaviour is likely to be reinforced. In this context the mother initially serves as a major source of contingent reinforcement, and is therefore the source of this expectency that reinforcement is likely to follow behaviour. Once the basic development of this motive occurs the infant then learns he is able to obtain pay-offs from the environment other than his mother. She (the mother) now has a second function - that of providing the environment which facilitates the infant's self-reinforcement, e.g., toys which can be reached for, touched, etc.

The model rests on the assumption that the infant is able to produce some kind of model or "schema" of his environment and the reinforcement contingencies to which he was subjected and this schema serves to direct his behaviour.

This theory relies on the model of schema development of Lewis, Goldberg and Rausch (1967) which suggests that the response decrement which is observed to occur to a redundant signal is not due to habituation, rather it is due to the repeated presentation of the stimulus building up a central neuronal model or "schema" of the input, which, when built up, if the presented stimulus corresponds to that schema a response decrement occurs, and if the stimulus is discrepant to the schema then it is "not recognised" and attention results.

To support this hypothesis it is necessary to show that response decrement in the individual is related to cognitive capacity. The evidence falls into two parts.

First organism status variables usually considered to be predictive of efficient perceptual-cognitive capacity are found to be related to response decrement, e.g. Lewis and Goldberg quote a study in which the response of children aged 1 to 3 years to repeated stimulation underwent response decrement (as measured by fixation time and cardiac deceleration) which was related to age, i.e. the youngest infant showed the least response decrement.

Second the rate of response decrement to repeated stimulation has been found to be directly related to cognitive capacity as measured by tests of I.Q. and concept formation. Lewis and Goldberg (1969) show from further research from their laboratory that for infants aged approximately one year their response decrement to a signal was related positively to their measured Binet I.Q. at three and a half years. In a second study children of three and a half years were given a concept formation task as well as a series of redundant signals to which they had to attend. Again infants who had higher scores on the concept formation task showed higher rates of response decrement.

Thus it appears reasonable to suggest that when presented with repeated redundant stimulation the infant develops some kind of "internal representation" or "schema" of that stimulus. As a direct test of their theory, Lewis and Goldberg (1969) investigated the relationship between certain mother and infant behaviours when the infant was aged 12 weeks and the infant's response to a single light blinking. The measure recorded was the number of times the infant orientated his head and eyes towards the screen on which the lights were blinking. Nine infants were tested and correlations between response decrement to the lights and each of five mother behaviours were calculated. Response decrement was found to be positively related to the amount of time that mother spent touching, looking at, holding and smiling at her infant, and negatively correlated with the amount of time mother spent sitting reading and not attending to her infant. Thus the more stimulation a mother provided for her infant the greater the response decrement. A positive relationship was also found when frequency of maternal response to infant crying and vocalizing was correlated with response decrement, high frequency of maternal response being associated with greater response decrement. When latency of response to infant cry and vocalization were related to response decrement the results were in the same direction but non-significant.

Thus there is a positive correlation between maternal responsiveness to infant behaviour and the cognitive development of the infant as measured by response decrement, and hence capacity for schema development. Thus the more often the mother provides contingent reinforcement of her infant's behaviour, the more rapidly the infant tends to build up a schema representation of a new stimulus, i.e., the infant becomes more efficient at processing repeated signal information and so is able to build up models of the environment more rapidly. The kind of evidence reported does go some way to supporting the Lewis and Goldberg (1969) theory but more direct evidence is still required.
Further support for this interpretation is found in a study

of Provence and Lipton (1962) in which they found that the tendency of infants to exhibit a skill depended not on whether they had acquired it or not, but on whether or not it had been reinforced, i.e. to display it or not depended on the expectation of reinforcement. The specific example that they gave was that infants at home and in institutions stand in a crib at approximately the same age, but in the institution they rarely do it. It was suggested that this is due to the fact that the infants in the institution are rarely reinforced for standing and so do not have the expectation that reinforcement will follow their behaviour.

Two studies by Papousek (1967) give more direct evidence of the generation of expectancies from reinforcement history. Infants 5 months old had undergone discrimination training (a right head-turn was cued by a bell, the appropriate response being reinforced by milk delivered from a nipple, while a left head-turn was cued by a buzzer, reinforcement again following the correct response) but even when satiated i.e., they refused reinforcement (milk), nonetheless continued to make the correct discrimination. In a second study Papousek (1967) reinforced infants of average age 4.5 or 130 days for a head-turn following the sounding of a bell. Infants could choose a right head-turn followed by unsweetened milk, or a left head-turn followed by sweetened milk; all infants chose a left head-turn. When they were consistently responding to the left the sweet milk reinforcement was switched to the right. All infants gradually changed their responding to the right, indicating a degree of independent behaviour, i.e., infants previously reinforced for behaviour "expect" reinforcement, and if it is not forthcoming will emit behaviour previously not reinforced to obtain reinforcement.

Papousek and Papousek (1975) elaborated on this finding further when they observed infants' responses to a multi-coloured light display. When the lights' flashing was not contingent on the infants' behaviour habituation to the display rapidly occurred, but when the lights' flashing was made contingent on a head-turn of at least 30 degrees a dramatic change occurred in the infants' responding; they became alert, orientated towards the light, and motor behaviour increased markedly. When successful in "switching on" the light display the infants carried out rapid head-turns, emitting vocalizations and gestures, strongly suggesting that the expectation of reinforcement brought about the change in behaviour.

Miller and Schaffer (1972) when investigating the ability of infants 6 and 9 months old to be reinforced by a light stimulus offset 60 degrees, noted the development of a response strategy in the older group. Infants were reinforced by the light's flashing and a sound for making hand contact with a small cylinder attached to the desk, the older infants developing the strategy of contacting the cylinder, at the same time looking towards the reinforcement source.

Even more direct evidence for the generation of expectancies from reinforcement history was found in a recent study by Finklestein and Ramey (1977). In a series of three experiments infants aged 9 months were subjected to contingent reinforcement for a selected response, while a control group was either not reinforced or received non-contingent reinforcement for the response. When required to learn a new behaviour under conditions of contingent reinforcement the former group was clearly superior, illustrating the effect of prior experience of contingent reinforcement on future response acquisition.

Lewis and Goldberg (1969) point out that their theory of the development of a generalized expectancy model is very similar to Rotter's (1954) social learning theory. Rotter considers that the potential for any behaviour to occur in a given situation is a function of the expectation that the behaviour will be effective in securing the available reinforcement. Rotter (1966) extended this further into the theory of locus of control. He considered that individuals could be divided into those who are internally and those who are externally controlled. Internal control is characterized by those individuals who believe that they control their own reinforcement, while external control refers to those who believe their behaviour is not effective in producing reinforcement. The relationship between these beliefs and parental practices has been suggested in a study by Katkovsky et al. (1967) who noted that parental behaviour classified as protective, approving, and affectionate, correlated significantly with the child's belief that he can affect the environment by his actions (as measured by questionnaire).

Davis and Phares (1969) in a similar study also related parental reports of child rearing behaviour to the locus of control of the child and discovered that fathers of children judged to be internally controlled were classified as more indulgent and less protective than mothers, while the opposite relationship held true for externally controlled children.

In this same study Davis and Phares related children's memory of their parent's behaviour and locus of control. Children who remembered their parents having been accepting, positively involved with them, being less rejecting and exercising less hostile control were characterized by being internally controlled, while children who were externally controlled remembered their parents being inconsistent in discipline.

MacDonald (1971) reports somewhat similar results in his finding that the mothers of internally controlled students were described as being more nurturant, having had more predictable standards and applied more pressure for achievement, while fathers were also more nurturant, but in the case of males applied more physical punishment. The mothers of externally controlled students had been more protective, more inclined to use deprivation of privilege as a punishment, and affective punishment.

The relationship between belief in internal control and perceptual-cognitive performance has also been documented. For example, Crandall et al. (1962) found that intellectual test scores and reading and arithmetic scores were significantly related to internal control belief, while Crandall et al. (1965) using a scale which measured a child's belief that he or she is responsible for academic success or failure, found that the scale predicted intellectual achievement performance.

While direct observations of parental practices in relation to the development of locus of control has not been carried out, the results of studies such as those reviewed above suggest that behaviour classified as protective, approving, consistent, positively involved, etc., is found from interviews to describe parents of children rated as internally controlled. It is considered that there is a relationship between parental approval, consistency etc., and contingency of reinforcement of infant behaviour which results in the child's generalized expectancy that his behaviour will be reinforced, which in turn gives rise to his locus of control orientation.

Obviously direct testing of the Lewis and Goldberg (1969) model is required, but nonetheless the indirect evidence reviewed provides some support and suggests that it is a potentially fruitful approach to analysing mother-infant interaction, and the relationship between this interaction and the infant's processing of the environment.

Theories reviewed to this point have tended to rest on some aspect of secondary drive theory, or the reaction to it epitomized by those invoking the principles of operant conditioning. However the last theory to be reviewed, while it also came about because of a questioning of the adequacy of a secondary drive theory of the development of attachment, has taken a somewhat different direction.

1. 5 ETHOLOGICAL APPROACH:

Bowlby (1958), while rejecting that the infant's tie to its mother was due to the mother's meeting the baby's physiological needs and the baby in due course learning that she is the source of gratification, preferred to accept two other theoretical positions. First, for all infants there is an in-built need to relate themselves to a human breast, i.e., to suck it and possess it orally, and in due course to learn that attached to the breast there is a mother to whom they then begin to relate. Second, that there is in infants an in-built need to be in touch with and to cling to a human being. In this sense there is a need for an object independent of food which is as primary as the need for food and warmth. Bowlby suggests that the attachment behaviour which we observe in a child of 12 months old is made up of a combination of instinctual responses which express the infant's need to relate to the breast, and need to be in touch with and cling to a human being. These serve the function of binding the child to the mother and contribute to the reciprocal dynamic of binding mother to child. He considers that there are five of these responses, namely, sucking, clinging, and following, in all of which the baby is the principal active partner, and crying and smiling, in which his behaviour serves to activate maternal behaviour.

When Bowlby referred to "instinctual behaviour" he was using it in the ethological sense and equating it with "species-specific behaviour", i.e. behaviour which is specific to a particular species and which is activated by some quite specific signal. Well-known examples of this are the eliciting of the mating response of the male stickleback when shown a shape resembling a pregnant female, the attack response of the male robin when shown a bunch of red feathers similar to those on the breast of a rival male. The stimuli which act to release or to activate these behaviours are termed "social releasers" and at the same time there are stimuli which terminate such species-specific behaviour, e.g. the termination of eating due to stimuli from the mouth, oesophagus and stomach. Thus Bowlby is suggesting that a child's attachment to its mother is expressed through a number of instinctual responses, all of which are primary, (i.e., they are innate) and in the first place are relatively independent of one another. The five responses he suggested fall into two classes. Sucking, clinging, and following, achieve their end, in the first case food and in the others proximity to mother, with only a limited reciprocal response being necessary on the mother's part. Crying and smiling on the other hand, depend for their results on their effect on maternal behaviour and Bowlby suggests that both of these act as social releasers of instinctual responses in mothers.

Still within an ethological framework Bowlby (1969) extended the list of species-specific infant behaviours (now called "precursors of attachment") to eight (rooting, sucking, postural adjustment, looking, listening, vocalizing, crying and grasping) suggesting that through genetic and evolutionary programming they had come to function as behaviours which promote proximity between mother and infant, i.e., they had brought about a bias in the infant to emit and respond to certain classes of behaviour which are adaptive in promoting survival. These behaviours, he postulates, became integrated into a sophisticated goal-corrected system in which mother and infant maintain their proximity to one another through the use of feed-back, e.g., a child which is mobile may move towards its mother, and when she moves the infant uses the feed-back from his receptors and changes his direction accordingly. Thus Bowlby has extended his original 1958 formulation to what he terms a "control systems theory of attachment behaviour" in which he considers the precursors of attachment, and the importance of a goal-corrected relationship.

There is considerable indirect evidence in the literature which suggests that each of the precursor behaviours in fact have unique characteristics which help serve to bind the infant and mother together and these will be considered in the following chapter (Chapter 2).

CHAPTER 2

PRECURSORS OF ATTACHMENT BETWEEN CARETAKER AND INFANT

2.1 ROOTING AND SUCKING:

The classic study of Levy (1958) and those of Moss (1967) and Richards and Bernal (1971) suggest that at least during the first few weeks rooting and sucking are important in regulating maternal behaviour. However Dunn (1975) (Judith Bernal publishing under her married name) commenting on the Richards and Bernal (1971) results pointed out that while in a multiple regression analysis suck rate was associated with affectionate maternal vocalizations, the direction of effect could not be established, moreover Ainsworth (1967, 1973) notes that rooting may occur in the sated infant, thus confusing the mother, and Kaye (1977) has indicated that interaction between mother and infant during feeding is more likely to occur when the nipple is out of the infant's mouth, and the infant sucks more when the mother is still and not jiggling the breast. Thus while it may be said that rooting and sucking may well serve to bring mother and infant into close physical contact where interaction may occur, it seems unnecessary to describe such behaviours (i.e., rooting and sucking)as acting as releasers of maternal behaviour.

The infant's tendency to orientate itself to the breast or bottle has been noted as early as the fourth feed, and by the twelfth feed is generally well established (Call, 1964). Once this response is developed the infant

opens his mouth and brings his free arm up to the region of his mouth, or mother's approaching breast, as soon as he is placed in a nursing position, i.e., when his body is in contact with his mother's though his face is not. It appears that these anticipatory movements are not elicited by the sight of the breast or bottle but by tactile and/or proprioceptive stimuli that he receives when he is placed in a nursing position. Hetzer and Ripin (1930) have suggested that it is not until the third month that his anticipatory movements are guided by what he sees.
Call (1964) observed a few babies who were slow to develop this orientation and he found that these were infants who had minimal bodily contact with their mothers while being fed.

2.2 VISUAL BEHAVIOUR OF THE INFANT:

The early studies of Fantz (1958, 1961, 1963, 1965, 1966) have shown that young infants have preferences for certain visual stimuli. He exposed infants to a great variety of targets, both coloured and uncoloured, as well as patterned and unpatterned. In each trial the infant was given a choice of two items to look at and the fixation time for each stimulus measured. Fantz noted that as early as 48 hours after birth there was clear preference for patterned as opposed to plain stimuli and a schematic face was preferred to a scrambled pattern. More recently Goren et al. (1975) have observed this preference as early as nine minutes after birth and Carpenter and Stechler (1967) reported that an infant's attention to its mother's face increases as a linear function from the first week through to the eighth week of life.

A number of studies have attempted to isolate what are the stimulus qualities of the human face which attract infant attention. One of these aspects appears to be movement. Haith (1966) investigated the responsiveness and the habituation of response to an intermittent moving visual stimulus. Using suppression of non-nutritive sucking as a measure of attention he noted that a moving sequence of lights was consistently more successful in suppressing sucking than a stationary pattern. Wilcox and Clayton (1968) added further weight to the importance of movement in attracting attention when they noted that 5 month old female infants when presented with still or moving pictures of a human face fixated the moving faces significantly longer. Carpenter (1974) presented infants aged 2-7 weeks of age with three dimensional faces which were moving or non-moving, and again observed that movement attracted more interest at all ages. Brazelton et al.(1975) described the response of a 4 week old infant to the faces of her blind mother and father. The mother, who had been blind from birth, had a "masklike" unmoving face when in interaction with the infant, while the father, whose blindness was more recent, had a more mobile face. When in interaction with her mother the infant would scan her mother's face then avert her eyes, while when with her father she would gaze at his face. Further confirmation of the importance of movement in attracting attention came from an observation in which a mother was instructed to change her face from being responsive and mobile to immobile.

After a brief "checking" of the mother's face the infant avoided her face, checked briefly again then made no further attempt to engage her mother. Thus movement appears to have an important role in both attracting and maintaining infant attention.

The early studies of Fantz would suggest that there may be a possible facial dimension in infant visual preferences. A number of researchers have investigated this phenomenon. Fantz (1963) showed infants aged 10 hours to 5 days a series of stimuli including a face, circle, newsprint, and plain white, yellow and dark red stimuli. He noted that infants at all ages preferred the face. Kagan and Lewis (1965) with infants aged 6 and 13 months observed preferences for two types of visual stimuli, pictures of faces and geometric designs and patterns of blinking lights. At 6 months humanoid stimuli elicited more sustained attention than other stimuli and also greater motor behaviour (e.g. arm and leg movements), however at 13 months when a schematic face was added, then this face elicited more attention than the picture of the humanoid face. This latter result was possibly due to the schematic face representing a more novel stimulus to the older infant. Kagan et al. (1966) presented 4 months old infants with familiar and distorted faces (eyes and nose and mouth rearranged, no eyes or blank); fixation times to the regular and rearranged faces were equivalent, but smiling and large cardiac rate (deceleration established as a measure of attention, e.g. Lewis et al. 1966; Moffitt, 1973) were significantly more frequent to the regular face. Lewis et al. (1966) from the same laboratory recorded fixations of 24 infants to pictures of male and female faces, schematic faces, a bulls-eye, and chequer-board. They found that when total fixation was considered only girls looked significantly more at schematic and realistic faces more than other patterns, with the same result being noted when first fixations were measured. The reason for lack of significant findings for boys was not apparent. Haaf and Bell (1967) from observing the responses of 4 months old infants to four visual stimuli in which resemblance to the human face and complexity were varied independantly, noted that fixation time varied according to faceness, not complexity (i.e. amount of detail in the stimuli). Koopman and Ames (1968) on the other hand failed to find any significant difference in the tendency of 2½ month old infants to look at schematic or scrambled faces presented in a paired comparison paradigm. This lack of significance occurred in all response measures, including first fixation time, total fixation time, and habituation to stimuli. They argued that complexity rather than configurational quality attracts infants' attention.

Wilcox (1969) reported a study with infants aged 4, 10, and 16 weeks of age, in which they viewed seven pictures of a human face, i.e., a photograph, a realistic drawing, a schematic drawing of a complete face, and three incomplete schematic faces and a scrambled face. Analysis of total fixation time and duration of first fixation gave somewhat discrepant evidence about preference among stimuli. Schematic and scrambled faces were not differentiated at any age and no differences occurred between the targets in which varying degrees of missing detail occurred. For all three ages complexity increased fixation times. Developmental changes were noted; at 4 weeks drawings of faces produced lower fixation times than schematic faces or photographs, at 10 weeks there were no significant differences, however at 16 weeks of age the infants preferred the photograph to other complete faces. Fitzgerald (1968) using the pupillary reflex as his measure of attention to stimuli, with 1,2, and 4 month old infants as subjects, presented mother's face, stranger's face, triangle and two chequer-board patterns, (four squares and 144 squares). Analysis showed that a face consistently elicited greater pupil dilation at 1 month and 4 months, while 2 month old infants did not respond differentially. Lewis (1969) investigated infants at four age levels, 3, 6, 9 and 12 months. He presented in random order a photograph of a face, schematic drawing of a face, scrambled drawing of a face, and a cyclops photo (a face with only one eye in the centre). Younger subjects (3 and 6 months old) fixated the faces more often in the order, regular: schematic: cyclops: scrambled, while those aged 9 and 12 months looked equally at all. When fixation of each target was presented as a percentage of total fixation time, then as the most realistic face attracted less interest with increasing age, the least realistic faces evoked more interest.

Carpenter et al.(1970) with 18 female infants in a longitudinal design carried out observations at one week intervals from 1 to 8 weeks of age. Stimuli included the mother's face, a manikin's head, and an abstract form (a three dimensional curved surface with knobs) and were presented either still or nodding once every two seconds. By 2 weeks of age infants attended more to the manikin and abstract models. The effect of movement was not recorded in this study but Carpenter (1974) using a similar paradigm found that infants attended more to moving than to non-moving faces.

Thomas (1973) using a mathematical model of stimulus preference reinterpreted the Koopman and Ames (1968) study. The model uses each individual rank ordering of stimuli, (called "I" scales) and determines the most likely scale of preference it belongs to. For example, for three items there are three possible orderings of stimulus preference (termed "J" scales) - i.e., A B C, C A B, and B C A. Using this technique it is possible to attempt to match individual preferences to the J scale and to see which one accounts for the most individuals. Thomas found that for the Koopman and Ames data the J scales of three possible orderings were not sharply differentiated from each other, the most probable being one which had an order based on symmetry. He also reinterpreted the Haaf and Bell (1967) data. He found that the J scales which related to "faceness" or "complexity" failed to account for the majority of infants' preferance orderings, again a kind of symmetry ordering appeared.

In his own laboratory Thomas conducted two separate studies, one with infants aged 2 and 3 months old and the second with infants aged 5 weeks. In the first study stimuli were a blank face, scrambled schematic face, schematic face, and photograph of a face; in the second experiment they were a face with only a nose, scrambled schematic face, and schematic face. In both these studies the stimulus orderings were along a dimension of facial discrimination. Haaf (1974) on the other hand with 5 and 10 week old infants, varied the degree of resemblance to face and complexity. At these ages fixation times appeared to be determined by complexity rather than "faceness".

Jones-Malfese (1975) in an attempt to clarify discrepant results to date investigated the visual behaviour of infants aged 3 to 14 months old. Because of the difficulty in determining if an infant viewing a stimulus is actually carrying out some kind of information processing Jones-Malfese used an operant-response method. Subjects were faced with a blank screen which was removed and a stimulus (a one square or 16 square chequer-board) displayed only when the child looked at the screen and maintained a two second fixation. As soon as the subject looked away from the screen it was replaced with the blank which was removed only when the infant was looking again. During the experimental procedure this operant-response method was employed and regular and distorted faces used as stimuli (photo of human face, schematic face and scrambled face). Each subject was classified according to his preference ordering using the method outlined by Thomas (1973). Although no significant differences between preferences for the three faces could be found, the ordering which best fitted the data was not a dimension of facial realism, but one more akin to facial-complexity. However, there were infants who preferred to schematic to the scrambled face and vice versa. As these two do not differ in complexity, the reason for their preference was not clear.

The different ages of infants, the variety of stimuli and methods used and the small size of the groups (generally less than 20) makes it difficult to compare studies and to sum up the results of the foregoing. Suffice to conclude at this point that it can not be said categorically that infants are responding to some dimension of "faceness". First because no attempt was made in these studies to define what constituted "faceness", and second it appeared that the determinants of attention may well be multidimensional, possibly with some dimensions prepotent over others.

There is some evidence from the foregoing that an important constituent of "faceness" is symmetry. Three studies would support this contention. In the aforementioned study of Thomas (1973) he found in a reinterpretation of two studies using a sophisticated model of attention that a symmetrical ordering of stimuli best described the results. Fagan (1972) when studying infant memory for faces (as shown by their habituation to a previously presented face and preference for a more novel face), noted that habituation to faces which had been presented in an upright, realistic orientation was more likely (i.e., infants preferred the more novel face) than when faces had been presented in a 180 degree rotation (in this configuration the symmetry of eyes and nose is much less obvious). Finally Ruff and Birch (1974) when investigating the effect of a number of dimensions on infant attention found that concentric stimuli were preferred over others.

There are also studies which have emphasised complexity as a determinant of infant attention. Salapatek and Kessen (1966), using photographs of the image of the stimulus on the infant's cornea as a measure of attention, observed that infants as young as 8 days old when viewing a black homogeneous target dispersed their fixations widely over the surface, while infants viewing a triangle concentrated their fixations around the vertices. Thomas (1965) with infants 2 to 14 and 15 to 26 weeks old observed that when presented with a range of stimuli varying in complexity that they preferred the most complex.

McCall and Kagan (1967) attempted a more definitive study of the role of complexity when they investigated number of turns (complexity), length of perimeter, contour length and familiarity as determinants of attention. When contour length and number of turns were varied independently of each other they found that fixation times were determined by contour length not by the number of turns (complexity).

Fixation to perimeter (area) occurred according to an inverted "U" function. However, as McCall and Kagan (1967) pointed out, mean contour length, perimeter and perhaps area are confounded with the number of turns and therefore their results are open to question.

Moffett (1969) investigated the complexity preferences of infants ranging in age from 9 to 17 weeks. She used a variety of targets which varied in two ways, the number of lines, and the number of white rectangles or parts created by those lines. She noted that infants looked longer at those stimuli with a greater number of lines, but when the number of parts was varied, the number of lines became less important as a determinant of visual preference.

Miranda and Fantz (1971) attempted to throw more light on the question of complexity as it relates to perimeter and area preferences. With full-term neonates they used items which varied according to size of element (perimeter) and number of elements (complexity); these were presented in pairs. Data supported the contention that the infants showed complex preferences along the dimension of size of elements, number of elements and angles, and that when these were opposed to each other the result suggested that size (perimeter) is prepotent over number of elements. However, this result is somewhat ambiguous because contour length also increases with size. Fantz and Fagan (1975) also found preferences for large elements of the same number and more elements of the same size with size preferences being prepotent at younger ages (5-10 weeks post-natal) lending weight to the preceding finding.

Martin (1975) using moving three dimensional stimuli differing in the number of turns (complexity) found groups of infants aged 2, 3½ and 5 months old preferred the stimuli with more turns. It was also noted that latency to fixate was less for more complex stimuli, again suggesting the number of turns is a significant feature in the determining of visual preferences. Cohen et al.(1975) also noted that for 17 week old infants complexity (in this case smaller and more checks on a chequer-board) attracted attention more rapidly.

Ruff and Birch (1974) investigated the relative effectiveness of concentricity, curvilinearity and number of turns as determinants of attention in infants aged 3 months. They concluded that all three dimensions were effective to varying degrees, with the order of effectiveness being: concentricity, curvilinearity, number of directions. Fantz and Miranda (1975) with infants under 7 days of age have also reported the effectiveness of one of these dimensions, viz., curvilinearity, as a determinant of attention (they controlled for contour length, size of element, number of angles and elements).

Again the variation among stimuli and techniques makes summary difficult, but it would appear that when complexity alone is considered increased complexity results in increased attention, but when size of element is included as a variable size determines attention. However because contour length also increases as size increases this result may well have been due to a preference for greater contour length. In their turn concentricity and curvilinearity also affect attention, their effect being prepotent to complexity. Thus, as suggested earlier, the determinants of infant attention are multidimensional, with some dimensions being dominant over others.

Studies from the laboratory of Robert Haaf would suggest that an age dependent process also influences attention (Haaf 1974, 1977; Haaf and Bell, 1967; Haaf and Brown, 1976). Infants younger than 15 weeks of age respond chiefly in terms of complexity, and after that age to a dimension they term "faceness". Of course these results need to be qualified by those conclusions already reached in this section, viz., the need to determine "faceness"(as suggested it may well be a dimension of symmetry) and the need to consider the probable multi-dimensional nature of the determinants of infant attention (thus at the age when complexity becomes prepotent, the dimensions of concentricity, curvilinearity, contour, etc., may also increase in importance).

One particular structure of the face itself seems to have a high stimulus value for the infant. Caron et al. (1973) measured the recovery from habituation of infants 4 and 5 months old to the presentation of distorted schematic faces and noted that response recovery occurred most reliably when the distorted habituated face contained distortions of the eyes and was then followed by a regular face. Bloom (1974, 1975) has shown the importance of the experimenter's eyes as a necessary condition during reinforcements. Only when eye to eye contact was possible was reinforcement by adults successful in increasing infant vocalization rate. Papousek and Papousek (1974, 1977) observed the reactions of infants to films of themselves in which eye to eye contact was possible or impossible. Overall attention was directed more to the film in which eye to eye contact was possible.

The capacity for three dimensional vision from as early as seven days has been suggested in two studies by Bower and his associates (Bower, Broughton and Moore, 1970a, 1970b). They were able to present a projected three dimensional image of an object to infants and observed reaching and grasping for the object with subsequent frustration when it could not be grasped. In a second study they presented infants with an object moving towards them and observed the infants' eyes widen, their head moving in retraction and inter-positioning of hands between face and object when the object came near. When air displacement alone was tried then rapid eye closure and slight rotation of the head was observed, but with no head retraction or hand raising. Unfortunately response to visual stimulation alone was not studied, although response to a stimulus which increased in size was observed in 2 week old infants and the defensive reaction occurred. Unfortunately an attempt at replication of the first study by Dodwell et al.(1976) has failed to replicate this finding. However, Jones-Malfese (1972) investigated the preferences of infants 7 to 48 hours old for two and three dimensional patterns with indications of preference for three dimensional as well as two dimensional contoured stimuli being shown,while Pipp and Haith (1977) found more definite preference for three dimensional over two dimensional figures by the age of 4 weeks.

While it appears that certain features cause the infant to orientate itself to a human face this orientation itself has an effect on the mother. Both Greenman (1963) and Wolff (1963) noted a discernable change in mothers' behaviour when their infants began to look at them. Wolff in particular in an extensive investigation of the history of smiling behaviour noted that a small group of mothers who had previously spent little time playing with their infants began to do so within two or three days of his first recording eye to eye contact. However, when he questioned the mothers they appeared to have no awareness of why their behaviour had changed. Robson (1967) adds support to this finding from his observation that some mothers reported that they lost their feeling of "strangeness" towards their infant when the infant began to look at them.

There is some evidence that this visual exchange between mother and infant has developmental consequences for the infant. Moss and Robson (1968) interviewed mothers while they were pregnant and rated them as to the degree to which they saw having the baby as being positive and the amount of interest they had in affectionate contact with their infant. Observations in the home were conducted for two six-hour periods when the infants were aged 1 and 3 months, the frequency of mother-infant eye to eye contact being recorded. Finally at $3\frac{1}{2}$ months the time infants spent fixating various stimuli (including chequer-board patterns and human faces) presented in a schematic, scrambled and photograph form was measured. Moss and Robson found for boys and girls aged 1 month the pre-natal attitude of the mother was correlated with eye to eye contact but at 3 months it correlated for girls only. Also for girls at 3 months fixation of all social stimuli (photographs of faces) reflected the maternal interest in affectional contact, suggesting that both antecedent and later maternal behaviour had developmental consequences for the girl in the area of responsiveness to social stimuli. The lack of similar finding for the boys was suggested to be due to their being at an earlier developmental level than the girls and their preference for human stimuli as opposed to all kinds of complex stimuli may not have developed. This is supported by Moss and Robson (1968) noting that 3 month old boys had a longer fixation time for all stimuli.

Klaus et al. (1970) explored the behaviour of mothers at first contact with their infant during the first 10 minutes of life. They noted from their recordings of the verbal behaviour of mothers and photographs taken every second that mothers had an intense interest in the babies' eyes, in fact 73 per cent of the mothers verbalized this interest and in the period from 6 to 9 minutes after they began to handle their new infant spent 23 per cent of that time in a face to face position. In a follow-up study

Klaus et al. (1972) reported a similar result, mothers showed greater interest in placing their infants in this face to face position.

Jaffe et al. (1973) noted the importance of mothers' responsiveness while gazing at their infants when they related this dyadic interaction to their earlier work on adult dyadic interaction during conversation (Jaffe and Feldstein, 1970). They noted a similarity between adult conversation and mother-infant gaze behaviour, both these forms of dyadic behaviour conforming to a Markov chain model, a stochastic process which moves through a finite number of states, and for which the probability of entering a particular state depends only on the last state occupied. Obviously as with the adult conversation, the more responsive the partners the more conversation (i.e. gaze interaction will occur).

Stern (1971, 1974) has closely investigated the dyadic interaction of mothers and infants when the infants were aged 3 to 4 months old. He observed facial, vocal and gaze behaviours. He found that gazes between mother and infant were extraordinarily long, up to 30 seconds in length, a length which rarely occurs between adults. It was considered that it was the infant gaze which maintained the mother's gaze, i.e., the probability of mother terminating her gaze when the infant was looking at her was very low. Stern also noted that the infant's tendency to initiate gaze was relatively independent of what the mother did, suggesting a physiological readiness or state which brings about gaze behaviour. However once gazing was established the probability of mother's gazing at the infant increased the probability that he will gaze at her, and this effect was increased by maternal speech.

Tronick et al. (1977) provided further evidence for the regulatory nature of the mutual gaze between mother and infant, when they found that infants were capable of modifying their attentional and affective displays in a reciprocally co-ordinated manner. That is, when analysed in 10 second time samples in which mother and infant behaviour were ranked according to the degree of engagement with each other, high correlations were found which reflected that the mother and infant were moving in the same direction along the attention-inattention dimension. The fact that this pattern tends to conform to a speech cycle suggests that in this early visual exchange is found the roots of the infant's learning to communicate.

Blehar et al. (1977) elucidated the developmental consequences of this early face to face interaction. Observing infants when aged 6, 9, 12 and 15 weeks of age at home with their mothers and when aged 51 weeks in the laboratory they obtained intercorrelations of 20 maternal and infant variables which were then factor analysed. This revealed that certain mother initiated behaviours, (e.g. playfulness, contingent behaviour initiating interaction), were associated with certain infant responses (vocalizing, smiling, bouncing, etc). This suggested that from the ages of 6-15 weeks the mother plays the leading role in producing infant responses. Blehar et al.(1977) then classified the behaviour of the infants at 51 weeks into categories from the responses of each infant during reunion with the mother after separation. According to their findings infants who were judged "securely attached" (i.e. actively seek mother on reunion) had mothers who in their face to face interaction were more contingent in their behaviour and kept pace with the infants. It was also noted that those infants had been more likely to smile at mother during face to face interactions. On the other hand, infants who were "anxiously attached" (they sought mother on reunion, then resisted being picked up) had mothers who more often initiated face to face interaction with a silent, impassive face and more often failed to respond to their infant's attempts to initiate interaction. It was interesting that they found that the absolute amount of face to face contact in the two groups was the same, rather it was the quality of that contact which was different.

The foregoing would suggest that the structural characteristics of the human face possess high stimulus value for the young infant, thereby attracting relatively high rates of attention. These characteristics apparently involve several dimensions, e.g., movement, symmetry, curvilinearity, complexity, as well as the eyes themselves being an important determinant of attention. For the mother herself the infant's face, particularly the eyes, have a marked effect on her behaviour, and in early interaction with her infant she spends a large proportion of the time maintaining a face to face orientation.

This early interaction has developmental consequences for the regulation of the early dyadic interaction between mother and infant, and in it are probably the roots of speech, social responsiveness and the infant's attaining of a secure relationship with his mother.

2.3 RESPONSIVENESS TO AUDITORY STIMULI:

As with visual stimulation there appears to be a range of auditory stimuli to which the infant is maximally responsive and these stimuli fall within the range of those characteristically emitted by humans. Hutt et al.(1968) measured the responsiveness (i.e., change in state of arousal or activity level) of infants 8 to 12 days old to sound stimulation, including sine and square waves at each of 70 Hz, 125 Hz, 250 Hz, 500 Hz, 1000 Hz and 2000 Hz. The results showed that generally those sound waves in the region of the human voice (square waves ranging from 70 to 250 Hz) were prepotent in gaining attention from the infant.

Lenard et al. (1969) followed up this study and measured acoustic evoked responses to sound. They investigated two groups: group 1 were stimulated with sine and square waves at 125 Hz, 1000 Hz and a female voice saying "baby"; group 2 received 125 Hz square waves and three bands of patterned white noise. The results showed that for group 1 accoustic evoked responses were greatest to 125 Hz square waves followed in order by the voice, square wave 1000 Hz, sine wave 125 Hz and sine wave 1000 Hz. For group 2 the results were in the order 125 Hz square waves, wide band white noise, low band white noise, and high band white noise. However, Ashton (1971) using square wave auditory signals of 75, 95, 115, and 135 Hz, failed to find any differential auditory responsiveness of infants 3 to 5 days old during the quiet alert state, differential responsiveness being found only when infants were in a state of quiet sleep. Hutt (1973) has commented that this is probably of little significance if one accepts that the human infant ear is "turned" to a range of frequencies fundamental to human speed then differential sensitivity within the range tested would not be expected.

Bench (1973) has criticised the Ashton (1971), Hutt et al. (1968) and Lenard et al. (1969) studies on the grounds that spectral analyses of their signals were not presented, the capabilities of small speakers being such that the differences in acoustic sensitivity of infants may have been due merely to differences in bandwidth not frequency. However he repeated the study of Hutt et al. (1968) with essentially similar results, and Hutt (1973) in a reply pointed out that spectral analyses of the audio stimuli were made. Thus the original Hutt et al. (1968) results were strengthened.

Weir (1976) subjected the Hutt et al. (1968) study to a further replication with infants 3 to 8 days old. He used a signal detection paradigm to estimate infants' responsiveness to auditory stimulation. He found that square waves were always more discernable than sine waves, with those of 70 Hz to 50 Hz being more detectable than those of higher frequency. He concluded, as Hutt et al. (1968) and Lenard et al. (1969) had, that the sensitivity of infants to auditory stimulation is a complex combination of band width and frequency, and that they are more sensitive to wide band, low frequency sound, that is, the fundamental frequency of human (adult and infant) vocalization.

Eimas et al. (1971) startled developmental psychologists with their demonstration that infants as young as 4 weeks could distinguish between synthetic samples of voiced and voiceless consonents "B" and "P". Their procedure called for infants to be presented with sound stimulation contingent on high amplitude, high rate non-nutritive sucking. With repreated presentation habituation occurred (a decrement of at least 20 per cent for 2 minutes of stimulation was required to suggest habituation had occurred) and then a second stimulus was presented. If an increase in suck rate was observed then the infant was considered to have perceived a difference in the two sounds.

Trehub and Rabinovitch (1972) also using the habituation paradigm found that infants of 4 weeks of age could distinguish between a synthetic "B" and "P" and natural speech "B" and "P" and "D" and "T", while Morse (1972) with infants 1 and 2 months old also reported that they could discriminate between "B" and "P" as well as a rising as opposed to falling tone.

Further evidence as to the organisation of the auditory apparatus comes from two studies. Wertheimer (1961) presented a new born infant a few seconds after birth with a sound source either to the right or left. The infant was observed to turn her eyes consistently to the direction of the sound indicating correct auditory localisation and some degree of auditory-visual co-ordination. Aronson and Rosenbloom (1971) also showed auditory-visual co-ordination in very young infants. In this study mothers spoke to their infants through a sound-proof glass screen, with their voice coming from stereo speakers either side of the infant. Thus the infant could see his mother and hear her through the speakers. As long as the speakers were in balance, that is, the sound appeared to come from the face directly in front of the infant, then the infant was content, but if the stereo was out of balance, that is, sound came from left or right of the face talking, then infants became upset. Again this showed some degree of auditory-visual localisation and also the early expectation that voices come from faces.

While some difficulty in replicating this finding has been experienced (Condry et al. 1977), nonetheless the study of Wertheimer (1961) and more recent work of Lyons-Ruth (1977), Mendelson and Haith (1976) and Spelke (1976) indicate that the infantscan process audio information but do not necessarily become distressed when audio-visual discrepancy occurs. Lyons-Ruth (1977) reported that infants aged $3\frac{1}{2}$ to 4 months if presented with a familiar object emitting an unfamiliar sound would tend to look away from it rather than towards it as was the case when the object and sound had previously been presented together. Mendelson and Haith (1976) noted that infants as young as 40 hours will scan towards a sound source, while Spelke (1976) observed 4 months old infants when shown two sound tracks simultaneously but with only one sound track from one central speaker will look primarily at the event specified by the sound track.

The relationship of a human voice (generally the mother's) to specific infant responses has been noted in a number of studies. Within a few days of birth the sound of mother's voice or soft patterned sound is capable of soothing the infant (Hetzer and Tudor-Hart, 1927; Wolff, 1963; Hutt et al., 1968). The infant will begin to suck and vocalize upon hearing his mother's voice, and may cry when the voice ceases. Wolff (1969) noted that crying can be reduced by a human voice by the second week and by the third week a female voice becomes effective, while Birns et al. (1965) observed that lower frequency sound in particular (150 Hz) compared with higher frequencies (e.g., 500 Hz) acts effectively in soothing infants.

Mills and Melhuish (1974) have reported that the mother's voice in particular is recognised by infants at least by the twentieth day. They trained infants to suck for auditory stimulation, suck rate being significantly higher and pause length significantly shorter when sucking was followed by the mother's rather than a stranger's voice.

Bankiotes et al. (1972) showed with infants 3 to 4 months old that auditory stimulation in the form of a male or female voice can effectively reinforce infant vocalization when presented contingent on vocalization. Trehub and Chang (1977) exposed infants aged 5 to 15 weeks to presentation or withdrawal of natural speech contingent on the infant's non-nutritive sucking as well as non-contingent or no stimulation following sucking. Only contingent speech resulted in a significant increase in suck rate.

Again there is evidence for the organisation of a receptor system of the infant to be most responsive to stimuli which originate from the caretakers or are within the fundamental frequency range of the caretakers. Infants demonstrate particular responsiveness to wide band, low frequency sound and within a few weeks of age can distinguish some fundamental speech sounds and are able to locate sound in space. It was also noted that auditory stimuli, particularly speech, are powerful reinforcers. Such organisation must give rise to a marked tendency for the infant to be differentially responsive to the auditory behaviour of the caretaker, with obvious implications for the origins of attachment.

2.4 GRASPING RESPONSE OF THE INFANT:

It is considered by Bowlby (1958, 1969) that clinging by the infant is an instinctual behaviour brought about by the infant's "..... in-built need to be in touch with and to cling to a human being. In this sense there is a need for an object independent of food which is as primary as the need for food and warmth." (Bowlby, 1958; page 350) "Primitive" clinging behaviour can be demonstrated with a modification of the well-known Moro response. The German paediatrician Moro in 1918 discovered a reflex behaviour which is traditionally elicited when the baby's hands are not grasping anything. The usual procedure is to hold the baby in a supine position and to drop the head a few centimeters. Immediately the arms and legs extend in a generalized "startle" reaction. Prechtl (1965) demonstrated that the Moro response is very different when it is elicited while the infant is held in such a way that traction is exerted on his arms and hands and a palmer grasp reflex is induced. In this situation when the infant is subjected to a slight drop, then little or no extension occurs, rather there is a strong flexion and considerably strengthened clinging. Prechtl suggests that this response can be understood when one considers that a similar behaviour is observed in young rhesus monkeys who must cling to their mother's body during her movement. Thus the Moro response appears to be a primitive response maintaining contact between mother and infant.

While this is likely the particular stimulation associated with being held against the mother's chest and what she does when the infant is held there is probably more important to the infant. Korner and Thoman (1970, 1972) noted that when an infant is crying then the vestibular-proprioceptive stimulation of the upright position on the shoulder was the most effective procedure in reducing crying (compared with touching and holding against the mother's breast).

A number of studies have suggested that the over shoulder position evokes visual alertness (e.g. Fredrickson and Brown, 1975; Korner and Grobstein, 1966a; Korner and Thoman, 1970, 1972; White and Castle, 1964). However, a more recent study by Gregg et al.(1976) indicated that vestibular-proprioceptive stimulation either horizontally or semi-vertically achieved visual tracking, whereas an upright position did not. Therefore it is suggested that the movement of pulling the infant up to the on shoulder position is probably the determinant of infant altertness and soothing.

Thus while the primitive clinging reflex may well serve to bind mother and infant together, the frequency of occurrence of that behaviour would be very low, whereas the visual alertness brought about by movement while on the mother's shoulder and resulting soothing is probably a more important determinant of the mother's use of this position and its effectiveness in promoting the bond between mother and infant.

2.5 THE SMILING RESPONSE OF THE INFANT:

Initially the infant's smile is spontaneous and reflexive and has been observed within 12 hours of birth (Wolff, 1963; Freedman and Kellar, 1963; Freedman, 1965). This very early smiling was usually observed during drowsiness and it was unusual for it to occur after the first month.

During the second week a smile could be elicited (when the baby was well fed and with his eyes opened) in response to a cheek being gently stroked, a soft light shone in the eyes or by a soft sound. This reflexive smiling was followed by unselective social smiling beginning about the 14th day and usually becoming well established by the end of the fifth week (Wolff, 1963).

Wolff also reported that during the third week of life the stimuli most regularly producing this primitive social smile were auditory, the most effective being the human voice, especially a higher pitched one. By the end of the fourth week he found that the sound of a human female voice was so effective that it could elicit a smile even when the baby was crying or sucking. At this age visual stimuli played little part in eliciting smiling, but during the fifth week a change occurred, the voice losing its potency and the moving human face becoming most effective. Wolff reported that during the first 3 weeks of life an infant may look at a face and track it but does not seem to focus on it, however, at approximately the same time as he begins to respond to a face with a smile (4 to 5 weeks) the baby begins to engage the mother in eye to eye contact with the result that mothers who have previously played little with their babies now spend more time playing with them.

As well as the effect which a baby's smile has on the mother's behaviour, evidence also suggests that the mother's behaviour influences the frequency of baby's smiles.

Brackbill (1958) with eight 3 month old babies, used a multiple baseline operant conditioning approach in which she established that smiling was under operant control. During the baseline phase the experimenter responded to the infant's smiling by gazing at the infant with a sober face. During the conditioning phase contingent reinforcement was given on the emitting of a smile (i.e., the experimenter smiled, spoke softly and picked the infant up). During the final phase extinction was attempted with the experimenter again responding to smiling by the infant with a passive face. Smiling significantly above baseline was observed during the stage of conditioning and a reduction in smiling occurred during extinction. Tautermannova (1973) has confirmed this observation in a separate study in which he showed that social stimulation of the kind used by Brackbill increases both the frequency and length of smile.

Further evidence for the importance of the human face in producing lengthy social smiles comes from Freedman (1964) who investigated smiling behaviour in blind children. He found that a blind baby would smile in response to a voice or touch in much the same manner as a sighted baby, but it was not until 6 months that the wide-mouthed, lengthy smile (observed by Wolff (1963) during the fifth week in normal children) occurred.

2.6 VOCALISATIONS FROM THE INFANT

Studies have indicated that, as with smiling, vocalising is under operant control. Rheingold et al.(1959)

found that an adult's responses contingent on the vocalising of 3 months old infants could bring about an increase in that behaviour. Subsequently when the reinforcement was withheld during two days of extinction vocalisation rate fell to a point only 18 per cent above the operant level. However, Rheingold et al. considered the effect of the experimenter's presence on the dependant variable may have been that presence acting simply as a "social releaser" for vocalising, i.e., it had stimulus rather than reinforcing properties. Weisberg (1967) reported a well-controlled study in which he investigated the stimulus properties of an immobile human face on infant vocalisations, and also the effectiveness of response contingent and non-contingent reinforcement by the experimenter (the experimenter rubbed the infant's chin, grinned, and produced an aspirated "yeah" sound). Weisberg noted that the mere presence of an immobile human face did not affect infant vocalising reliably, nor did non-contingent reinforcement. On the other hand contingent reinforcement reliably increased vocalising over base rate, and extinction returned it to mere base rate. It was also noted that contingent non-human reinforcement (bell-chime) had no effect. Schwartz, et al.(1970) in an analysis of the effectiveness of auditory, visual or tactile stimuli reported that all combinations successfully reinforced infant vocalizations.

Thus it has been demonstrated that vocalizing, as with smiling, is under direct operant control.

Todd and Palmer (1968) tried to establish the degree to which human presence was necessary in conditioning infant babbling using a human voice as reinforcement. With infants $2\frac{1}{2}$ to $3\frac{1}{2}$ months of age they subjected them to two experimental conditions. In the first infant babbles were reinforced contingently by a tape recorded voice, and in the second contingent reinforcement was provided by the tape recorded voice plus an adult presence in the infant's visual field. Results revealed that while significant increase in vocalizations occurred in both conditions during the conditioning trials, nonetheless the vocalizations of the group which had human presence increased significantly more. It was also interesting that during extinction trials the group without the human presence initially underwent an increase in vocalization, while the group with the adult presence underwent an immediate decrease. The significance of this was not obvious, but it was suggested by the experimenters to be due to the group without the adult present experiencing greater "frustration". Bloom and Esposito (1975) also reported that a human presence facilitates infant vocalizations in their demonstration that response-independent as well as response-dependent social responses (from adult) brought about equivalent increases in infant vocalizations.

Bloom (1974) highlighted one aspect of the human presence which is effective as a reinforcer. She compared vocalization rates of infants aged 10 to 14 weeks reinforced by experimenters with eye to eye contact possible (either directly or with the experimenter wearing photographs of eyes on spectacles) or not possible (experimenter's spectacles had opaque lenses). The rate of vocalizations increased only when eye to eye contact was possible. In a follow-up study Bloom (1975) had the experimenter speak to and touch infants non-contingently, the experimenter and infant being in a face to face position. This procedure effectively increased vocalizations recorded. In a second experiment infants were reinforced either contingently or non-contingently for their vocalizations, with eye to eye contact possible or not possible. Only when infants could see the experimenter's eyes did vocalizations increase, this result being independent of the contingency of stimulation.

Although Bloom concludes that such results indicate that a responsive adult with whom eye to eye contact is possible acts as a "releaser" of infant vocal sounds, in fact a more parsimonious explanation is that this effect is due to the adult's presence, and eye to eye contact in particular, being a potent discriminitive stimulus for the delivery of reinforcement under a wide variety of conditions. Such a discriminitive stimulus would be expected to have become a generalized reinforcing stimulus (Skinner, 1953) with the result observed by Bloom (1974, 1975), Bloom and Esposito (1975) and Todd and Palmer (1968). The relative stimulus potency of the eye was indicated by Caron et al. (1973) who reported that, at age 4 months at least, the eyes are the most salient feature, i.e., when habituated to a slide of a schematic face distorted in various ways it was distortion of the eyes which resulted in greatest response recovery when the target to which infants had undergone stimulus habituation was a regular schematic face. Such a finding suggests that the eye then is an ideal stimulus to become a generalized reinforcing stimulus.

In a study related to both the perception of speech sounds by infants and the conditioning of different infant sounds, Routh (1969) with infants aged 2 to 7 months demonstrated that differential reinforcement of either vowel or consonant sounds successfully increased the appropriate differential responding.

Thus it can be concluded that infant vocalizations may be readily brought under operant control, human presence, particularly when eye to eye contact between infant and experimenter is possible, significantly improving the degree of control achieved.

2.7 CRYING OF THE INFANT:

As early as the second or third week crying can be reduced by a human voice (Wolff, 1969). He noted that by the second week a human voice was effective in reducing crying and by the third week a female voice was more successful, while Ambrose (1969) observed that rocking at 60 cycles per second was conducive to soothing.

Some investigation has been made of the conditions most effective in reducing crying. Etzel and Gewirtz (1967) attempted an experimental modification of high-rate crying in two infants using non-reinforcement (extinction) of crying and fussing and reinforcement of behaviour incompatible with crying (smiling) by the experimenter saying "Good boy, X" then nodding and smiling when the infant was not crying. This procedure successfully extinguished crying and increased the frequency of smiling. Brackbill (1958) also noted that rate of protest (crying and fussing) decreased as rate of smiling increased.

While the reinforcement of responses incompatible with crying helps to reduce crying rate, it has also been reported that the latency with which mother responds to crying influences crying duration. Thoman (1975c) concluded that the infants of mothers who responded to crying within 90 seconds of its onset ceased crying more quickly than those of mothers who took longer. Bell and Ainsworth (1972) reported that mothers who were more responsive to their infants' crying had infants who cried less by the age of 6 months to 1 year. They also reported a negative correlation between the infant's ability to communicate with mother using non-crying signals and crying and a positive correlation with maternal responsiveness to the cry. Parsley and Rabinowitz (1975) interpreted this finding as being due to mothers who quickly terminate crying tend to reinforce other communication responses which are incompatible with crying. The findings of Brackbill (1958) and Etzel and Gewirtz (1967) would certainly support this, as well as those of Bell (1971), Moss (1967) and Moss and Robson (1968) who noted that increased responsiveness from the mother generally follows increased crying.

However, the study of Bell and Ainsworth (1972) has recently come under fire in an article by Gewirtz and Boyd (1977b). They were concerned particularly with the portion of the Bell and Ainsworth report that dealt with the relationship between earlier maternal ignoring of and responding to crying and later infant crying. Between quarters Bell and Ainsworth (1972) used rank correlations to intercorrelate the frequency and duration measures for the maternal ignoring of infant crying and total infant crying. The measures for later time quarters were conceived to be the dependent variables and those for earlier quarters the independent variables. Thus the dependent variables were total infant crying and maternal ignoring of infant crying. Gewirtz and Boyd consider that some of the results of the Bell and Ainsworth study should be considered with caution because they have (a) intercorrelated measures which were intrinsically contingent, a relationship which would have influenced the correlation of statistics, and (b) because the intercorrelations were correlated within and between the matrices used, there would have been an increased probability of type 1 errors (i.e., the same mothers and infants appeared in every row and every column of each intercorrelation matrix), and (c) there were no controls for the effects of relevant antecedent and concurrent determinants of the two sets of outcome variables (i.e., total infant crying and maternal ignoring of crying).

A fourth concern was with Bell and Ainsworth's main conclusion that maternal responding to crying was associated with decreases in subsequent infant crying. In fact their between quarter correlations for frequency and duration measures did not involve the maternal responding variable at all, they were between the variables of maternal ignoring of crying and subsequent infant crying. Bell and Ainsworth treated the variable maternal responding to crying as the inverse of the orthogonally defined variable "maternal ignoring of crying", as if the frequency scores of those two variables had been converted to proportions of their sum before the maternal ignoring variable was correlated with infant crying between quarters. In fact it was not determined whether maternal ignoring and responding were inversely related as assumed by Bell and Ainsworth.

In a reply to this article Ainsworth and Bell (1977) consider that the nature of crying is such that there is no satisfactory way to devise pairs of measures that will be independent of each other for any one episode. Regarding the criticism of lack of independence of correlations between the various quarters, Ainsworth and Bell point out that the only possible way in which a contingent relationship could apply across quarters was through the historical processes of mother-infant interaction, and indeed that was what they featured in their 1972 discussion when they stated that infants who had an early history of delay on the part of the mother in responding to crying tended later to cry for longer periods than did infants with a history of less delay.

To demonstrate unequivocally that maternal responsiveness and duration of infant crying are related a study is required in which both variables and their relationships are observed directly rather than being inferred through the use of intercorrelational statistics which preclude adequate experimental control.

Parsley and Rabinowitz (1975) suggested an operant interpretation of the original Bell and Ainsworth (1972) findings inferring that mothers who quickly terminate crying tend to reinforce other communication responses which are incompatible with crying. While this may well be so, as Gewirtz and Boyd (1977b) point out, the summary variables of the Bell and Ainsworth study are inappropriate for demonstrating conditioning contingencies between maternal responding and infant crying because they are remote from the level of precision required by an operant-learning analysis.

While it is not entirely unequivocal whether promptness of response to crying results in less crying, there does seem to be a relationship between promptness of response to crying and competence of the infant. Lewis and Goldberg (1969) reported that infants whose mothers had responded promptly to their cries while in the waiting room prior to an experiment performed better on a perceptual-cognitive task. Further support also comes from Clarke-Stewart (1973) who, in factor analyses of infant and mother behaviours, found that a factor termed "infant competence" (which included measures of cognitive and intellectual skills, communication, etc.) was negatively related to crying and strongly, positively related to "optimal" mother care (contingent response to infant signals of distress and other social signals, interaction which was verbally and visually stimulating, etc.). This study demonstrated the interrelationship of cognitive and affective aspects of development in infancy, and also emphasised that mothers who are responsive to distress signals are also responsive to other signals as well and therefore are likely to spend a great deal of time playfully stimulating their infant, and probably reinforcing behaviour incompatible with crying.

To date the weight of evidence denotes that vocalizations from the caretaker are effective in reducing crying, with some indication that in both the short and long term minimum latencies of response to crying result in more rapid reduction and less frequent occurrence of crying. Responsiveness of the mother also gives rise to greater infant competence. Nonetheless more definitive studies of the relationship are required with direct observation of infant and mother behaviours being carried out, together with adequate experimental controls which enable appropriate statistical procedures to be utilized.

CHAPTER 3

CRITIQUE OF BOWLBY'S (1958, 1969) FORMULATION IN THE LIGHT OF THE FOREGOING AND RECENT LITERATURE

3.1 EVIDENCE AGAINST FIVE BEHAVIOUR SYSTEMS:

Bowlby has argued that five environmentally stable infant behaviour systems are particularly effective in bringing about proximity of mother and child, and that these behavioural systems are species-specific (instinctive) and result in the development of attachment between mother and infant. These are sucking, clinging, following, crying and smiling. Observational studies such as those of Dunn and Richards (1977), Kay (1977), Levy (1958), Moss (1967) and Richards and Bernal (1972) suggest that the infant's nutritional needs play an important role in the regulation of maternal and infant behaviour during the first few weeks, but the evidence is lacking that the infant's sucking acts as some kind of a releaser of maternal feelings, particularly when one considers Levy's (1958) study in which it was shown that pain experienced by the mother during feeding was not infrequent, and the findings of Kaye (1977) that interaction is most likely to occur between feeding bursts, rather than being a feature of feeding itself.

Similarly studies indicate that the clinging behaviour of the infant plays a very minor role in the early relationship. The moro reflex itself ceases to be functional after 3 to 4 months and it is probably the movement of placing the infant against the chest providing stimulation and increased arousal which serves to sooth the infant and to reinforce the mother for such behaviour (Gregg et al., 1976).

The observational studies such as those of Richards (1971a) and Wolff (1963) confirm that smiling appears to play a role in the early interaction of mother and infant, as does crying (e.g., Moss, 1967; Moss and Robson, 1968), while following, except perhaps visual tracking, does not (e.g., Richards, 1971a).

In addition to the above, whereas Bowlby seems to propose that the five behavioural systems operate on the mother much like the releasing mechanisms of ethology, a persual of the literature results in the finding that a wide range of behaviour patterns bring about mother-infant proximity, in fact almost any discernible change in state can be sufficient to have the mother come. This is most unlike the restricted and specific signals that are typical of the releasing mechanisms of the lower animals.

3.1.1 Behaviour When Mother And Infant Are in Close Proximity:

In fact recent evidence suggests that the mother and infant when in close proximity to each other engage in quite complex interactional behaviours. For example, Richards (1971b) has observed and Stern (1971, 1974) has closely analysed infant-mother gaze interaction, and noted a complex process of infant attention and inattention to the mother's face to which the mother is responding by her own cycle of attention-inattention, these two cycles being in phase with each other. Brazelton et al. (1974) have also filmed infants and their mothers in interaction and during frame by frame analysis of one minute of intensive interaction noted the cyclical nature of the infant's attention to mother. They considered that a very complex patterning of behaviour was occurring, so that the mother's behaviour could fit into the infant's, e.g. she would adjust to his rhythm, reduce interfering activity, set the stage for interaction and create an air of expectancy for further interaction by adjusting the amplitude of her movements she would catch his attention, she would direct the infant's attention towards herself by specific interesting movements of her face, and she would attempt to intensify attention from the infant by smiling, talking, nodding her head, etc., and would allow for reciprocity in the interaction. Fogel (1977) has confirmed these observations in his studies with mothers and infants. Tronick et al. (1977) have also closely investigated face to face behaviour of mother and infant, and by correlating the degree to which each mother and infant was engaged with the other partner they found in some instances a high degree of mutuality in the cycling of attention and inattention, indicating as the previous studies have interaction at a complex level.

Such phasic interaction is characteristic of early feeding as well. Both Richards (1971a) and Kaye (1977) have noted that the feeding behaviour of the young infant is characterized by phasic bursts of sucking, and at a higher level sucking bursts and pauses are separated by winding and changing from breast to breast, and feeding schedules themselves also form part of a rhythmical cycle of feeding, awake, sleeping, etc. It is interesting that the mother tends to interact (talks and smiles at the infant) predominantly when the nipple is out of the infant's mouth, a somewhat unexpected finding in the light of Bowlby's theory.

Also demonstrating surprising complexity are the studies of Condon and Sander (1974) and Condon (1977) which have shown synchronisation of infant movement organisation with the articulatory segments of adult speech as early as the first days of life. This study followed that of Condon and Ogston (1967) who discovered a synchronisation of body movements of adults and children when another is speaking. In a frame by frame analysis of infants aged 12 hours to 2 days and two infants aged 14 days, Condon and Sander analysed infant movement in relationship to maternal speech. They found synchronisation of the infant movement and maternal speech. A check control study indicated that it was not merely a "random fitting together" of maternal speech and infant movement, because when a film of infant movement during the awake alert state was made and then related to an independent tape of maternal speech, no synchronous relationships were found. Thus this study reveals a complex interaction system in which the organisation of the neonate's motor behaviour is entrained by and synchronised with the speech of adults in his environment. Condon and Sander (1974) suggested that ".......... the "bond" between human beings should be studied as the expression of a participation within shared organisational forms, rather than as something limited to isolated entities sending discreet messages".

Stern et al. (1977) in a follow-up of the earlier studies of Stern (1971, 1974) noted that mother's in engagement with their infant's provided both vocal and kinesic (movement, facial expression, etc.) acts which had a loose tempo and which therefore may help to pattern the infant's perceptual world and to lay the foundation for the development of communication, especially speech. That is, the pattern of vocal-pause or kinesic-pause rhythm was parallel to the rhythm of speech. This while a mother is patterning her stimulation to the infant in such a way so as to maintain his attention, she is also shaping his responsiveness to patterned stimulation.

Direct imitating of adult facial and manual gestures has recently been shown in a well-controlled study by Meltzoff and Moore (1977). In two separate studies they were able to show that infants aged between 12 and 21 days would imitate adult movement which had been demonstrated to them, even after the adult movement had ceased. They considered that the experimental design precluded an explanation based on experimenter reinforcement of infant gestures and the range of gestures imitated (four) made it unlikely that the imitation was merely the activation of innate behaviours. Rather they suggested that the infant is comparing his own unseen gestures with that of an internal (neural) representation of the visually perceived gesture, and constructs the match required.

It must be concluded then that the interaction of mothers and infants as revealed by the evidence presented above is more complex than that which would be predicted by Bowlby's (1958, 1969) theory of a behavioural system which is the result of species-specific behaviours activated by releasing stimuli from the other partner. While there are obviously some similarities between the species-specific behaviour patterns of lower animals and the early interactions of mothers and infants, e.g. the synchronisation of mother and infant speech and movement, nonetheless there is a danger in describing behaviour at that level because it suggests fixed behaviour patterns rather than highlighting the intricacy of the relationship and the potential it represents.

3.1.2 Behavioural Variability Of The Partners And Its Effect:

Studies of the behavioural variability which mothers and infants bring into their reciprocal interaction also indicate a level of complexity beyond that predicted by a system based on mere species-specific action patterns.

Variability of the infant:

Marked individual differences in a variety of measures of infant state have been noted. Korner (1974) has commented that it is a relatively common finding that neonates differ with respect to state and that this will lead to differential effects on the caretaker, e.g. there are marked variations in duration of waking activity, number of shifts of state, and frequency of global and diffuse movements (e.g. Korner, 1973; Korner and Beason, 1972; Korner et al.,1968; Korner and Kraemer, 1972). Differences have also been found in the infant's general threshhold level to stimulation (Korner, 1970), in infant soothability (Korner, 1971; Korner and Thoman, 1972), auditory responsiveness (Ashton, 1971; Korner, 1974) nature of change from state to state (Brazelton, 1961) frequency of being spontaneously alert (Korner and Grobstein, 1967; Korner, 1970) suck rate (Dunn, 1975; Kay, 1977) and duration and frequency of crying (Korner, 1971).

While the state of the infant obviously influences the mother's behaviour, the regularity and discernibility of the infant's changes from state to state have important consequencies. Both Richards (1971a) and Thoman (1975a) have made the observation that mothers of infants which appear "well-organised", i.e., their behavioural cycles (both those due to state changes and to the mother's behaviour) are regular and give the mother clear cues as to whether the infant is asleep, awake, uncomfortable etc., find it easier to respond appropriately to their infant's signals. On the other hand they have observed infants whom they considered "poorly organised" in that the infants show relatively small amounts of "quiet sleep" or "alert inactivity" and are highly erratic both with respect to the amount of time they spend in each state, and the number of transitions between states. The researchers found it difficult to judge which state the infant was in and considered that the mothers would also have this difficulty, with resulting problems in appropriate responding to their infant's signals.

More direct evidence that infant behaviour does indeed affect mother behaviour has been demonstrated by a number of studies. Bell (1971), Moss (1967) and Moss and Robson (1968) have noted that infant behaviour both elicits and terminates the mother's care, and Gewirtz and Boyd (1976, 1977a) (reviewed in Chapter 1.3) reported four separate studies which highlight the phenomenon of infant effects on maternal behaviour. They found that mother's verbal behaviour and facial expressions could be brought under operant control without their awareness when infant vocalizations or headturns,supposedly from a mother's own infant, were signalled contingent on predetermined maternal behaviour.

Osofsky and Danzger (1974) studied mothers and their new born infants during a bottle feed and compared this behaviour with observations of the infant carried out during a standardised assessment. They found that infants who were found to be generally alert and responsive to auditory cues during the assessment looked at the mother a great deal during the feeding observation, with the data also suggesting consistent and interactive relationships between patterns of maternal stimulation and infant behaviour in corresponding areas, e.g. the infants who maintained high levels of eye contact had mothers who were attentive and sensitive to them, those who responded efficiently to auditory stimulation had mothers who engaged in more stimulation. Osofsky (1976) followed this study up with observations of mothers and infants during feeding and for a 15 minute period approximately 1½ to 2 hours after the feed when the infant was awake and alert. During the observation session the mother was asked to stimulate her infant in various standardised ways (e.g. shake a rattle beside the bed, move a red ball in front of baby's face). Osofsky found a positive relationship between infant eye contact with mother and auditory and tactile responses, while maternal auditory stimulation related to infant auditory and tactile responsiveness, and tactile stimulation by the mother related to auditory and tactile responsiveness of the infant. She also noted that infants who in assessment were found to have less general tone, less motor maturity, less mature ability to pull themselves to a sitting position, more startle and less hand to mouth facility, had mothers who handled them less often during the feeding. The more alert infant received more visual stimulation, while the more irritable infant received less auditory stimulation. The less mature infants with poorer tone received less overall stimulation in the auditory and tactile domains.

Shaw (1977) observed two groups of mothers with young infants, one group of infants having had a history of prolonged crying and sleeplessness of at least 6 months duration from birth. She found that the mothers of "criers" interacted significantly less often with their infants, they emitted fewer behaviours to the infant and a higher percentage of the infant's signals to the mother were not heeded.

Although no directional effects could be stated in this study, nonetheless it was suggested that these mothers may have been "turned off" from their infants because of the high percentage of aversive behaviours (crying, etc.) emitted by them.

Variability of the mother:

As well as individual variation between infants being a source of complexity in mother-infant interaction, there is also the variability between mothers. Moss (1967) reported that the way in which a mother will treat her baby is to some extent predictable even before the baby is born. He interviewed mothers two years before they had their children and rated them according to the value they placed on the maternal role and the emphasizing of the rewarding aspects of having a baby. Those that rated highly on these two aspects were found to be more responsive to their infant's crying than mothers who had been rated much lower on his scales. Bishop (1951) observed young mothers playing with their infants and commented that patterns of interaction between mother and child varied from almost continuous interaction to very little, the determining variable being the extent to which the mother responded to or ignored her child's initiative. David and Appell (1969) when observing mother-child pairs during the first year of life, noted that while there was great variation between pairs, most of the variation was due to the mother. That is, every infant in the study was observed to respond on almost every occasion that his mother initiated interaction so that variance in the frequency of responses amongst infants was near zero, but the variance in frequency of responses amongst mothers was very high.

Ainsworth and Bell (1969) in a home study of infants and their mothers, noted a relationship between mothers' style of feeding and the infants' subsequent behaviour when in a strange situation, both with and when separated from the mother. They noted that babies who were fed in a manner which gave control to the infant, which tended to be flexible and concentrated on satisfying the infant, resulted in infants who spent the greater percentage of their time in contact with the mother and were significantly distressed by her absence. Ainsworth et al. (1971) extended those observations and attempted to group infants according to their behaviour during separation and reunion with the mother. They identified three major groups: (a) those infants who displayed little or no tendency to seek proximity, interaction, or contact with their mothers; (b) those infants who responded to reunion with more than a casual greeting, they may cry or smile, and show a clear-cut tendency to seek proximity to and interaction with the mother; (c) a maladaptive group showing a mixture of approach and withdrawal from the mother. Following observations in this separation and reunion situation infants were observed at home in free play. The relationship between behaviour in the two situations was considered and it was noted that the infant's behaviour at home was congruent with that observed in the strange situation. From their observations Ainsworth et al. (1971) developed a rating scale of maternal behaviour involving

the following dimensions:
Sensitivity - Insensitivity to the infant's signals;
Co-operation - Interference with the infants activities;
Accessability - Ignoring of the infants overtures.
It was found that mothers who were sensitive to the baby's signals also tended to be accessible, co-operative and accepting. When these babies were at home they explored away from the mother and were not disturbed by everyday minor separations. When separated in a strange situation they tried to seek mother and were distressed and when reunited with her they immediately sought contact with her. A second group of mothers were observed whose behaviour was characterised by inconsistent sensitivity to the baby's signals. Babies responded to this maternal behaviour by displaying less contact with mother, both at home and in the strange situation. The third group was composed of those mothers considered to be insensitive to the infant's needs' they were often inaccessible and displayed a wide range of interfering and rejecting behaviours. Their infants tended to show mixtures of approach to and avoidance of the mother both in the home and strange situations. Thus a direct relationship between mother's behaviour and her infant's behaviour is shown by this study. Waters (1978) has replicated this study and has shown that the categories of behaviour used are stable over at least 6 months.

Brody and Axelrad (1971) relying on mother's report of her attention to the infant, rated a group of 77 mothers on the degree to which they stimulated the infant. They then filmed mothers with their infants interacting when the infant was aged 6 weeks, 6 months and 1 year. When analysing the infant's responsiveness to the mother at 6 months it was affirmed that there was a significant relationship between mother's report of her responsiveness and the infant's responsiveness to her overtures. Beckwith (1971) studied 24 mothers and their 8-11 month old adoptive infants. Findings revealed that the quality of the mother's responsiveness to her infant was important in determining the infant's social behaviour. The more the mother ignored signals and criticised the baby the less he was orientated to her and the less he maintained contact with her. How much the mother allowed the infant to explore was also important; if she suppressed the infant's activity then the infant tended to ignore her. A high frequency of crying by the infant tended to make the mother less responsive to him and a mother's saying "no" to the infant produced more crying and less responsiveness.

Bell and Ainsworth (1972) in a longitudinal study considered that the mother's behaviour during the first year had a strong influence on the amount of infant crying, particularly towards the end of the first year. This conclusion was reached by comparing infants and mothers behaviour (by correlation) at several points over the year. Mothers who tended to respond more readily to their infant's crying had infants who cried less frequently at the end of the year.

Stayton et al. (1971) undertook an analysis of the relationship between infant obedience and the quality of maternal care. Observations were made at home for four hourly periods every three weeks from the age of 9 to 12 months. From these observations the mother's behaviour with her infant was divided into the categories devised by Ainsworth et al. (1971) mentioned above. It was found that all three measures (sensitivity, acceptance, and co-operation) were positively related to the infant's compliance with mother's commands and its displaying of internalised controls.

It is clear from the studies reviewed above that the mother and infant each bring a set of unique characteristics into their interaction which exert an influence over the behaviour of the other partner, and that this influence produces a rich complexity of dyadic interaction far removed from that based on species-specific behaviours. The evidence of such studies would suggest that it is necessary to move away from the ethological framework to one which encompasses the complexity of the interaction observed.

CHAPTER 4

REVIEW OF BEHAVIOURS TRADITIONALLY EMPLOYED TO MEASURE ATTACHMENT

Apart from the complexity of the dyadic interaction of mother and infant which would not be predicted from Bowlby's ethological approach, when attempts are made to measure attachment between mother and infant further problems are encountered. It is reasonable to assume that if certain species-specific behaviours bring about or act as precursors of the development of attachment between mother and infant, then observation of mothers and infants when in interaction should result in the finding that those behaviours would occur more frequently between the infant and attachment figure than between infant and non-attachment figure. Such an observation would lend credence to the original formulation. However, a search of the literature often fails to produce such support.

4.1 DIFFERENTIAL SMILING:

Research on the smiling of the infant has assumed that around 6 months of age smiling occurs differentially to the attachment figure (Ambrose, 1961; Bowlby, 1969; Freedman, 1964; Spitz and Wolf, 1946). This assumption has been based on the observation that the baby sobers in the presence of a stranger at this age. While this may well indicate that fear of the unfamiliar person is developing at this stage, it does not necessarily provide grounds for defining smiling as an index of attachment.

Recent research would support this contention. Stayton et al.(1973) when studying infants at home, observed no differences between frequency of smiling towards the mother or an unfamiliar figure. Corter (1973) found that infants when alone with their mother or a stranger tended to look at the mother more often, but when both the mother and stranger were present, smiling was not differential to either. Bretherton and Ainsworth (1974), with infants in a strange situation, again observed that they tended to smile at an unfamiliar person more often. Eckerman and Whatley (1975) investigated the reactions of infants to adults varying in novelty (strangeness). They placed each infant in a strange environment with his mother and an adult for five minutes, then a new adult entered and remained for a further five minutes. Although the infants smiled at both adults they were directed more often to the more novel of the two. Spitz and Wolff (1946) on the other hand noted a very low incidence of smiling by infants to a stranger; however, it appears that the stranger may have been only a few inches from the baby's face, and this may have caused an aversive reaction.

Observations of infants with adults does suggest that the closer the attachment figure comes the greater the excitement displayed by the infant, whereas the closer a stranger comes the more sober the infant appears. Cohen (1974) suggests that this may be a way of demonstrating differentiality. Wolff (1963) supports the Spitz and Wolff (1946) finding of differential smiling by infants when with very young infants he found that smiling was elicited more reliably by the mother than by the father or the male experimenter. Nonetheless the balance of evidence for smiling being differential to the caretaker is not impressive.

4.2 DIFFERENTIAL LOOKING:

Studies in which looking at mother and a stranger has been measured have not established clearly that looking is differential to the mother. Corter (1973), when infants were observed with the mother or stranger alone or mother and stranger together, reported that the infants looked at the stranger more often. This result was not statistically significant, but the finding that looking was not differential to the mother is the important conclusion. Bretherton and Ainsworth (1974) reported that when infants were with their mother and a stranger in an unfamiliar situation and the mother and stranger were both talking together, that the infants looked more frequently at the stranger. Cohen and Campos (1974) concluded from their research that infants when close to either mother or father direct significantly greater eye contact towards the stranger who is present. Again with mother and father together Lamb (1976b) noted that upon the entrance of a stranger infants directed their behaviour almost exclusively to mother, thus enabling her to be defined as the attachment figure, however, when mother and father only were present the infant looked at the father more than the mother. Lamb (1977) also found that infants directed more looking towards the stranger than the mother.

4.3 DIFFERENTIAL VOCALIZATIONS:

In the case of differential vocalizations conclusive evidence has again not been forthcoming. Stayton et al. (1973) studied infants at home and noted that when the mother returned from being out of the room that the infant vocalized to her significantly more often than when a stranger or a sibling returned from being out of the room. Bretherton and Ainsworth (1974) on the other hand, with infants in a strange situation, found that when both mother and stranger were present the infant vocalized to the mother and stranger equally.

4.4 CRYING IN RESPONSE TO SEPARATION:

Crying in response to separation has also been implicated as a measure of attachment between mother and infant. (Ainsworth, 1963, 1964; Schaffer and Emmerson, 1964b). This phenomenon has been studied more recently and the results considered to support the contention (e.g., Ainsworth and Wittig, 1969; Cox and Campbell, 1968; Rheingold, 1969). But as Lamb (1976a) in a review of studies has pointed out, these investigations have compared crying during separation from the mother with crying when the mother is present, rather than comparing crying when separated from the mother as opposed to being separated from an habituated non-familiar figure. Thus this design has not established crying as a differential phenomenon and it also confuses the assessment of the response to mother's absence with being in a strange room alone or with a stranger. Fleener and Cairns (1970) studies infants' responses to separation from the mother in a situation involving successive departures and returns of the mother and a female stranger. Infants in the 12 to 19 month age group vocalized distress more often when the mother left the room, but unfortunately it is not possible to decide from their design whether each infant's response was due only to the identity of who departed, or whether it was confounded by the identity of the person with whom the infant was left. It was also noted that crying on any particular trial was not independent of crying on the preceding trial, i.e., Fleener and Cairns commented that once infants began to cry they persisted in crying. Spelke et al.(1973) subjected a group of infants to 13 conditions of separation and reunion with mother, father and a female stranger. Once every three minutes in the experimental situation an adult either entered or departed from the room. It was reported that infants cried as much when the father departed as they did when the mother departed, even although they should be more attached to the mother, and children of fathers who interacted with them most frequently (as judged from an interview) cried the least, the opposite of that which would be expected. Kotelchuck et al.(1975) repeated the study with the same result and also noted that infants cried not at who left the room, but at the adult with whom they were left, i.e., they cried more if left with a stranger. Thus they were reacting not to the attachment figure's departure, but to the strangeness of the situation in which they were left. Further it was noted that infants whose parents were characterised by low frequencies of interacting in fact protested more when the mother or father departed. Ross et al. (1975) using the same design with infants at home found a similar result, with infants reacting in an equivalent manner to being left with mother or father, and crying significantly more often when left with a stranger. An interesting finding was that there was three times more crying when the infant was left with the stranger in the laboratory than when left with the stranger at home. This underlines the conclusion that protest is more a function of the person with whom the infant is left and the strangeness of the situation than parental departures per se. Cohen and Campos (1974) carried out a similar study and observed no differential crying to the mothers departure from the room. However, they also reported that crying increased significantly as trials increased, regardless of which parent was present or absent.

Thus when repeated measures are taken crying seems to be a measure of cumulative stress rather than being a specific response to the manipulations of the persons present. Therefore if crying is to be investigated as an attachment index then the cumulative effects of stress need to be minimised by having lengthy periods between sessions, or limiting the number of sessions and exploring the dimensions of response to separation with a between subjects design.

Stayton et al. (1973) largely avoided the influence of cumulative stress by collecting data in the home environment over a four hour period. The observations were of normal interactions at home. The frequency of crying when a person left the room was measured in two ways: (1) as a percentage of all occasions on which someone left; and (2) as a percentage of episodes in which he was not left alone nor put down. This study found that babies from the age of 5 months cry significantly more often when the mother leaves the room, regardless of whether left with a stranger or a sibling, a result in which one can have more confidence in that it goes some way towards controlling for the cumulative effects of stress and the problem of whether crying is due to the strangeness of the person with whom the infant is left. Feldman and Ingham (1975) also observed infants accompanied to their laboratory by mother, father and an acquaintance of one hour. During separations it was found that the infants cried significantly more often when left by the mother than when left by the father or the acquaintance. No significant difference in the infant's crying occurred when left by the father or an acquaintance.

These latter findings suggest that when the effects of cumulative stress and the strangeness of the environment are adequately controlled then crying upon separation is more likely to be differential to the mother.

4.5 USE OF MOTHER AS A SECURE BASE:

Ainsworth (1963, 1964) noted that an infant capable of locomotion did not always stay with its mother, but would explore away from her returning from time to time. This gave rise to the notion that an estimate of an infant's attachment to its mother could be made from the tendency that the infant showed to explore away from her. She termed this "exploration from a secure base". Ainsworth and Wittig (1969) suggested that the mother's function as a secure base from which the infant can explore has two aspects: (1) the attachment figure acts to retard the eliciting of fear in the presence of a novel object; and (2) the attachment figure facilitates exploration of novel objects and situations. Unfortunately however neither of these aspects have been unequivocally demonstrated in human infants. Studies certainly indicate that exploration decreases when the mother is absent (Ainsworth and Wittig, 1969; Cox and Campbell, 1968; Rheingold, 1969; Rheingold and Eckerman, 1969, 1970, 1971), but crying has also been found to increase when the mother is absent, suggesting that the distress at mother's departure preempts other activities, not that mother acts as a fear inhibitor, or exploration facilitator. It is proposed that what is required is a demonstration that an infant when settled calmly without the mother in an unfamiliar environment (possibly with a familiarised stranger or sibling), explores more when the mother is introduced into the situation. Similarly it needs to be shown that when alone in a familiarised environment and a novel object is introduced an infant explores it less than when with the mother.

It is implied by some writers, (e.g., Ainsworth and Wittig, 1969; Cox and Campbell, 1968; Rheingold, 1969) that the distress on separation from the mother is partly due to the fear of the strange environment which increases as the mother's comforting presence is lost. It is also concluded by some writers that the mother's entrance was necessary to quell the infant's fear. This has been demonstrated by the observation that the stranger's entrance does not have any significant calming effect (e.g., Ainsworth and Wittig, 1969). To substantiate the first conclusion it must be shown that the fear is independent of the acute separation distress, e.g., by showing avoidance of novel objects when the mother is not present. Such evidence has not been forthcoming. The second conclusion runs into difficulties when one considers the finding that at certain ages at least (See Chapter 4.7) a complete stranger is an effective fear-producing object. Thus the stranger's entrance is likely to produce more fear in the infant, thus mitigating against any conclusion being reached as to the differential effects of the attachment figure and others on fear inhibition.

Morgan and Riccuiti (1969) have conducted a study which was along the lines suggested above, namely, they studied mother's fear inhibiting function in the absence of the confounding effects of her departure. Mother was seated with the infant on her knee or approximately four feet from her. In the oldest age group studied (12½ months) infants responded "neutrally" to the approach of a stranger when on the mother's knee, but strongly negatively when seated on the floor. However, they did not investigate the capacity of an habituated unfamiliar figure to provide a secure base. Thus it cannot be concluded that this effect is differential to the mother.

More recently Kotelchuck et al. (1975), and Ross et al. (1975) in a partial replication, noted suppression of an infant's play when the mother was not present, but her absence also resulted in more crying the result thus lacking conclusiveness in showing that the mother's absence per se suppressed play.

In a more recent study Feldman and Ingham (1975) investigated the behaviour of infants with either father, mother, a stranger or an acquaintance of one hour. They had two age groups, 1 and 2 year olds. In the case of 1 year old children they played more with their mothers than with a stranger or an acquaintance, and overall were more active with their parents, while they cried more when with a stranger. The observation that they were not crying prior to entering the room suggests that this result can be taken to illustrate the fear inhibiting effects of attachment figures, and the facilitatory effect of the main attachment figure on exploratory behaviour. Thus there is some support from these two studies for both aspects of the role of mother in facilitating exploration from a secure base, i.e., she was shown to both inhibit fear, and to act as a promoter of exploration.

This support is reduced by the results from two studies. One study which was not strictly designed to investigate exploration (Ban and Lewis, 1974) investigated 1 year old's behaviour when with the father or mother in a free play situation. While exploration as such was not measured the researchers did measure distal and proximal contact with the parents. While it would be expected that the main attachment figure would facilitate exploration the infants in fact spent twice as much time close to and touching the mother than the father. Further, Willemson et al.(1974) with infants in a strange environment, found that for girls with their fathers there was a negative correlation between what were considered to be measures of attachment (contact maintaining and search for the parent when they departed) and exploration.

In general one can conclude that the poor use of experimental control resulting in the confounding of variables and the lack of consistency of results even when control was exercised renders the concept of the mother's "providing a secure base from which to explore" one which has only limited usefulness until more definitive studies are carried out.

4.6 DIFFERENTIAL PROXIMITY-SEEKING:

The tendency to seek proximity to and to maintain contact with an attachment figure is another example of behaviour which is considered to be differential towards the attachment figure (Bowlby, 1969). Coates et al.(1972a) discovered that the incidence of proximity-seeking increased after the infant was separated from the mother for two minutes, and Coates et al.(1972b) noted that the stability of proximity to and touching the mother were the most stable behaviours from session to session, day to day, and across a four month period. But with only the mother present these results do not allow one to determine the differentiality of the response to the mother. In fact where differentiality of approach to mother or a stranger is measured in a non-stressful situation, then there is a tendency for the infant to approach the stranger at least as often, and on some occasions more often than the mother (Stayton et al.,1973; Tracy et al.,1976).

Context seems to influence the tendency to seek proximity quite markedly. In the Stayton et al. (1973) study it was noteworthy that following the mother when left alone was more frequent than when left with someone else. Corter et al. (1972) and Corter (1973) have both noted that when an infant is placed at an equal distance from the mother or a stranger that the infant reliably follows the mother more often, but when the infant is alone with mother and the mother moves away, the infant then follows her more quickly than when a stranger is also present. The context of a laboratory is also more likely to heighten proximity-seeking to the mother and studies have generally shown that this proximity-seeking is almost exclusively differential to the mother, e.g., Bretherton and Ainsworth (1974), Cohen and Campos (1974). The context of these studies which has presumably brought about differential proximity-seeking towards the mother has usually involved some form of stress and Lamb (1976b, 1976d) has confirmed that stress, in these studies in the form of the entrance of a stranger, brings about an increase in proximity-seeking directed towards the mother compared with the father. Maccoby and Jacklin (1973) and Jacklin et al. (1973) both concluded that stress increased proximity-seeking, although in their study only the mother was present and therefore differentiality could not be demonstrated. However, the relationship between stress and proximity seeking is by no means clear cut particularly in the light of the finding of Ban and Lewis (1974). With infants initially in a free play laboratory situation, when presumably stress was at its highest, they observed no preferences for the mother over the father, but after fifteen minutes of play, when the infants would be more familiar with the environment and level of stress at a lower point, they spent almost twice as much time touching and seeking proximity with the mother as they did with the father.

The degree of novelty of the situation also appears to have an influence on proximity-seeking. Corter et al.(1972) noted that the presence of toys would delay the infant's following of the mother, suggesting that where the novelty value of the situation is below a certain level, i.e., non-stressful, then novelty may in fact delay proximity-seeking to the attachment figure. This finding again suggests the importance of considering the context in which the infant is contained and its influence on proximity-seeking when proximity-seeking is used as a measure of attachment.

Tracy et al.(1976) employed more sophisticated methodology when they considered the effect of context on proximity-seeking. When spontaneous approaches to the mother or a stranger were observed a slight but significant preference for the mother was noted. Behaviour when in proximity to the adult clearly differentiated the mother and stranger, with infants more often directing social (smiling and vocalizing) behaviour to the mother, and object oriented behaviour (e.g., showing of a toy) more often to the stranger. They also noted that proximity-seeking by distressed infants when the mother and stranger were both present was almost exclusively directed to the mother.

It would seem then from the studies reviewed above that where the situation contains some element of stress that proximity seeking is more likely to be directed to the mother, and when the outcome of proximity seeking is measured that clear differences may be found between the behaviour an infant displays to the mother and a stranger.

4.7 NEGATIVE REACTIONS TO THE STRANGER:

Negative reactions to a stranger are not usually considered in the context of infant behaviours which demonstrate attachment to the caretaker. Nonetheless this behaviour is well-recognised as being specific to non-attachment figures and for this reason,and the inclusion in this project of an observation of the infant's reaction to strangers,a brief overview of relevant literature is presented.

Clear negative reactions to a stranger are not expected before the sixth month, in fact the median age of onset usually being between the seventh and ninth months (Ainsworth, 1963, 1967; Ambrose, 1963; Benjamin, 1963;

Emde et al. 1976; Freedman, 1961, 1965; Freedman and Keller, 1963; Morgan and Riccuiti, 1969; Tennes and Lampl 1964; Rand and Jennings, 1978; Scarr and Salapatek, 1970; Schaffer, 1966; Schaffer and Emerson, 1964a; Waters et al.,1975). Although not all studies included actual touching or picking up of the infant those of Emde et al. (1976), Morgan and Riccuiti (1969), Rand and Jennings (1978), Schaffer (1966), Schaffer and Emerson (1964a), Skarin (1977), Scarr and Salapatek (197) and Waters et al. (1975) did include intrusion of this kind and have all reported negative reactions of the infant to a stranger. Where studies have found little or no negative reactions to strangers (e.g., Campos et al., 1975; Rheingold and Eckerman, 1971; Riccuiti, 1974) these have not included actual intrusion by the stranger, or the infant has experienced prolonged explosure to the situation.

The relationship between caretaker-child interaction and aversive reaction to the stranger has received little attention from research. Ainsworth (1967) and Ainsworth and Wittig (1969) concluded that the child's response to a stranger is influenced by variables which have little to do with the child's attachment to the mother (e.g. she suggests it relates to experience with strangers) although in her 1967 article Ainsworth points out that the baby who is afraid of a stranger is likely to be one which has previously demonstrated signs of attachment. Schaffer (1966) found no significant correspondence between maternal availability, responsiveness to the child's need, or maternal interaction with the child and fear of strangers, while Moss et al. (1969) on the other hand discovered a relationship between maternal stimulation and fear of strangers which linked the provision of caretaker visual and auditory stimulation and negative reaction, i.e., increased stimulation made it easier for the child of 8 or 9 months to adapt to a stranger. Brody and Axelrad (1971) also provided (although less conclusive) support for the relationship between caretaker behaviour and wariness of strangers when they related infant sociability to a stranger when aged 6 months and mother's report of frequent provision of stimulation (auditory, visual, playing, etc).

Some studies, namely those of Brossard (1974) and Paradise and Curcio (1974) have attempted to relate the concept of object permanence and person permanence to the infant's reaction to the stranger. These concepts owe their origins to Piaget (1937, 1947) who considered that the child has acquired the concept of "object" when he can conceive things as independent from himself and having separate spatial and causal relationships even when not currently within his perception. He considers that person permanence undergoes a homologous process but precedes object permanence because of the relative salience of the caretaker in his environment. Bell (1970), with infants 2 to 3 months old, confirmed this thesis when she showed that the majority of the infants were displaying superior person permanence (ability to discover a hidden person, the degree of difficulty of the task being varied by increasing invisibility of the person together with decreasing information as to where the person was hidden) compared with object permanence. She also noted on almost perfect correspondence between person permanence and a measure of attachment (using the Ainsworth and Bell (1969) stranger situation and the Ainsworth et al. (1971) (See Chapter 3) categories of infant behaviour during separation and reunion), those infants demonstrating high degrees of person permanence compared with object permanence tending to display active attempts to maintain contact with the mother when separated from her and when reunited, whereas infants for whom person permanence was less well-developed than object permanence or equally developed were more ambivalent in their relationship (i.e., approached and withdrew) or were generally less active in seeking proximity with their mothers.

Paradise and Curcio (1974) investigated person and object permanence in relation to response to strangers when infants were aged approximately 9½ months (the stranger approached through a series of steps culminating in picking up of the infant). Infants who displayed unequivocal fear of the stranger were characterized by more advanced development of person permanence, there being no difference between fearful and non-fearful infants with respect of object permanence.

Brossard (1974) investigated only person permanence in relation to response to strangers. Her subjects were 32 infants, eight in each of four age groups (32 weeks, 40 weeks, 48 weeks and 56 weeks). The relationship between response to the stranger (also measured during stepwise approach culminating in a pickup) was inconclusive when considered in terms of positive or negative affect, but when analysed according to whether affect changed or did not change during approach by the stranger, then infants whose affect was stable were more likely to be in a higher stage of person permanence. Thus there does seem to be a relationship between maternal behaviour, person permanence, and reaction to strangers, with infants who demonstrate negative or unstable affect in the presence of a stranger tending to be at a more advanced stage of person permanence and to have a mother who engages them in frequent interaction.

In conclusion the point of view that attachment is revealed in the differential responsiveness of the infant to the caretaker has generally received only limited support from the literature. In the case of smiling results imply that smiling may well be a response to novelty (Eckerman and Whatley, 1975) or the perception of contingency (Watson and Ramey , 1972). Only one study came close to revealing differentiality by demonstrating that the mother more often elicited smiles than the father or experimenter (Wolff, 1963). More confirmatory studies are required in which the mother's knowledge of the conditions which best elicit infant smiles is controlled when being compared with that of non-attachment figures.

Looking is most likely to occur towards a novel figure. One study (Lamb, 1976b) reported infant looking at the mother when a stranger entered, but the possibility that this result was influenced by the stress caused by the stranger's entrance makes the result difficult to interpret.

Differential vocalizing was revealed as a characteristic of reunion between mother and infant (Stayton et al.,1973) but not in other situations, however again confirmatory studies are required.

Studies of crying often omitted to consider the phenomenon of differentiality, as well as being confounded with the effects of cumulative stress and the situation in which the infant was left. Some studies even showed that crying was more frequent, or at least as frequent upon the departure of a non-attachment figure. In two studies in which the effect of cumulative stress was minimised and the stress of the situation in which the infant was left was controlled for, then crying on separation was differential to the mother (Feldman and Ingham, 1975; Stayton et al.,1973).

The concept of the mother as a secure base from which the infant can explore has failed to receive conclusive support. It needs to be shown that an infant in a familiarized environment without the mother explores less than when she is present, or explores novel objects more when she is present. In most studies where it was shown that exploration decreases without the mother increased crying occurred which confounds the result since crying would preempt exploration. The effect of a stranger's entrance is also difficult to ascertain because of the possible fear-inducing effects of the stranger. One study did attempt to assess the relative efficacy of mother, father and a familiarized stranger in promoting exploration (Feldman and Ingham, 1975), with the conclusion being reached that the mother promoted more exploration. Two other studies gave contradictory evidence highlighting the need for more definitive studies in the area.

The seeking of proximity to the mother was shown to be influenced by context, where the situation is more stressful it occurs more often to the mother, although even this finding did not always find support.

Therefore in the present state of knowledge based on differentiality of responsiveness, the conclusion that certain behaviours act as attachment behaviours is inconclusive, more studies being required which employ superior methodology.

Fear of the stranger is unusual before the sixth month, the norm for its onset being between seven and nine months, and only then if the stranger's approach involves some intrusive act such as a pick-up of the infant. There is some evidence that maternal auditory and visual stimulation minimizes fear of the stranger, at least at the ages tested (8 to 9 months), and infants whose concept of person permanence is relatively advanced display stranger anxiety also at an earlier age. However, as with the preceding studies of the differentiality of infant behaviour to the caretaker, this area too suffers from a lack of definitive studies and more confirmatory evidence from well-conducted studies is required.

CHAPTER 5

METHODOLOGICAL CRITIQUE OF THE LITERATURE ON ATTACHMENT

5.1 USE OF CORRELATIONAL STATISTICS:

Research on human attachment has produced a pool of inter-correlations of individual differences in the various behaviours that are considered indices of this construct, e.g., Ainsworth et al. (1969); Ainsworth et al. (1972), Coates et al. (1972a, 1972b); Maccoby and Feldman (1972); Stayton et al. (1973). Masters and Wellman (1972), in a review of these studies, have pointed out a basic problem in the use of correlational techniques when the sample is relatively small, i.e., the smaller the sample the greater is the range within which the true correlation may lie. For example, with an N of 28 a correlation of .55 lies within a 95% confidence interval that stretches from .22 (non-significant) to .77 (significant). Thus for a small sample a single high or low correlation may be spuriously so due to sampling errors, an independent sample may well reveal a relation of quite different magnitude.

5.2 GENERALIZATION OF FINDINGS:

Masters and Wellman (1974) have also pointed out that with a small sample the conclusion based on correlations may not be accurate when applied to an equivalent sample, regardless of the level of statistical significance of the original findings, e.g., Coates et al. (1972a, 1972b) reported two studies with independent samples of 14 month old children. In these studies subjects were brought into the laboratory for two experimental sessions 10 minutes long, which included a non-separation session with mother, and a separation session in which the mother left the infant alone. Four variables were coded, namely, visual regard of the mother, vocalizing to the mother, touching and maintaining proximity to the mother. Among four pairs of stability coefficients calculated from one session to the other (one coefficient for each of the four variables in each group) for the non-separation situation (with a single day intervening) only one stability coefficient was significant for both samples, and in two cases the reliability coefficient was significant for only one sample. Within the non-separation sessions 16 pairs of coefficients (four for each of the four variables for each of two samples) there were few instances in which the stability coefficients were significant, but seven instances in which it was significant for one sample only.

5.3 TEMPORAL STABILITY OF RELATIONSHIPS:

The temporal stability of various attachment behaviours has often not been adequate. Coates et al. (1972a) reported short-term stability data for visual regard, vocalizing, touching and proximity-seeking within an experimental session and from one session to the next. Stability data within a session revealed only 31 significant correlations out of 64, the session having lasted only 10 minutes. Nonetheless the stability for touching and proximity was quite high, 26 out of 39 correlations being significant, but from one day to the next 6 out of 16 coefficients only were significant. Over a four month period (10 to 14 months and 14 to 18 months) in the non-separation session 5 of 8 stability coefficients were significant, whereas only 1 of 8 coefficients were significant in the separation phase (visual regard of the door when mother left). Maccoby and Feldman (1972) reported long-term stability data from a longitudinal study of children aged 2, 2½ and 3 years. Children were subjected to eight episodes in which the child was in various conditions of interaction with his mother and/or a stranger, and being left alone. From this study measures could be extracted which are usually considered as being indices of attachment (proximity to mother, looking at her, vocalization and protest at separation). When stability coefficients across 6 and 12 month intervals for the various attachment behaviours within the different situations were calculated only 9 out of 24 coefficients attained statistical significance, and 19 out of 24, regardless of significance level, were less than .4. Stayton and Ainsworth (1973) when studying attachment behaviour of 26 infants at home during the first year, analysed their data by quarters of the year. Temporal stability of three mother-separation behaviours (crying, when the mother left the room, greeting her positively and crying or crying and reaching when the mother came back) were calculated. Of nine stability coefficients in all only three reached significance. Bell and Ainsworth (1972) using the same data studied the effectiveness of various maternal responses as terminators of crying. They also noted little stability of attachment behaviours even with intervening times as small as a few minutes.

5.4 CONVERGENT VALIDITY OF BEHAVIOURS:

The convergent validity of attachment behaviours, that is the intercorrelation between different measures of attachment, has also been calculated with the results often being less than impressive. Ainsworth et al.(1972) and Stayton et al.(1973) presented intercorrelations among various attachment behaviours within and between the separation situations; of 29 correlations only 12 reached significance. They also reported intercorrelations between different forms of the infant's response to physical contact with the mother; in this case only 6 of 15 coefficients were significant. Maccoby and Feldman (1972) presented intercorrelations among their behavioural measures across time and situation (visual regard, vocalize/smile, proximity/cries with stranger, cries alone). In the case of 2 year olds, when the emitting of these behaviours with mother or with stranger was considered, only 7 of 20 possible correlations were significant. When aged 2½ years, 10 of 20 correlations were significant, and at 3 years only 3 of 20 attained that level. Maccoby and Feldman (1972) reported data concerning the cross behavioural consistency of attachment behaviour towards a stranger when the mother was present and when alone with the stranger. Across all ages in all situations only 9 of 27 correlations were significant and these were always between visual regard and vocalizing. Coates et al. (1972a) also found significant correlations between vocalizing and visual regard, but, as Masters and Wellman (1974) pointed out, this result may be largely artifactual because vocalizing to and looking at are characteristics of vocalizing to anyone at nearly any age and in nearly any situation, not merely to those to whom one is attached. Likewise the meaning of crying when alone and with a stranger (one of the significant intercorrelations) is obscure. In order to decide if this behaviour is in fact attachment related then it would be necessary to show that it occurs less often with the mother. It could be envisaged that even with the mother crying might occur, e.g., on the presentation of a loud noise or the deprivation of a toy. Thus crying may be measuring a response to an extremely novel or aversive stimulus, rather than its relating to attachment. Thus the above statistically significant convergent analyses do not necessarily have any meaning in the absence of discriminant validity, i.e., there needs to be a supporting absence of significant correlations in situations which are not attachment related.

Coates et al.(1972a) presented intercorrelations among their attachment behaviours by age and situations. Again few of the possible intercorrelations between attachment behaviours were significant. In all of the situations in which mother and child were present high correlations between touching and proximity occurred, but these correlations are largely artifactual because children must be near their mothers if they are to touch them. Thus these results provide little in the way of convergent validity.

It is concluded then that the reliance of some authors on the use of correlational statistics with a small sample has meant that their results can be generalized to the population only with extreme caution. The studies reviewed also indicate little temporal stability or functional equivalence among many attachment behaviours. A child which looks frequently at his mother on one day does not necessarily do so on the next, in fact a child which carries out this behaviour in one session may not do it in the following session even when those sessions are separated by only a few minutes. Such results do little to provide substantial support for the concept of attachment as a measureable construct.

CHAPTER 6

CURRENT VIEWS ON THE CONCEPT OF ATTACHMENT

It is clear from the foregoing that the approach to the measurement of the mother-infant relationship which implies that the behaviours being measured constitute some kind of underlying trait or construct has suffered from lack of convincing evidence that such a construct can be measured, i.e., behaviours which are considered to be indices of attachment have rarely been shown to reach the required criterion of differentiality to the caretaker, and there has been a lack of both temporal stability and behavioural equivalence of those indices, as well as a lack of systematic consideration of the effects of context on such indices. Gewirtz (1961, 1972a, 1972b, 1976); Rosenthal (1973) and Sroufe and Waters (1977) have all considered alternatives to the trait construct approach.

Such alternatives have become necessary not only because of the failure to substantiate the trait construct approach, but also because of the paucity of studies which have directed attention to developing Bowlby's (1969) formulation to encompass the results of the research it has generated. In particular there are now inconsistencies between the recent writings of Ainsworth (e.g., Ainsworth et al., 1971, 1974) who collaborated with Bowlby in some of his earlier research (e.g., Bowlby, Ainsworth et al.,1956) and Bowlby himself. Whereas Ainsworth, (1963. 1964, 1967) was concerned with providing support for Bowlby's (1958, 1969) specification of the components of attachment behaviour, her later writings have diverged from this ethological viewpoint somewhat. To recapitulate, Bowlby (1958, 1969) viewed attachment as the end result of innate species-specific behaviour from the infant (i.e., looking and listening) being evoked by the mother's face and voice, with innate responses from the mother being the result of infant signals, i.e., smiling, crying and vocalizing, this complex being built up into a goal corrected system. Such a theory is couched in ethological terms invoking the concept of innate releasing stimuli, i.e., stimuli which "release" unlearned behaviour patterns characteristic of the species. Ainsworth in her studies (Ainsworth, 1963, 1964, 1967) sought confirmatory evidence for this concept of attachment as revealed in the differential responsiveness of the infant to the attachment figure. More recently however Ainsworth et al. (1971) related attachment between mother and infant to the mother's responsiveness to infant behaviour and Ainsworth et al. (1974) has postulated the principle of socialization as the outcome of the mother's and infant's reciprocal responsiveness to each others signals. Such viewpoints are seen as being more closely related to the social learning position, even although Ainsworth herself has taken issue with social learning theorists (Ainsworth, 1972).

It is this author's contention that the apparent contradiction between Bowlby's original formulation and Ainsworth's recent writings has come about firstly because Ainsworth has not aimed for a direct evaluation of the original theory, instead it has been implied that attachment is a measurable dimension (e.g., Ainsworth et al.(1971) related dimensions of maternal response styles to dimensions of infant attachment behaviours during reunion with the mother) and secondly because observations of mothers and infants lend themselves more readily to an interpretation of attachment based on the reciprocal nature of the relationship, rather then its being the result of innate species-specific behaviours of mother and infant.

In the light of the above three viewpoints representing current theorizing will be reviewed.

6.1 ATTACHMENT IS THE INTERACTION BETWEEN MOTHER AND INFANT:

Rosenthal (1973) suggests that attachment be viewed not as a "thing" resulting from an interaction between mother and infant, but rather as "..... a characteristic of some patterns of interaction between mother and infant itself ...." (page 202). This approach considers that the study of attachment involves investigation of the factors determining the conditional probabilities in the attachment interaction, and the study of the processes underlying that interaction. Attachment is thus seen as "...... a characteristic of the interaction itself (i.e., a given conditional probability for a certain sequence of events)" (page 203). Rosenthal considers that the work of Ainsworth et al.(1971) in which dimensional categories of mother behaviour at home and infant behaviour in the Ainsworth and Wittig (1969) strange situation were related together to be in line with her formulation.

In this formulation the underlying processes would be studied together with the relationship between different patterns of interaction across time and different situations in which the interaction takes place and the different persons with whom it takes place. Within this system emphasis on stability of particular behaviours is unimportant, it is the change or stability in patterns of interaction which are studied. From this point of view the lack of stability of individual behaviour is therefore not a problem, what is to be studied is stability between classes of behaviours.

6.2 ATTACHMENT AS A CHARACTERISTIC OF THE INTERACTION BETWEEN MOTHER AND INFANT:

Gewirtz (1961, 1972a, 1972b, 1976) also sees attachment as being a characteristic of the interaction between caretaker and infant. He says that attachment exists in a situation "...... in which there is (mostly) positive stimulus control over a wide variety of an individual's orienting approach, and other responses made to or in connection with a recipient. These responses are under the control of discriminative (cue) and reinforcing stimuli........ from a particular person." (Gewirtz, 1972a; page 148). Within this sytem Gewirtz allows for the fact that context will place limits on behaviour, i.e., "..... correct situational and ecological factors which define behaviour and reinforcement possibilities are often quite likely to determine the limits within which the behaviour patterns are acquired and exhibited." (Gewirtz, 1972a; page 152). Gewirtz allows for initial response biases in the infant, such as those due to biogenetic make-up, structural changes, and genetic determinants, and with developmental and situational changes other responses will enter the behavioural repertoire of the infant, and the nature of the changing receptor capacity will mean that the reinforcing value of stimuli will change. Thus under this functional learning approach diverse classes of events will come to function as evocative, discriminative and/or reinforcing stimuli for the organisation of child behaviours.

When there is a single person who, because of their perceptual potency is readily discriminated and who mediates many of the environmental stimuli impinging on the infant, including those that function as reinforcers for his behaviours, then this constitutes an attachment relationship. It begins as the physical and behavioural characteristics of the person become discriminative and/or reinforcing for the child's behaviour systems on the basis of being cued and reinforced by the diverse stimuli provided by that person. These interdependent conditioning processes can account for the development of progressively longer and more intricate interaction chains between the infant and his caretaking environment.

This approach enables quite precise definition of the assessment of attachment between caretaker and infant, this being made on some or all of the following behavioural parameters: (a) the range of behaviours under control of the attachment figure compared with others; (b) that range relative to the control of others; (c) the degree of positive control by a person over each behaviour system; (d) the number of settings in which the control operates; (e) the degree of disorganisation and/or intensity of emotional behaviours resulting from interference with the interaction.

Gewirtz has therefore clearly defined the way in which attachment between caretaker and infant comes about and the way in which it may be measured. His formulation allows for variation within and between caretaker-infant pairs due to context and developmental changes, and in fact he expects to obtain low inter-correlations between individual behaviours which have in the past been considered to be indices of attachment, i.e., because sampling is usually done with no regard to the conditioning histories of the children and thus an averaging (inter-correlation) matrix will obscure this diversity. However, on an individual basis, with knowledge of the conditioning history of the individual mother-infant pair, then accurate predictions of patterns of attachment can be made. As yet there are no studies in which the attachment relationship has been assessed using this method.

6.3 ATTACHMENT AS AN ORGANISATIONAL CONSTRUCT:

Sroufe and Waters (1977) also consider that the conceptualisation of attachment as a trait construct is unnecessary, and in fact suggest that the implication of the existence of such a construct has not been a part of the concept of attachment put forward by its chief proponents (Bowlby, 1969; Ainsworth 1969, 1972, 1973). Sroufe and Waters (1977) have invoked the concept of attachment as an intervening variable or organisational construct. They do not believe as Gewirtz (1972a) and Rosenthal (1973) do that it is merely the interaction between infant and caretaker, they consider it to be the product of that interaction. As Ainsworth (1972) points out, attachment is a "... mode of relating to a specific figure ..." and individual differences are seen as "... qualitative differences in the way attachment behaviours are organised ...." rather than as differences in the strength of some generalised drive or trait (page 124). Thus the validity of the construct does not rest upon demonstration of positive inter-correlations in a random sample of cases. Rather Ainsworth (1972) views different patterns of correlations as being the result of differences in the organisation of attachment relationships.

The organisational concept stresses that in an adaptive relationship discreet behaviours may change, e.g., clinging and proximity seeking may be replaced by distance interaction later on as the functions of attachment become elaborated. In this context Sroufe and Waters (1977) decry the use of simple frequency counts of discreet behaviours in the assessment of attachment, pointing out the more viable alternative to be the view of behaviours as examples of categories or classes of behaviour. The manner in which these classes of behaviours are organised across individuals and situations can then be studied. Thus attention is focused on the meaning not merely the frequency of occurrence of the behaviours. Therefore behaviours in different contexts(e.g. looking at a stranger or looking at mother), will have different meanings and therefore any correlations between the frequency of occurrence of looking in those two contexts will have little significance.

The usefulness of the organisational approach is shown in the work of Ainsworth et al.(1971) with validation support from Waters (1978). Ainsworth et al.(1971) were able to classify infants into three broad groups on the basis of their reaction when separated and reunited with the mother. Briefly, those groups were (a) those infants who displayed little or no tendency to seek proximity or contact with their mothers on reunion, (b) those infants who responded to reunion with clear attempts to seek proximity and interaction, and (c) a maladaptive group who showed a mixture of approach and withdrawal from the mother. They were able to relate these patterns of interaction to maternal behaviour observed at home and rated according to dimensions of:sensitivity to the infants signals; acceptance; co-operation and accessibility. Waters (1978) provided further independent support for the system. Observing seventy 12 month old infants in a similar situation only 10 per cent could not be classified into the classification Ainsworth and her colleagues used. There was very high agreement between those who were classifying the infants, and the stability of classification was shown to be very high between the ages of 12 and 18 months with 48 of the 50 infants observed receiving the same major classification on both occasions (independent coders at each age level were used). A discriminant function analysis of the data obtained at 12 months was employed to classify infants independently of observations at 18 months. The result was significant agreement between the two methods of classification.

Thus the use of the concept of attachment as an organisational construct and the measurement of behaviour within categories rather than discreet behaviours has resulted in the attaining of acceptable temporal stability.

The organisational approach therefore would seem to have advantages over approaches which emphasise discreet behaviours in that it enables relationships between mother and infant behaviours to be assessed and valid predictions as to their relationship made.

6.4 EVALUATION OF THE "ATTACHMENT IS INTERACTION", "ATTACHMENT AS A CHARACTERISTIC OF INTERACTION" AND "INTERVENING VARIABLE" VIEWPOINTS:

Sroufe and Waters (1977) in putting forward their viewpoint have taken issue with the social learning approach of Gewirtz (1961, 1972a, 1972b, 1977),and Rosenthal (1973), considering that the emphasis of the latter authors that attachment is the interaction (or stated another way the sequential contingencies in the interaction) and that the construct, if it is useful at all, can only be assessed by examining the contemporary dyadic interaction, is inadequate

and that from this point of view stable individual differences in attachment existing independently of dyadic interaction would not be predicted. In fact Gewirtz (1972b) considers that if one knows the conditioning history pattern of a particular mother-infant dyad, then accurate predictions regarding patterns of attachment can be made. Far from being opposed the social learning and organisational approaches have many basic similarities. They both agree that assessment of attachment based on frequency counts of discreet behaviours is inappropriate and that the context and behavioural class that the behaviour is serving needs to be considered before attachment can be assessed.
Both Ainsworth et al.(1974) and Gewirtz (1972b) see the conditioning history of the infant as being the main determinant of the relationship. Ainsworth terms it "reciprocal responsiveness to signals", while Gewirtz speaks in terms of the mother being a discriminative stimulus for provision of reinforcement for infant behaviours, and her importance as a prepotent person mediating those stimuli.
In this way the outcome of the interaction, whether it be termed due to reinforcement history or responsiveness to signals, determines the attachment relationship. The amount of control the caretaker has over the behaviour of the infant is also invoked by both systems as an aspect of attachment. Gewirtz (1972b) uses this directly as one of his measures of attachment, while Stayton et al.(1971) have related the mothers responsiveness to signals from the infant to the control she has over the infant's behaviour.
There are also similarities in the way in which the two

theories dealt with the early response predispositions of the infant. Gewirtz (1972a) states that ".... biogenetic make-up, structural changes, genetic determinants and the like ...." (page 155) will contribute to certain responses of the newborn differing in their initial probability of occurrence. Ainsworth (1972) on the other hand, puts it thus: "From the very beginning, the infant is disposed to respond more readily to stimuli within certain ranges than to others, and there is much evidence to support the proposition that the stimuli to which he is most responsive tend to be those most likely to emanate from other members of the species ....." (page 106).

Thus from the foregoing discussion it is considered that the ethological and social learning approaches are no longer as radically opposed as was implied by their advocates. This coming together has probably been due largely to the demonstration that attachment as a trait construct, whether specified directly or implied, has limited predictive ability and that theorising needed to be more rigorous if it were to be useful in making effective predictions. With the advent of the tight theoretical arguments of Sroufe and Waters (1977) together with the studies of Ainsworth et al. (1971) and Waters (1978) the ethological approach is now being set on a sound theoretical and experimental basis. The social learning approach on the other hand was based on the experimentally proven concepts of operant control through contingent reinforcement. From the beginning it has enabled specific predictions to be made, but has suffered from a lack of investigations using this approach which relate to the development of the attachment relationship, most of the studies using this approach having involved the demonstration of operant control of discreet behaviours such as vocalizations, smiles, etc. What is now required is for studies of mother-infant interaction to be carried out employing the concept of attachment as an intervening variable, or organisational construct, together with the rigor of the social learning approach. From studies of this kind reliable predictions could be formulated regarding interaction patterns between mothers and infants allowing statements to be made in relation to effective parenting practices.

6.5 ALTERNATIVE HYPOTHESIS:

Finally an alternative to the foregoing is suggested which is an attempt to take into account recent evidence relating to the infant's receptive and expressive capacities, and to incorporate this into a formulation which links the unique contribution made by the major current theories to the understanding of the genesis of attachment. It is a two level theory, the first level being a description of the mechanism by which caretaker and infant come into proximity with one another, and the second level pertaining to the process of behavioural elaboration whereby the emitting of certain classes of behaviour is enhanced and the capacity of the infant for behaviour independent of his caretakers is developed.

It has been considered by some writers that the human infant is somehow "biased" or "programmed" to be social

Bowlby (1969) has considered that through an evolutionary process certain species-specific behaviours have come to be adaptive in promoting proximity between a mother and infant. Ainsworth (1972, page 119) has extended this concept when stating " .... empirical findings portray an infant as social from the beginning" with the implication of some innate predisposition to social behaviour. Gewirtz (1972a, page 155) on the other hand writes that ".... a conditioning approach .... takes account of, issues that have been raised ..... about ..... biogenic make-up, structured changes, genetic determinants and the like ...." and thus agrees that certain responses of the newborn will differ in their initial probability of occurrence. The present writer considers that a synthesis of these approaches is more in order. That is, by a process of evolutionary selection a behavioural matrix has been formed in which the infant and mother are brought in to close proximity where each may refine and elaborate the behavioural repertoire of the other. This evolutionary programming is considered to have come about through the normal variation in members of a species which has caused changes in the structure and function of the central nervous system of the human infant and mother. These changes, it is suggested, have resulted in a "fine-tuning" of the auditory and visual apparatus of the infant causing increased sensitivity to stimuli which lie within the range of those emitted by the caretakers. At the same time the caretaker's sensitivity to stimuli from the infant has been "fine-tuned". Thus we find that the infant's visual apparatus is most responsive to those stimuli containing movement, symmetry, contour, and complexity, characteristics which are contained by many stimuli, but most often by the human face. His range of maximum auditory sensitivity lies within the frequency range and band width of sounds which are fundamental to those emitted by his caretakers (Hutt,et al.,1968; Lenard,et al.,1969; Eimas,et al.,1971; Trehub,et al.,1972, Weir, 1976). He also shows specific reactivity to patterned sound stimulation, such as that found in human speech (Condon, 1977; Condon and Sander, 1974). At the same time the infant's cry is within the frequency and amplitude range to which the caretaker is maximally sensitive and will evoke attempts by the listener to cause the sound to cease. The mother being the principal source of nourishment and the necessity for this nourishment to be given with the infant in close contact with her, while not being the result of "fine-tuning", of the mother's central nervous system, nonetheless also serves to bring her into close contact with the infant. Thus it is considered that through evoluntary change two behavioural systems have come to function to maximise the infant's initial orientation towards his caretaker, namely his visual and auditory apparatus, and at the same time two behavioural systems of his caretaker serve to orientate her towards him, namely her sensitivity to his crying and the providing of nourishment. It is the interplay of these four systems which provides the matrix within which elaboration and refinement of behaviour may occur. It is considered that this is the first level of a two level process.

At the second level once orientated towards his caretaker, i.e., following her response to his crying or because of the provision of nourishment, then there is a high probability that the infant will receive those stimuli which are within the range to which he is maximally sensitive, i.e., his caretaker's face and voice. He is now likely to receive such stimulation frequently and behavioural elaboration may occur in a number of ways. The mother functions as someone who provides positive consequences for the infant's behaviour and removes negative ones, and she becomes a discriminative stimulus for the onset of reinforcement (Bijou and Baer, 1961, 1965; Gewirtz, 1961, 1972a) the infant itself fulfilling the same role for the mother (Bijou and Baer, 1965). The infant's perception of contingencies between his behaviour and that of his caretaker is important, the perception of the contingency itself being sufficient to act as reinforcement (Papousek and Papousek, 1974, 1975, 1977; Watson and Ramey, 1972). Also important is the contingency between the behaviours the infant indulges in frequently when in contact with the mother (e.g. looking, listening and feeding) and preceding behaviours, because behaviours which precede those frequently occurring will, according to Premack (1959), themselves be reinforced. Thus any behaviour which brings the infant into close contact with the mother will be reinforced.

At the same time as the mother's and infant's behaviour is undergoing a change as the direct result of reinforcement schedules, the infant is learning that his behaviour has consequences. This leads to the infant's development of a model of his environment, which Lewis and Goldberg (1969) termed a "generalized expectancy model", a concept similar to the "field expectancies" of Tolman (1949). The infant through the past history of reinforcement develops the expectancy that at least certain of his behaviours are likely to be reinforced and thus he will develop strategies of responding (Finklestein and Ramey, 1977; Miller and Schaffer, 1972; Papousek, 1967) and will in fact emit behaviours which have not been reinforced previously simply because of the expectation that they may be reinforced. A recent study by Meltzoff and Moore (1977) has also indicated that even from as young as a few days of age the infant engages in imitative learning.

The role of "contact-comfort" which was given a primary position by Harlow (1958, 1961, 1963) has not been considered to be primary to this theory because it is considered that the studies of Harlow did not test the relative importance of facial and visual stimulation as opposed to contact-comfort (i.e., his "surrogate" mothers emitted no sounds, and their "faces" included few of the stimulus dimensions known to be important in eliciting visual attention from the infant). Even if contact-comfort were shown to be primary to the development of attachment it is still not certain what aspect of contact-comfort is important, e.g. contact-comfort is made up of at least three components: (1) vestibular stimulation (the infant is usually placed against the chest when it has been lying down); (2) warmth; (3) a change in visual input (a) a reduction of visual input, (b) an increase of visual input; and (3) the provision of competing stimulation which reduces the effect of aversive stimuli. Therefore it is considered that the variable of "contact-comfort" requires more detailed investigation before it can be incorporated into a theory of the development of attachment.

To summarise, the theory suggests that there are four behavioural systems which are primary in the development of the bond between a mother and her infant. These behavioural systems have been brought about by an evolutionary process which has caused a "fine-tuning" of the central nervous systems of the mother and infant, so that they are each maximally sensitive to stimuli which bring them into close contact with each other where behavioural elaboration can occur. In the case of the infant it involves his capacity for visual and auditory reception, and in the case of the mother involves her sensitivity to the infant's cry and need for nutrition. Once in close proximity with each other then behavioural elaboration may occur in a uniquely social direction according to the principles of learning.

CHAPTER 7

CONCEPT OF A "CRITICAL PERIOD" FOR ATTACHMENT

Walters and Parke (1965) suggested that research on young birds and dogs has led to the theory that there is a relatively short period early in life which is critical for the development of attachment behaviour. Caldwell (1962) distinguished two aspects of this "critical period" hypothesis: (a) there is a critical period beyond which attachment behaviour will not develop; and (b) there is a critical period during which an organism is maximally susceptible to influences that promote or hinder attachment behaviour.

7.1 A CRITICAL PERIOD BEYOND WHICH ATTACHMENT WILL NOT DEVELOP:

With regard to the first aspect, that there is an upper limit beyond which attachment cannot be formed or is formed only with difficulty, there are some studies which suggest there may indeed be a critical period. Goldfarb's (1943) work implies that if an infant is kept in an institution for up to the age of 3½ years it is extremely difficult for it to form an attachment to its foster mother, while other studies (Rheingold and Bailey, 1959; Gardiner et al.,1961) suggest that infants in institutions who have had adequate opportunity to form attachments to a specific figure during the first year of life may develop normally if placed in an adoptive home by the end of the first year. Provence and Lipton (1962) on the other hand observed that infants kept in institutions until they were 18 to 24 months of age found it difficult to become attached when placed in a foster home. Clarification comes from a study by Schaffer (1963) who investigated 20 infants who had spent 10 weeks or more in an institution where they had had no opportunity to make a discriminating attachment, all were returned to their homes between 30 and 52 weeks of age. In his sample were two distinct groups, those who received regular visits from their mothers but otherwise received little social stimulation, and the second group who had no contact with their mothers during the separation but received a considerable amount of social and other stimulation. On return home the latter group established specific attachment to their mothers in a few days, while the former group took at least four weeks to establish a specific attachment,with two requiring three months to do so and one more than a year.

It would appear then that 18 to 24 months is perhaps the upper age limit of the sensitive phase for becoming attached for the first time, and if the infant is given sufficient social stimulation during the middle and latter half of the first year of life it will quickly develop a discriminative attachment when given the opportunity to do so. However, without such social stimulation the infant will be much slower to develop it.

7.2 A CRITICAL PERIOD OF MAXIMUM SUSCEPTIBILITY:

Caldwell's (1962) second aspect of the "critical period" hypothesis suggested there may be a critical time during which an organism is maximally susceptible to influences that promote or hinder the development of attachment. No studies were found in the literature which related to the identification of a critical period for infants, but there are studies which suggest that for the mother there is a time when she is maximally sensitive to stimuli emanating from her infant and which aid her to become attached to it.

Klaus et al. (1970), when observing the first contact between mothers and their nude full-term or premature infants, noted an orderly progression of exploration of the infant, especially in the full-term group. The mother started with finger tip touch on the infant's extremities and proceeded to massaging, encompassing palm contact on the trunk. Mothers of premature infants permitted to touch their infants in the first three to five days of life followed a similar sequence but at a much slower rate. Klaus et al. (1972) followed up this observation in a second study with two groups of primiparous mothers. The first had normal contact with their infants, i.e., a glimpse of the infant soon after birth, a brief contact six to twelve hours later, and then visits each four hours for feeding. The second group was given extended contact with their infants. For one hour within three hours of birth they were permitted to have the infant with them, and following this each afternoon of the first three days after delivery they had the infant for five hours. Twenty-eight to 32 days after delivery the mother returned to the hospital for observation and interview. It was noted that mothers of the extended contact group were more reluctant to leave

their infants with someone else, they usually stood and watched during the physical examination of the baby, and engaged in significantly greater amounts of eye to eye contact and fondling of the infant when feeding.
Kennell et al. (1974) followed up these groups for one month and one year after the baby had been delivered. At one month mothers in the extended contact group more often said that they picked up their infant when it cried and tended to stay at home with them and not to leave them with others. During the physical examination they more often stood beside the examination table and soothed their infant when it cried. Although the amount of time mothers spent looking at their infants did not differ between the two groups, the extended contact group spent significantly more time in a face to face orientation and fondled them more. When interviewed when the infant was aged 1 year the mothers of this group expressed more interest in their babies, e.g., if they had returned to work they said that they missed them, whereas the majority of the standard contact control mothers did not mention the baby. During examination of boys in particular the extended contact mothers were again more likely to stand by the examining physician and to sooth the crying infant. In further studies Klaus et al. (1975a) again found (in home deliveries this time) that when given their infant immediately after birth mothers showed interest in placing the baby in a face to face orientation, and began the orderly stroking and massaging of the infant.

Barnett et al. (1970) have shed further light on the importance of early contact between mother and infant. They investigated three groups of mothers who had given birth to either a premature infant or one which was delivered full-term. A group of those that had given birth to premature infants were permitted to handle and feed the infant while it was in the neo-natal intensive care unit. During interviews, when this group was compared with mothers of premature infants who had not been permitted into the unit, they found that the former group expressed greater commitment to the infant, they had more self-confidence in their ability to be a mother, and showed greater skill in handling and stimulating the infant. Seashore et al. (1973) also measured maternal self-confidence of mothers who were denied contact with their premature infants for between three and twelve weeks, and mothers who were permitted access to their infants to feed, handle and diaper it. On each of four occasions (on first contact with the baby in the nursery 24 to 48 hours after the birth, after the first visit to the infant approximately a week later when it was discharged to an open nursery, the day before discharge from hospital and one month post-discharge) the mother was asked to complete a questionnaire comparing herself with five other caretakers (father, grandmother, experienced mother, paediatric nurse and doctor). They were asked to compare themselves for six tasks, such as calming the baby, understanding what the baby wanted, showing affection, feeding, etc. They were also interviewed and rated on the amount of confidence they displayed. The results revealed that for primiparous mothers only denial of contact with their infant detrimentally affected self-confidence at the first test. On the second occasion the same relationship held, with primiparous mothers who were separated from their infants having lost confidence. By the third testing the same result was reported, although the confidence of the separated group had increased. One month after the infants had been discharged from the hospitals the mothers who had been separated from their infants were no longer differentiated in their confidence in carrying out social tasks, but still felt less adequate in instrumental tasks such as feeding, bathing and diapering.

Leifer et al. (1972) in another part of this long-term study carried out more detailed observations of the mother and infant, this time including all three groups (i.e., mothers of premature infants who had either experienced or not experienced separation from the infants during the first three to twelve weeks and a group of mothers whose infants were delivered full-term). Each mother was observed six times during a period of two years carrying out normal caretaking functions. Few differences occurred between the two premature groups, the only differences which were notable being between the separated groups taken together and the full-term mothers. The features which differentiated the two groups were all in the favour of mothers of full-term infants. They carried out more affectionate touching, more ventral contact and more smiling at their infant. It was interesting to note that in the separated group two mothers subsequently relinquished their infant and five were divorced. The lack of differences between the two separated groups (those who did not have contact with their infants and those which did) may have been due to the contact group only rarely exercising the right to have the contact. The question of why the two groups differed in rates of divorce and in relinquishing of their infant could not be answered.

Leiderman and Seashore (1975) followed up this study eleven to fifteen months after discharge of the infant from the hospital and found that most of the original differences had disappeared except that the premature "contact" group were observed to touch their infants more and the full-term mothers still smiled at their infants more.

A group of three studies have suggested that not only is the amount of contact a mother has with her infant after birth possibly a determinant of some aspects of their relationship, but when she has this extra interaction may be important. Klaus et al. (1975b) have studied a group of mothers who were given their nude babies during episiotomy repair (immediately after birth) the infant staying with the mother for 45 minutes. Another group had their infants removed immediately after the birth for weighing and bathing. When tested 35 days after birth infants of mothers who had had extra contact weighed an average of 203 grams more than the control group. In another group after a similar intervention it was noted during the first feed that the mother orientated her face to the infant and gazed at it more often and held it close for longer periods during the feed. De Chateau and Wiberg (1977a) have provided further evidence for the importance of this very early contact. They examined the effect of extra contact limited to 15 minutes immediately following delivery of the baby. Their extended contact group had the naked infant placed on the mother's abdomen and covered with a blanket immediately after birth. Five minutes later the infant was moved to the mother's breast and encouraged to suckle for five to ten minutes. Normal hospital routine then followed (e.g., the infant was removed to be weighed and bathed and checked physically). Approximately 36 hours after the birth of the infant this group and a control group which did not have the extra contact were observed. It was found that the extended contact mothers sat up more when holding their infant and they held and encompassed them more often. This effect was more marked for boys than for girls. De Chateau and Wiberg (1977b) followed up these mothers and infants when the infant was aged 3 months and observed them during a free play session and interviewed the mother. Mothers in the extended contact groups spent more time kissing and looking at their infants in a face to face position, their infants smiled more often and cried less frequently. A greater proportion of these mothers were still breast feeding at three months. Again the effects were more pronounced for boys than girls.

7.3 A POSSIBLE MECHANISM TO EXPLAIN THE IMPORTANCE OF EARLY CONTACT OF A MOTHER WITH HER INFANT:

Thus it appears that there may well be a period during which the mother at least is maximally susceptible to influences which promote the development of attachment between herself and her infant, and that separation from her infant after birth precludes this "sensitive period" operating. However, from the studies quoted it is difficult to determine exactly what it is that happens during the first few moments of contact after birth. The studies do not report the infant's behaviour during this contact, and thus it is not known whether when in the face to face position the infants were reciprocating the mothers' gaze by their own, or whether the infant was unresponsive. It could be that, for the mother at least, some "visual imprinting" occurs, or the baby's face acts as some kind of "releaser" of maternal feelings. An alternative explanation is suggested by the writer to try to explain the importance of first contact with the infant.

It is suggested that during the 9 months of her pregnancy the mother has built up a high degree of expectation of positive affect following the birth of her baby (expectation which could be largely the result of a social system which regards the birth of an infant as being highly rewarding for the parents, and also accords them status), and that this high state of arousal (which may also have a physiological basis) could then be interpreted by the mother as being a "release of maternal feelings" for the infant. The mechanism of such an interpretation could be similar to that described by Schachter and his associates (Nisbett and Schachter, 1966; Schachter, 1964; Schachter and Singer, 1962) in the classic studies in which they suggest that the labelling of the physiological components of emotion depends on the context in which the individual finds himself. Thus being able to handle her infant immediately would ensure contiguity between the mother's high state of arousal and appearance of the infant, so that for the mother the two will become firmly associated. Anything which disrupts this early interaction during the high arousal state would mean that the period during which high arousal feelings may be associated with the infant will be lost. Once this period is passed then the state of arousal which can be labelled by the mother as "maternal feelings" will be lower and the mother will interprete this as her being "less interested in the infant" or "less maternal".

One would expect that these arousal differences would be reflected in a mother's tendency to seek contact with her infant, with mothers who had experienced high arousal during first contact with their infants tending to seek interactions with the infant more often and therefore, at least potentially, having greater opportunity for their orientation to the infant to be reinforced more frequently.

Clearly research is required before such an explanation could be accepted as having potential to explain the results of studies reviewed above, but nonetheless it is considered to be a plausible possibility.

CHAPTER 8

THE STUDY

8.1 AIMS:

From the consideration of the literature relating to the development of attachment it was deduced that while the ethological approach of Bowlby has given impetus and direction to a large volume of research, one of the basic tenents of this approach namely, that certain innate species-specific behaviours give rise to or are precursors of attachment, has not been tested empirically. In addition the literature suggests that such a theory does not account adequately for the complexity of interaction which has been observed. An attempt was made therefore to reformulate Bowlby's (1958,1969) theory in order to take cognisance of recent literature and to carry out an investigation of early mother-infant interaction which would enable the contribution to attachment of those behaviours Bowlby (1958,1969) considered important to be assessed, and the appropriateness of Bowlby's (1958,1969) model versus the writer's reformulation to be investigated. In particular the contribution to attachment of infant looking at the caretaker's face, listening to her voice and clinging in a chest to chest configuration, and caretaker response to infant smiles, vocalizations and cries was considered. Rooting, sucking and postural adjustment which were included by Bowlby in his formulation were not incorporated because of the difficulty in modifying their occurrence and the lack of conclusive evidence for their having a major role in the development of attachment (Ainsworth, 1973).

In addition the appropriateness of three current models which describe the attachment relationship was to be investigated, namely attachment as a mode of relating to specific figure (Ainsworth, 1972; and Sroufe and Waters, 1977), attachment being seen as the interaction itself (Rosenthal, 1973), and attachment as a quality of the interaction (Gewirtz, 1972a).

A prospective approach was adopted, a group of primiparous mothers being taught by filmed presentation behaviour which would enhance their infant's attention to the mother's face, voice and response to her ventral surface, and the mother's responding to infant smiles, vocalizations and cries. The film was produced by the author, the actual filming being carried out by the Hospital Photographer, Nelson Hospital, New Zealand, Mr Ray Pengally.

It portrayed with commentary a mother and her seven week old son engaging in interaction which demonstrated the target behaviours.

While one group of mothers would be trained in this way a second group (matched with the first on all relevant variables) would receive no training and act as a control against which the effects of training could be measured. To obtain information regarding the outcome of training the two groups of infants and mothers were to be invited into the laboratory when their infants were aged three and six months, the infant to be filmed in interaction with the mother and with a stranger. From observations of this interaction it was considered that information would be forthcoming as to the degree to which training was successful, the way in which any changes effected had altered the interaction of mother and infant and stranger and infant, the appropriateness of the two models in describing the interaction and the relationship between infant and mother behaviours with regard to the development of the attachment interaction.

A number of specific hypotheses were made which the study was designed to investigate.

8.2 HYPOTHESES:

The null hypothesis, H_0, predicts that there will be no differences in the behaviour of mothers in the experimental group which are attributable to their viewing the training film, there will be no differences between the experimental and control group mothers and infants on any measures of their attachment relationship, there will be no differences in the behaviour which the infants in the two groups display towards the stranger, and infant looking at, listening to and clinging to the mother, and maternal response to infant cries, smiles and vocalizations will not predict the attachment relationship.

H_1, the alternative general experimental hypothesis predicts that differences in the behaviour of mothers in the experimental group attributable to the training film will occur, a significant enhancement in the attachment relationship will be measured, the experimental group infants will demonstrate greater positive responsiveness at three months and more negative reactions at six months to the stranger, infant looking at, listening to and clinging to the mother, and maternal response to infant cries, smiles and vocalizations will relate significantly to the attachment relationship.

More specifically the hypotheses are as follows:- The first six hypotheses will be dealt with in a group because they all relate to the efficacy of the experimental film with respect to teaching the mothers to emit the specific behaviours. Support for these hypotheses would indicate mothers have learned what was required.

Hypothesis 1:

Mothers in the experimental group will look at their infants in such a way that their face is available for the infant to focus on more often than the control group, i.e., the mother's face is in a plane no more than 45 degrees from that of the infant.

Hypothesis 2:

The frequency with which mothers vocalise to their infants will be higher in the experimental group.

Hypothesis 3:

The frequency of chest to chest contact between mother and infant will be higher in the experimental group.

Hypothesis 4:

The probability of a mother's responding to her infant's vocalisation will be greater in the experimental group.

Hypothesis 5:

The probability of a mother's responding to her infant's smile will be greater in the experimental group.

Hypothesis 6:

Mothers in the control group will respond more often to their infant's cries and grizzles within two time samples of its beginning.

Although not one of the behaviours to be manipulated it was tentatively considered that mothers in the experimental group, because they generally were expected to have more contact with their infants would touch them more often thus giving rise to the next hypothesis.

Hypothesis 7:

Mothers in the experimental group will touch their infants more often.

The second group of hypotheses refer to the infant's looking at the mother's face and listening to her voice and the relationship between this behaviour and that of the mother. It was considered that through the increased availability of mother's face and voice infants in the experimental group would look and listen to her more often.

Hypothesis 8:

Infants in the experimental group will look at their mothers more often, the amount of looking being directly related to a mother's provision of her face.

Hypothesis 9:

Infants in the experimental group will listen to their mother's voice more often.

It is considered that this hypothesis cannot be tested directly because it would not be possible to measure whether infants were listening to their mother's voice more often or not, rather an indirect measure was made, namely, the relationship between a mother's vocalising and the infant's orientation towards her. It was concluded that if a mother were talking to her infant and the infant were looking towards the mother, then the infant was listening to the mother.

The following hypotheses will be dealt with individually.

Hypothesis 10:

Infants in the experimental group will vocalise more often.

Because the mothers in the experimental group were expected to respond more often to infant vocalisations then it was expected that their infant's would receive contingent reinforcement for vocalisations more often and this would be reflected in their tendency to vocalise at a high rate.

Hypothesis 11:

Infants in the experimental group will touch their mothers more often.

It was expected that any improvement in the attachment relationship would be reflected in an increased tendency for infants in the experimental group to touch the mother.

Hypothesis 12:

Mothers in the experimental group will present toys for their infant's attention by demonstrating the toy, and will show more interest in their infant's reaction (as evidenced by their looking at his face).

It was believed that mothers in the experimental group, because of their increased responsiveness to their infants, would interact with them more often and show an interest in the infant's reaction to their attempts to play

Hypothesis 13:

Infants in the experimental group will respond to their mother's presentation of toys more often.

This hypothesis was made because it was expected that the mother's increased responsiveness to the infant would be reflected in the infant's increased responsiveness to overtures by the mother.

The following set of hypotheses relate to reciprocal interaction (as defined in the prodedure) between a mother and infant, this variable being an attempt to measure the degree to which the behaviour of the mother and infant was complementary to or "in tune with" that of the other. It was expected that if the experimental procedure was successful in enhancing the attachment relationship then this would be reflected in the higher rate of reciprocal interaction in the experimental group, the shorter time that it would take the mother and infant to settle in to cycles of reciprocal interaction, and the tendency for these cycles to continue until the end of the observation session. These considerations gave rise to the following hypotheses.

Hypothesis 14:

There will be more reciprocal interaction between mothers and infants of the experimental group.

Hypothesis 15 :

There will be fewer intervals until the experimental group reaches a steady state of reciprocal interaction lasting for at least six consecutive intervals.

Hypothesis 16:

Mothers and infants of the experimental group will be more likely to be engaging in reciprocal interaction during the last twenty intervals (three minutes) of the observation session.

In conducting the study the outcome of any improvement in attachment between mother and infant was also considered significant and so as a measure of outcome the infant's behaviour towards a stranger was to be assessed. It was believed that for the experimental group infants increased levels of interaction with the mother would, at least when aged 3 months, give rise to improved levels of sociability towards a stranger, but that by the age of 6 months the discrimination of the stranger as different would have proceeded at an advanced rate compared with the control group and this would be displayed by more frequent negative reaction to the stranger.

Hypothesis 17:

Infants in the experimental group will initially look at the stranger more often (that is when aged 3 months) when seated either on their mother's knee or the stranger's knee, but that this looking from the stranger's knee in particular will undergo a significant decrease when the infant is aged 6 months.

Hypothesis 18:

Infants in the experimental group will show greater fear of the stranger, particularly when aged 6 months.

The next set of hypotheses were formulated to relate the experimental findings to the three major ways in which attachment may be conceptualised, namely, as a mode of relating to a specific figure, as the interaction itself and as a quality of the interaction.

Hypothesis 19:

From the viewpoint of Ainsworth (1972) and Sroufe and Waters (1977), that attachment is a mode of relating to a specific figure, it would be expected that if the experimental manipulation has enhanced attachment that this will be reflected in an increase in the tendency of experimental infants to smile at, vocalise to and touch their mothers, and they will respond more often to her presentation of toys. In the case of the mother it is expected that she will smile at, vocalise to and touch her infant more often, and will present toys for inspection more.

Hypothesis 20:

From the position of Rosenthal (1973), that attachment is the interaction itself, then if the experimental manipulation has been successful the infants and mothers in the experimental group will demonstrate improved reciprocal responsiveness to each other.

Hypothesis 21:

If as characterised by Gewirtz (1972a) attachment is measured by the quality of interaction and in particular the stimulus control of the attachment figure over the infant, then if the experimental manipulation were successful it would be expected that the mother will have more stimulus control over the infant's behaviour.

One of the major aims was to test Bowlby's (1958,1969) proposition in relationship to that of the author.

It was expected that if infant looking, listening and clinging were the result of instinctive responses to the mother's face then the frequency of infant looking, listening and clinging should be predicted from the provision of mother's face, voice and chest and if maternal orientation to the infant is the result of instinctive behaviour released by infant signals (smiling, vocalizing and crying) then maternal orientation should be predicted from the occurrence of those releasing behaviours. If on the other hand the formulation of the author is more appropriate, i.e., infant orientation to the mother is due to the mother's provision of stimuli within his opitimal range of discrimination, then infant looking at the mother should relate specifically to her provision of a moving, talking, smiling face, and her face without movement, or voice without the face will fail to predict infant attention to the mother. It would also be expected that maternal orientation towards the infant will be independent of infant emitting of signals, i.e., because mother and infant are already in close contact then mother's emitting of behaviour to the infant will be relatively independent of infant signals of smiling, vocalizing and crying. Thus the following two hypotheses are made:

Hypothesis 22:

Infant looking at, listening to and clinging to the mother will relate to the mother's absolute provision of her face, chest and voice, and the mother's orientation to the infant will be predicted from the infant's emitting of signals (smiling, vocalizing and crying).

Hypothesis 23:

Infant looking at the mother's face and listening to her voice will be predicted from her provision of a "responsive face" (i.e., a moving, talking, smiling face), while the mother's emitting of behaviour to her infant will be relatively independent of infant behaviour.

It is expected that if Bowlby's (1958, 1969) formulation best describes the relationship then hypothesis 22 will be confirmed, and if the author's reformulation is more appropriate hypothesis 23 will be supported.

8.3 CONTROL VARIABLES:

Before describing the study itself a brief perusal of the literature pertaining to some of the variables requiring experimental control will be made to highlight the importance of adequate experimental control being exercised.

8.3.1 Sex Differences In Behaviour:

Sex differences in neonatal behaviour have been shown by many studies. Females have lower pain threshholds (Lipsitt and Levy, 1959), they react more to tactile stimulation in the form of an air jet applied to the abdomen (Bell and Costello, 1964), their level of skin conductance is higher (Weller and Bell, 1965), they emit more smiles and reflex sucks during sleep (Korner, 1969), they learn best under auditory stimulation (Watson, 1969), and are more responsive (in terms of E.E.G. measures) to photic stimulation (Engle et al., 1968).

Boys are able to raise their head higher (Bell and Darling, 1965), they cry more, sleep less and are more irritable and fussy than girls (Moss, 1967), they startle more readily and engage in more spontaneous motor activity (Korner, 1969; Freedman, 1972) their visual acuity is superior to that of females (Burg and Hulbert, 1961) and they learn best under visual stimulation (Watson, 1969).

The behaviour of mothers towards their newborn infants is also influenced by sex. Moss and Robson (1968) observed that during feeding mothers were more likely to hold their male infant closer and to offer distractions, whereas they responded to their female infant by talking, looking and offering a pacifyer. Thoman et al. (1972) reported that mothers smile at and talk to girls more often during feeding but hold boys more, Lewis (1972a) and De Chateau and Wiberg (1977a) noting a similar result. Moss (1974) when observing both mother and father with their infants concluded that they spent more time with their female infant trying to provoke her to vocalise and to smile, and used more affectionate terms when talking to her. Bakeman and Brown (1977) reported that mothers of boys emitted more behaviours overall to their infant, they were more likely to interrupt their quiescent state or ongoing activity to initiate interaction, and were less likely to break off this coacting state. Males were also rubbed, rocked and patted more.

When older infants are observed interacting with either a parent or alone if the session is longer than 15 minutes then sex differences are usually manifest.

Goldberg and Lewis (1969) found that when faced with a barrier between themselves and their mother that thirteen month old girls cried and motioned for help more often than boys, while the boys tried to get around the barrier. The girls were also generally more reluctant to leave the mother, they spent more time close to her, touched and vocalised to her more often, and made more returns. Messer and Lewis (1972) also reported that girls return sooner and more often to their mother, and spend more time touching her. Jacklin et al. (1973) again investigated the barrier behaviour of infants when the mother and toys were on the other side. The differences were not as marked as in the earlier study, but girls who had previously been placed near mother before being behind the barrier cried more than boys in the same condition. They did find that girls were more likely to stay at the centre of the barrier and boys to move to the ends, but these differences were not significant. Corter (1973) noted that when a mother left her ten month old infant andwent into an adjoining room (although still visible to the infant) males followed her after a shorter period while females tended to cry sooner. Maccoby and Jacklin (1973) compared the reaction of thirteen to fourteen months old males and females to the onset of a fear inducing stimulus (a loud angry male voice). Upon onset of the stimulus boys who had been a distance from their mothers now made more trips to her, while both boys and girls who had been near her showed no change in their behaviour. Brooks and Lewis (1974a) when observing the play behaviour of opposite sex twins aged twelve to fifteen months, found that the girls looked at and maintained proximity with their mothers more often.

8.3.2. Social Class Differences in Mother-Infant Interaction:

Merrill (1946) conducted one of the earlier studies in which the behaviour of children and parents of different social classes was observed directly. With children aged three and a half to five and a half years from the middle and upper classes she observed interaction while the children were carrying out a cognitive task. After the children had completed the task some of the mothers from both groups were told that their children had performed badly. Following this intervention the children were required to carry out another cognitive task and it was noted by Merrill that both middle and upper class mothers who had been informed that their children had performed badly, directed, helped, structured and taught their children significantly more frequently in the second than in the first sessions. Walters et al. (1964) carried out a similar study using lower class mothers and their children. He compared his results with those of Merrill (1946) and noted that upper and middle class mothers, when told that their child had performed badly, carried out nine times more helping, five times more structuring and three times more teaching of their children than lower class mothers in an equivalent situation.

Zunich (1961) from observations of mother-infant interaction with children aged between two years nine months and five years one month from the lower and middle classes, considered that middle class mothers gave evidence structuring, observing attentively, and playing interactively with their children, while the lower class mothers remained out of contact with their children more often. Hore (1970) when observing five year old children and their high or low social class mothers interacting during the child's performance of cognitive tasks, found only few differences. These were: more physical contact between lower class mothers and their children and more mutual glances between higher social class mothers and their children. Messer and Lewis (1972) again with lower and middle class infants and their mothers, reported that lower class infants vocalised significantly less often, were less mobile, and showed a preference for blocks rather than for a mallet, lawn mower and quoits.

Kagan and Tulkin (1971) investigating the behaviour of ten month old girls from middle and lower class families reported that middle class mothers showed a higher frequency of the following behaviours: being face to face with the infant; vocalising within two feet of the infant; reciprocal vocalisation; imitation of the infant's vocalisation; encouragement of walking; and verbal reward and entertainment of the child. Middle class mothers also tended to respond more frequently to fretting and crying with a shorter response latency and tended to respond verbally while lower class mothers would give a bottle or food. Social class differences in the attachment behaviours of ten month old infants were also noted by Tulkin (1973). He investigated the reactions of infants of middle and lower class mothers to being placed in a strange situation and to being separated from their mother. The only significant difference was in the latency to cry, the middle class infants crying sooner than the lower class infants. However, this finding must be related to an earlier study of Tulkin and Kagan (1972) who noted that lower class infants were more frequently restrained in a play pen or high chair and thus seeing the mother leave the room and being unable to follow her would be more familiar to them.

Richards (1971b) suggests that one must be cautious when relating differences in maternal or infant behaviour to some variable termed "social class". He points out that while research has consistently shown that children from varying social backgrounds differ in their school performance and performance on a wide variety of psychological tests, children are born with varying behavioural characteristics and these are not randomly distributed among different sub-cultures. For example, frequency of premature births, obstetric complications, malnutrition, etc., factors which are known to affect a child's behaviour, occur more frequently in the lower class. Thus the child from the lower class may have experienced varying numbers of disadvantaging circumstances and thus his behaviour is not merely a product of lower class membership. Therefore the individual differences of children at birth must be taken into account in comparisons of children from different sub-cultures, as well as individual differences in the environments from which they come. There are indications that congential and environmental factors interact together, e.g. Ucko (1965) reported that children who had suffered perinatal hypoxia were more upset by changes in their family situation than children who had less traumatic births. Without the knowledge of the congenital differences of groups of children from different social classes, one could be led to believe that the differences produce a sub-culture membership. Thus it may be said that while many studies have been able to demonstrate that mothers and infants from the middle and lower class emit different patterns of interaction, it is by no means clear that these differences are due to social class per se.

For the purposes of the present study it was considered sufficient to achieve a balance in each group of mothers from differing social classes. Social class was defined according to the Stewart-Gorringe Scale (Stewart and Gorringe, 1977).

One aspect of the measure of social class was selected for special consideration, viz., educational level of the mothers. This was done because of the possible relationship between education and the reading of literature regarding developmental psychology. The number of years of secondary and tertiary education were combined, this measure being subjected to statistical analysis.

8.3.3 Effect of the Parity of a Mother on Mother-Infant Interaction:

A decision was made to limit the groups for study to primiparious mothers only on the basis of studies which indicate that the relative inexperience of primiparous women results in mothering which is different from that of multiparous mothers, the difference as expected, being in the direction of less competence and less expertise of the primiparous mother, e.g., Campbell (1973), Thoman (1975b), Thoman et al. (1971), Thoman et al. (1972), Thoman et al. (1970), Leifer et al. (1972), Leiderman et al. (1973). Results have generally shown that primiparous mothers spend a longer time in feeding, they pause more often and the infant ingests less milk. The authors above and Bakeman and Brown (1977) also indicated that during the feeding the mother changes her activity with the infant more often, (e.g. she spends more time stimulating, talking to the infant, smiling at it as well as feeding), while Jacobs and Moss (1976) observed that multiparous mothers spent significantly less time in social, affectionate and caretaking interaction with their infants than they had with their firstborn.

In the case of older infants, studies have shown that primiparous mothers are more attentive to their children than multiparous mothers (Koch, 1954) they exert more pressure for attainment and responsibility (McArthur, 1956; Davis, 1959; Rosen, 1961; Sampson, 1962; Sutton-Smith et al. 1964); they are more inconsistent with discipline (Hilton, 1968; Sears et al., 1957); and they interfere more (Hilton, 1968).

Hilton (1967) observed mothers and their first born or later born children interacting during the completion of a task. He noted that first born children were significantly more dependant, i.e., they were more likely to run to their mother's side and to remain there even when told to return to the task, and they were more likely to ask for direct help or reassurance. Mothers of first born children interfered more with what their child was doing, but at the same time were more likely to initiate work on the task and to give more task-orientated suggestions and more direct help and were more extreme in their emotional response to the child.

Collard (1968) while observing the social and play responses of first and later born children in an unfamiliar situation with children aged between 38 and 56 weeks of age, noted that first born and widely spaced children were found to pause longer before picking up a new toy, they cried more, played less and smiled later and less frequently than later born children.

8.3.4 Effect of State on Infant Behaviour:

The effect of infant state on the mother's behaviour has been suggested by a number of studies. Moss (1967) reported that male infants tended to be more fussy, irritable, awake in a passive state and with their eyes on mother, and that mothers reacted to this by attending to the infant more often, and providing more stimulation. Bell (1971) and Moss and Robson (1968) have also concluded that infant state influences mother behaviour when they noted that crying tended to precede her attending. Korner and Grobstein (1966b) and Korner and Thoman (1970) noted a similar relationship and also reported that mothers who responded to their infant's crying by picking up induced increased levels of visual alerting in their

State was controlled in this study in two ways. First, observations were carried out approximately one and a half hours after the last feed, Brazelton (1973) having indicated that infants are most likely to be awake and alert at that time; and second, observation sessions were begun only if the infant was in an awake, alert state. Only on one occasion did a session have to be rescheduled for that reason.

8.3.5 Effect of Medication Administered During Labour:

Aleksandrowicz (1974) in a comprehensive review of the literature concluded that although the findings were by no means universal it could be concluded that drugs affect neonatal behaviour. Shnider and Moya (1966) have noted that morphine derivatives depress respiration and ability to suck, similar findings being noted by Dunn et al. (1977). A number of studies have shown depressed responsiveness to auditory and/or visual stimuli, e.g., Brazelton (1961a, 1961b), Brown et al. (1975), Conway and Brackbill (1970) and Stechler (1964), Brackbill et al. (1974) observed that the habituation of the orienting reflex to sudden quiet noise was significantly slower in infants whose mothers had been administered meperidine (a morphine derivative) during labour. They also noted that infants of non-medicated mothers generally performed more efficiently during a behavioural assessment.

The effect of the medication used during continuous lumbar epidural block on infant behaviour has also been shown. Scanlon et al. (1974) have shown that either lidocaine or mepivocaine caused the following effects in infants whose mothers had received varying amounts of them; compared with infants whose mothers had not received such medication they found that the response to pin prick was significantly lower, muscle strength and tone were less well developed, rooting behaviour was less vigorous and there was diminished vigour in the moro response.

8.4 THE FILM:

Because the film was presented post-natally the introduction was designed to reintroduce the mother to her experience of labour and delivery of her infant. It began with an expectant mother's arrival at the maternity annexe and from there to the labour room, the theatre, rooming-in and finally being discharged home. The film then proceeded to describe six behaviours.

Looking by the Infant:

(i) The subject is shown with her infant during breast feeding with mother and baby in a face to face position, the baby's face being approximately nine inches from the mother, the mother and baby being in mutual regard. The commentary explains that a baby, even as young as nine minutes, is capable of showing interest in his mother's face and when placed in a position which is conducive to his being able to focus on his mother's face (i.e. when placed in a face to face position approximately nine inches away from her) will do so. It is explained that by providing opportunity for the infant to express this strong motivation to focus on his mother's face that the infant will quickly learn to recognise her and to feel secure with her.

(ii) The mother is then shown holding the baby across her shoulder expressing his wind. The commentator points out that in this position the infant becomes alert and will scan over the mother's shoulder and this alertness will increase the likelihood of facial scanning by the infant when placed in position for the second feed.

(iii) The mother is shown playing with her infant in a supine position as well as holding it upright during play, always being in mutual facial regard with the infant. The explanation given was identical to that of the first part of the film, namely that the infant has a strong desire to look at the mother's face, and when given the opportunity to do so, will focus on it and learn to recognise the mother and to feel secure with her.

(iv) The mother is portrayed feeding her infant with her face averted (reading a magazine) in order to emphasize that the infant will only look at his mother's face if placed in a position which is conducive to his looking at it. The film shows that the infant is not looking at the mother's face because it is not possible for him to do so.

(v) Finally the mother and infant are shown during a further breast-feeding episode when the infant is aged fourteen months. It is described that this infant having experienced frequent opportunity to focus on his mother's face now shows very high interest in her face, with the result that the mother is now feeling that her infant is clearly recognising her.

Listening to the Mother's Voice:

The film depicts the mother talking to her infant while feeding and playing, with the infant showing interest in the mother's voice. The commentary explains that soon after birth infants can localise sound and with frequent exposure to the mother's voice will quickly learn to associate it with her face and will show specific responsiveness to it, such as orientating towards her, being soothed, etc.

Ventral Contact:

The film portrays an infant in chest to chest contact grasping his mother. The contentment on the face of the infant is obvious and the explanation given emphasizes that very young infants have a primitive ability to grasp and should be given the opportunity to do so, and that one of the best soothing positions is attained during chest to chest contact.

Smiling :

The film shows the infant smiling while in interaction with the mother together with her responsiveness to the smile (talking to the infant, smiling, stimulating, and picking him up). The commentary describes the relationship between the infant's smile and mother's response and the importance of the contingency of that relationship.

Vocalization:

Again the infant and mother are shown in interaction with the infant babbling and the mother responding by talking, smiling, stimulating, etc. The explanation is identical to that given for smiling, namely that babbling is to a large extent under the mother's control, i.e. the infant will babble more if she responds positively to it.

Crying:

Different kinds of crying are presented with commentary that crying is a means of signalling a variety of needs. The effectiveness of rapid versus delayed response to crying and the way in which this brings about a speedy resolution of distress is discussed, as well as the fact that a quick response to crying gives the child greater opportunity to learn to communicate in other ways with the mother, and does not tend to bring about a more demanding child as many mothers seem to think.

The film then concludes with a summary of the six behaviours and the suggestion that in these behaviours is found the roots of the infant's integration into the social world.

8.5 METHOD :

8.5.1 Subjects:

Subjects were sixty primiparous mothers and their new-born infants. They were obtained from the maternity annexe of Nelson Hospital, Nelson, New Zealand, during the period January 1977 to September 1977, all were volunteers, healthy, married, and of european descent. A perusal of Table (I) indicates that the two groups were well-matched on all relevant variables, i.e. mothers were aged between twenty and thirty-two years, they had had between two and ten years post primary education, the numbers from each social class were well matched, the gestation period of the infant ranged from thirty-eight to forty-two weeks, birth weight was within the range of 2.5 to 4.1 kilograms, the apgar score of infants immediately after birth (a measure of early vital signs of the infant (Apgar, 1953) was within the range of 8 to 10 (maximum score is 10), infants were breast-fed from zero to six months, during labour the amount of medication (including local anaesthic, analgesic and tranquilising) given was equivalent, the number of mothers whose labour was induced or had epidural anaesthesia was the same in both groups, and the distribution of sex of infants in both groups did not differ significantly. (See Appendix 1 for demographic and perinatal, variables for each subject). All infants underwent a paediatric and orthopaedic assessment with no signs of pathology being revealed in the final groups at that time or at any time during the six months of the study.

Approximately one quarter of the subjects approached declined to volunteer, and seven of the control group and five of the experimental group withdrew prior to the first observation when the infant was aged three months. During the actual period of the study itself one infant in the control group died from unknown causes ("cot death") and one member of the experimental group withdrew due to financial difficulties precluding her travelling from an outlying district. This attrition left 60

Variable	Statistic	Control Gp.	Experimental Gp.	Significance
Age	Mean	24.66	25.86	
(years)	Range	20-32	20-32	
	t		-0.18	>0.05
	D.F.		58	
	Std.Dev.	2.94	2.79	
Education	Mean	4.43	5.06	
(years 2^{o}	Range	2-10	2-10	
and 3^{o})	t		-0.47	>0.05
	D.F.		58	
	Std.Dev.	1.65	1.96	
Social	Class	No. in each class	No. in each class	
Class	1	5	4	
	2	7	10	
	3	12	10	
	4	6	6	NS
Gestation	Mean	40.06	39.9	
(weeks)	Range	38-42	38-41	
	t		0.02	>0.05
	D.F.		58	
	Std.Dev.	0.98	0.88	
Apgar	Mean	8.60	8.73	
Score	Range	8-10	8-10	
	t		unnecessary	NS
	D.F.		58	
	Std.Dev.	.56	.45	

Variable	Statistic	Control Gp.	Experimental Gp.	Significance
Birth-weight (kilo-grams)	Mean	3.48	3.26	
	Range	2.8-4.5	2.5-4.1	
	t		0.24	>0.05
	D.F.		58	
	Std.Dev.	0.44	0.42	
Labour induced		9	9	
Epidural anaes-thesia		9	9	
Pethi-dine (mg)	Mean	91.54	113.32	
	Range	50-150	50-200	
	t		-0.02	>0.05
	D.F.		49	
	Std.Dev.	29.27	39.92	
	No. of mothers receiv-ing	26	25	NS
Phene-rgan (mg)	Mean	36.78	46.36	
	Range	33-50	33-50	
	t		0.11	>0.05
	D.F.		26	
	Std.Dev.	10.74	7.23	
	No. of mothers receiv-ing	14	14	

Variable	Statistic	Control Gp.	Experimental Gp.	Significance
Sex of infant	Males	14	11	
	Females	16	9	
	χ^2		0.27	>0.05
	D.F.		1	
Mother's knowledge of target behaviours	Mean	1.73	1.96	
	Range	0.5	0.4	
	t		0.86	>0.05
	D.F.		58	
	Std.Dev.	1.24	0.89	
Mother's knowledge of target behaviours after film	Mean	N.A.	7.9	
	Range	N.A.	7-8	
Breast-feeding (months)	Mean	3.58	4.02	
	Range	0-6	0-6	
	t		-0.37	>0.05
	D.F.		58	
	Std.Dev.	2.40	2.18	

Table (I) Details of the Experimental and Control Groups.

mothers and infants in each group.

8.5.2 Procedure:

Mothers were approached in the obstetric ward approximately five days after the birth of their infant and asked to volunteer. A standard form of request and description of the study was used (Appendix 2). The group to which the first subject approached would be assigned was decided by a toss of a coin. On this basis the first individual was assigned to the control group. Subjects for any particular group were approached for a one week period and asked to volunteer, after which a few days were allowed to elapse until those mothers had been discharged from the maternity annexe and then mothers for the second group would then be approached and asked to volunteer. This procedure was followed to ensure that mothers when talking together did not discover that they were in different groups and carrying out different experimental procedures.

Having agreed to volunteer all mothers were then asked to complete a questionnaire designed to investigate their knowledge of the specific mother and infant behaviours which were to be investigated (Appendix 3). In the developing of the questionnaire care was taken to ensure that the questions did not give clues as to the likely answers. Table (I) shows that the two groups did not differ initially on their knowledge of the target behaviours.

When mothers had been at home for one week they were contacted by telephone and invited to come to the laboratory. Mothers in the control group were asked to complete a questionnaire with the experimenter which related to their expectations of the birth and their actual experience (Appendix 4). This procedure was carried out to control for time being spent with the experimenter. The experimental group were asked to view the film which was designed to teach them to be aware of and to practice behaviour which would enhance the frequency of occurrence of the six precursor behavours.

Following presentation of the film mothers in the experimental group were asked again to fill out the questionnaire relating to their knowledge of the precursor behaviours. They were required to receive a score of at least 90% before it was considered that they had demonstrated that they had learned the behaviours specified by the film. (Table (I). They were also handed a sheet with a summary of the behaviours outlined in the film (Appendix 5).

When the infants were aged 14 weeks (range 13 to 15 weeks) and 27 weeks (range 26 to 28 weeks) mothers were contacted by telephone and invited to come to the laboratory where filming of themselves and the infant and the infant with a stranger would be undertaken. The form of the invitation is found in Appendix 6. In addition the mother was asked to schedule her arrival at the laboratory approximately one and a half hours after feeding her infant, it having been established by Brazelton (1973) that at this time an infant is most likely to be awake and alert.

Upon arrival at the laboratory the mother and the baby were met by the experimenter, conducted inside, and asked to sit on a chair, the baby on the mother's knee. The laboratory was a sunny room facing north-west measuring 3.5 metres by 7 metres (see Figure 1 for layout of room). From Figure 1 it can be seen that in one corner in a triangular formation was the seat for mother to sit on, and approximately 2 metres from her along the base of the triangle was a group of soft toys (a large tortoise on which children could play, a small tortoise, a "basil brush", a large and a small rabbit, a large and a small clown, a ball, and a pyramid of wooden circles). The corner of the room formed the vertex of the triangle. In the opposite corner of the room, at right-angles to the base of the triangle was the television camera, together with cassette and monitor (the cassette and monitor being screened from the mother). The camera was a National T.V. Camera model WV-361N/A, with a Fujinon Zoom Lens Model CCTV 45X14HP-2 1:2/14-70mm, the cassette was a Phillips ½ inch model VCR N1520, the monitor was a Phillips Model K9 26 inch. Simultaneous sound recording was obtained with a microphone suspended 2 metres above the middle of the base of the triangle of mother, toys and corner of the room and attached to the microphone was a "beeper" (kindly provided by the Senior Technical Officer, Department of Psychology, University of Canterbury) which emitted a high pitched beep once every 10 seconds. This "beep" was not audible to the mother and baby, but was recorded on the audio channel of the videotape to be used during data extraction.

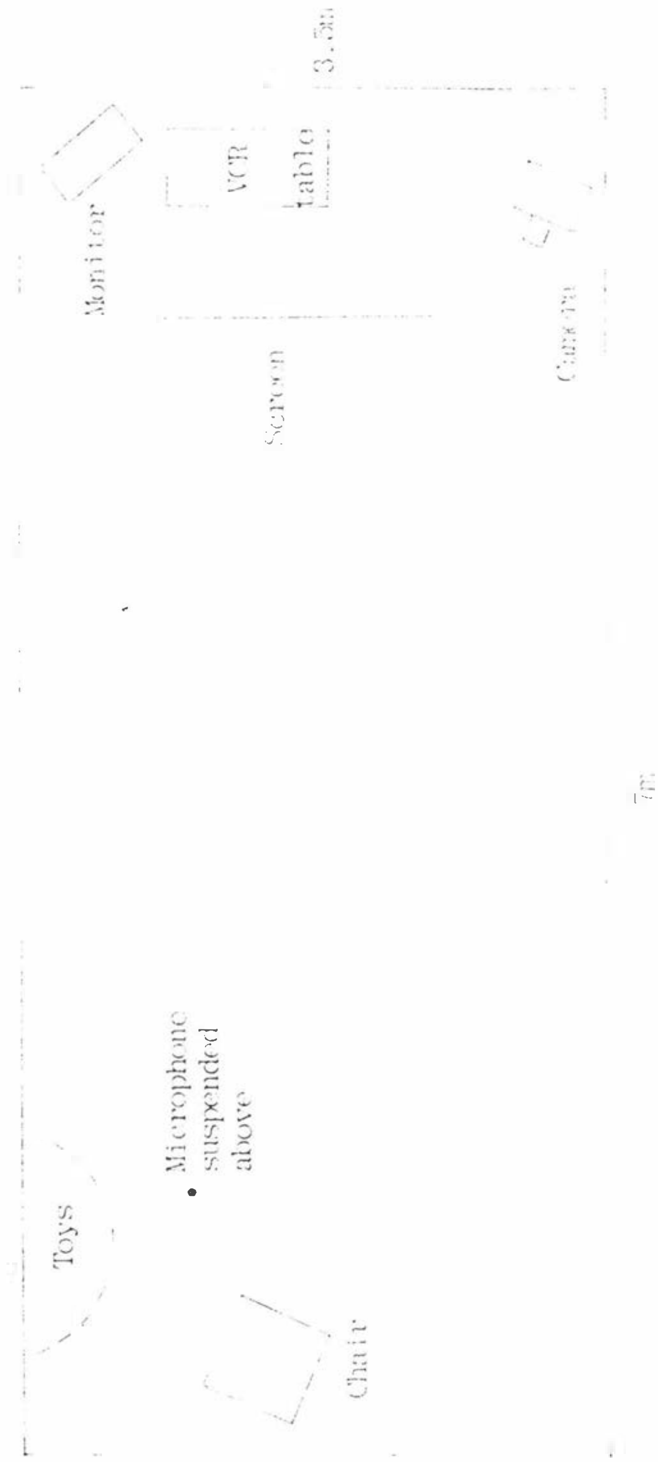


Figure 1: Plan of Laboratory.

When the mother and infant were settled quietly instructions were given regarding the procedure to be followed, (Appendix 7). The instructions were carefully worded so that the mother received no cues as to what kind of interaction was particularly relevant to the study. The sequences to be filmed and order of filming were:

1. Structured interaction of infant and stranger.

The mother was asked to sit on the chair with her infant facing away from her.

(a) A stranger (in all cases the same male person, Greenberg et al. (1973) having found that a male stranger is more likely to elicit wariness or fear from an infant) quietly approached to within one metre of the infant and sat on the floor facing the infant. For 90 seconds the stranger remained in this position quietly watching the infant with a neutral expression on his face and making no sound.

(b) The stranger then attempted to gain the infant's attention by talking, smiling and nodding his head for 90 seconds. During this time if the infant turned his head away the stranger would move his head so that the infant would be required to move his head no more than 45 degrees in order to reach a face to face orientation with the stranger.

(c) The stranger then quietly reached out and placed the infant on his knee, the infant facing him. For 90 seconds he looked quietly at the infant, again saying nothing.

(d) For 90 seconds the stranger attempted to gain the infant's attention by talking and smiling, all the time ensuring that face to face contact was possible with the infant being required to move his head only 45 degrees in order to attain a face to face orientation.

2. The stranger quietly left and when the infant was calm and alert the unstructured interaction sequence between mother and infant began. This lasted for 20 minutes. After instructing the mother as to what was expected of her (Appendix 7) the experimenter then left the room for the 20 minutes.

3. At the end of the 20 minutes of unstructured interaction the experimenter returned to the room, switched off the camera, and then administered a questionnaire designed to elicit information regarding the feeding, bathing and sleeping habits of the infant, as well as the mother's receiving of help (Appendix 8).

The structured interaction sequences with the stranger always preceded unstructured interaction. This was done for the following reasons: (1) In pilot studies it had been found that a baby was too tired at the end of the unstructured interaction to carry out adequately the structured sequences with the stranger; (2) It was desirable to have the end of the unstructured interaction occurring at the close of the session, (i.e. approximately 30 minutes after mother and infant had arrived) because this would increase the likelihood of the infant being tired and of the mother becoming bored and hence the mother's reaction to a tired infant and her own boredom would be manifest; (3) Having other arrangements such as the structured interaction occurring mid-way between two sessions of unstructured interaction would be likely to introduce confounding effects on the unstructured interaction following structured interaction, particularly if on some occasions the baby had been distressed by the stranger.

8.6 DATA EXTRACTION:

The videotaped interaction sequences were viewed and data was extracted using an interval recording procedure as described by Repp et al. (1976). Interaction was observed as the beeper sounded (each 10 seconds) and behaviour recorded during the same interval. Repp et al. (1976) noted that this method gives an acurate estimate of low and medium rates of behaviour occurrence and it was considered that these rates tend to typify early infant-mother interaction. Powell et al. (1975) have also indicated that time samples of this kind, using an interval as small as 10 seconds, best predicts continuous measures of behaviour.

At each beep of the time sample specific mother and infant behaviours which were occurring were spoken into the microphone of a tape recorder. This tape recording was then transposed on to a data sheet which was divided into pairs of squares, each pair representing mother and baby behaviour occurring when the beep sounded.

8.6.1 Behaviours recorded for mother:

1. Looking at infant. To be coded the mother must be looking at her infant in such a way that the infant has to move his/her face no more than 45 degrees to reach a face to face configuration with the mother. Two states of looking were coded, each divided into three sub-states.

(a) Looking at infant:

(i) neutral expression

(ii) smile expression

(iii) frown expression

(b) Not looking at infant:

(i) neutral expression

(ii) smile expression

(iii) frown expression

2. Vocalisations to the infant:

(i) Neutral expression:- the mother is talking in conversational tones merely giving a commentary of what she and/or her infant are doing.

(ii) Positive expression:- expression of positive affect to the infant, e.g. "you are a clever boy!".

(iii) Negative expression:- expression of negative affect to the infant, e.g., "that's naughty!".

(iv) Play expression:- mother is attempting to stimulate a higher state of arousal in her infant by her voice, this vocalisation is of a higher volume and frequency than the neutral vocalisation.

(v) Laugh expression:- mother laughs.

(vi) Sing expression:- mother sings to her infant.

(vii) Describes toy:- mother describes features or characteristics of a toy.

3. Touching the Infant:

This behaviour category is not recorded if the touching was necessary only for the infant's support.

(i) Neutral touch:- mother merely lays a hand or a finger on her infant.

(ii) Play touch:- mother stimulates her infant by tickling, moving his/her limbs, etc.

(iii) Affectionate touch:- mother caresses her infant.

(iv) Pat infant:- mother pats her infant.

(v) Caretake touch:- mother arranges clothes, wipes the baby's mouth, etc.

4. Presentation of Toys:

(i) Touch toy:- mother holds the toy for her infant's inspection, she does not move it or attempt to attract his attention to it by demonstration.

(ii) Show toy:- mother holds the toy for her infant's inspection and moves the toy in such a manner as to attract his/her attention.

(iii) Look at toy:-

(a) neutral (with a neutral expression)

(b) smile (with positive expression)

(c) frown (with negative expression)

(d) look at different toy (mother looks at a different toy from her infant).

8.6.2 Behaviours Recorded for the Infant

1. Looking at the Mother:

Again to be coded the infant must be looking at the mother in such a way that the mother has to move her head no more than 45 degrees to reach a face to face orientation.

Two states of looking were coded, with three sub-states in each.

(a) Looking at the Mother:

(i) neutral expression

(ii) smile expression

(iii) frown expression

(b) Not looking at Mother:

(i) neutral expression

(ii) smile expression

(iii) frown expression

2. Vocalising to Mother:

(i) Neutral expression:- infant vocalises at low volume and frequency with little change in volume during the vocalisation.

(ii) Positive expression:- infant vocalises at high frequency and volume, the volume starting relatively low and rapidly increasing.

(iii) Laugh expression:- infant vocalises in short bursts of a few seconds in duration with one or two seconds between each burst, the vocalisation being of medium to high volume and frequency.

(iv) Negative expression:- the infant vocalises at medium volume and pitch, the sound is continuous and non-modulated.

(v) Cry expression:- high frequency sound with the mouth wide open, it is continuous and non-modulated. Pauses occur only when breathing is required.

3. Touching Mother:

(i) Neutral touch:- infant merely touches a hand on to the mother.

(ii) Affectionate touch:- infant puts an arm around mother's neck or other part of her body.

(iii) Pat mother:- the infant pats mother.

4. Response to Toys:

(i) Touch toy:- infant merely touches the toy.

(ii) Manipulate toy:- infant manipulates toy with hands and/or mouth.

(iii) Look at toy:-

(a) neutral expression

(b) smile expression

(c) frown expression

(d) look at different toy (i.e. to that presented by mother).

5. Position on Mother:

(i) On knee:- infant sitting on mother's knee.

(ii) Stand on knee:- infant stands on mother's knee.

(iii) Infant lying supine:- infant lying supine on mother's knee.

(iv) Infant lying prone:- infant lying prone on mother's knee.

(v) Infant making chest to chest contact with mother.

6. Position on Floor:

(i) Sitting

(ii) Standing

(iii) Supine

(iv) Prone

(v) On toy

(vi) Waving arms

When the behaviour was being coded an attempt was made to code the direction of the behaviour of mother or infant, (i.e. whether or not it was directed to the opposite partner or to a toy or unconnected with the ongoing interaction). The only behaviour which was not readily classifiable in terms of direction was vocalizations from the infant. It was found that in the absence of the baby's looking at the mother there was no way to unequivocally determine whether a vocalization was necessarily directed towards her or to some other environmental event. Therefore no attempt was made to categorise infant vocalizations in terms of direction.

8.7. RELIABILITY OF CODING:

Reliability of the behaviour codes used was estimated by using two judges who independently coded every fifth mother and infant. Prior to beginning coding proper training sessions were held until both coders agreed at least 80% of the time. The form of determining agreement was that suggested by Johnson and Bolstad (1973) the formula used being:-

$$\frac{\text{Number of Agreements}}{\text{Number of Agreements + Disagreements}} \times \frac{100}{1}$$

For agreement between coders to occur it was necessary that they code each behaviour within each time sample exactly the same, i.e., it was not sufficient merely to code the behaviour within the same category.

8.8 TREATMENT OF DATA:

Once data had been transposed onto the data sheet they were then converted to a number code suitable for computer analysis and written on data sheets for punching. This was then punched on I.B.M. cards.

Lewis (1972b) and Lewis and Lee-Painter (1974) have suggested that data analysis can be carried out on more than one level. The lowest level involves more frequency counts of individual behaviours while at higher levels analysis can include consideration of behaviours occurring simultaneously and the direction and sequential relationships of such interactions. Higher levels can also include proportional measures because of the greater amount of information provided by such measures (Antonucci, 1976) e.g., it is potentially more meaningful to know what proportion of infant behaviour is responded to than the absolute number of maternal responses. At the first level little information is provided other than indicating which behaviours occurred more or less than others within and between groups, such analysis providing minimal indication regarding the key to interaction, viz., complementary behaviour between two individuals. Thus while frequency counts of individual behaviours were made proportional measures were used where practical, and emphasis was placed on analysis of interaction sequences.

Interaction was defined as being either specific mother and infant behaviours occurring within the same time sample, or where appropriate, description of interaction in terms of direction of behaviours, i.e., who initiated and who terminated the behaviour, and to whom it was directed. A model of this reciprocal interaction process is shown in Figure 2. The model indicates that the initiator of reciprocal interaction can on some occasions be specified, while on others it is not possible. Following initiation of reciprocal interaction a homogeneous system is then established which is maintained by the reciprocal responsiveness of the partners. This homogeneous steady state of interaction may then be interrupted at any time by either A or B or unspecified (i.e. using time sample observations it is often not possible to establish which partner actually terminated the interaction, e.g. when interaction was occurring in one time sample and is followed by one in which no interaction was occurring).

The derived measure "reciprocal interaction" was considered to have occurred if the behaviour of the mother and the infant fulfilled the criterion of occurring in the same time sample and being reciprocal or "complementary" to the behaviour of the other partner. The final choice of contemporaneous mother and infant behaviours included in the measure of reciprocal interaction was made in consultation with a second judge with 100% agreement on all pairs of behaviour being required before being included. Unlike some researchers, e.g. Collis and Schaffer (1975), joint gazing of mother and infant at the same object in the environment was not considered to be reciprocal interaction because it cannot always be concluded that either partner has made any attempt to relate to the

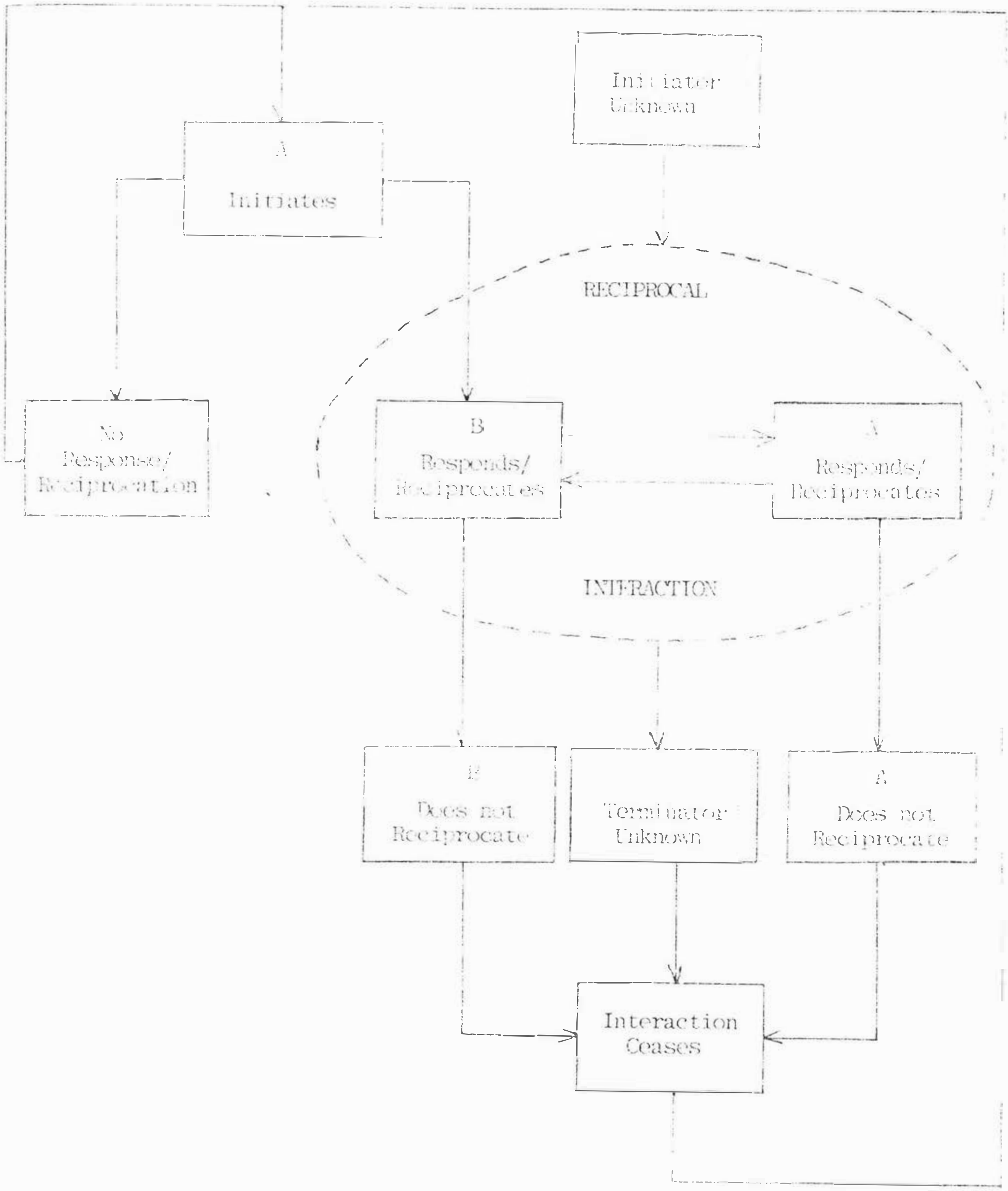


Figure 2: Model of Reciprocal Interaction.

behaviour of the other. Similarly infant's stopping of crying or grizzling when rocked by the mother was not considered reciprocal interaction because it could not be unequivocally established that the infant was responding to a stimulus from the mother, and also in this case a response was ceasing (crying or grizzling) rather than being emitted.

The final choice of behaviours to be included in the measure of reciprocal interaction was:

Mother Behaviour	Infant Behaviour
Look at infant (neutral, smile)	Look at mother (neutral, smile, frown)
	Infant touch (playfully, affectionately)
Vocalise to infant (neutral, positive, laugh, play, sing)	Look at mother (neutral, smile)
	Vocalise (neutral, positive, laugh)
	Touch (playfully, affectionately)
	Infant wave arms
Touch infant (neutrally, playfully, affectionately)	Smile (not at mother)
	Look at mother (neutral, smile)
	Vocalise (neutral, positive, laugh)
	Touch mother (playfully, affectionately)
	Infant wave arms
Present toy to infant	Look at toy (neutral, smile)
	Touch toy
	Manipulate Toy

Mother Behaviour	Infant Behaviour
Hold infant to chest	Touch mother (playfully, affectionately)
Rock or jig infant	Smile (not at mother)
	Look at mother (neutral, smile)
	Vocalise (neutral, positive, laugh)

Where response to a stimulus was used as a dependent variable a response was considered to have been emitted contingent on a stimulus when the two occurred within the same time sample period, e.g., a mother was considered to have responded to the infant's smile if she emitted the response within the same time sample period. This relationship was derived for the mother only, it being rarely possible to determine if the infant was responding specifically to the mother or not. The only situation in which it could be deduced whether the infant was responding to a maternal behaviour was an infant response contingent on a mother's presentation of a toy.

CHAPTER 9

RESULTS

9.1 LEARNING OF TARGET BEHAVIOURS:

As already shown in Table (i) the film was successful in enhancing in the experimental group the mother's knowledge of the target behaviours, all mothers achieving a percentage score of at least 90 per cent on the questionnaire designed to test that knowledge (Appendix 3).

9.2 EARLY INFANT MANAGEMENT QUESTIONNAIRE:

(See Appendix 8).

Tables (iia) and (iib) indicate that differences between the control and experimental groupsin their responses to the questionnaire were mimimal,and in all cases except one, non-significant (the response of mothers to question 11 when the infant was aged 6 months indicated that the experimental group mothers were receiving significantly less help with their infant).

It can be noted from Tables (iia) and (iib) that categories have been collapsed to make analysis easier, and also because it was unusual for more than two categories of response to be needed. The results show that both groups were well-matched in the ease with which mothers handled their infant, their confidence in handling, the amount of support received and the infants' feeding, sleeping, crying and bathing behaviour.

Question		Control	Experimental	Significance
1	4 or more feeds per day	28	27	
	Fewer than 4 feeds per day	2	3	NS
2	Feeding very or moderately pleasant	25	28	
	Mildly or less pleasant	5	2	NS
3	1 or more feeding problems	12	7	$\chi^2=1.23$
	No feeding problems	18	23	NS (Table (iii)
4	Bathing very or moderately pleasant	30	29	NS
	Mildly or less pleasant	0	1	
5	Wakes at least once a night	12	12	
	Does not wake	18	18	NS
6	Satisfied with sleeping habit	28	27	
	Not satisfied with sleeping habit	2	3	NS
7	Mother is getting enough sleep	28	27	
	Mother is not getting enough	2	3	NS

Table (11a) Results of Early Management Questionnaire - 3 months.

continued ...

Question		Control	Experimental	Significance
8	Infant cries only when hungry/tired	16	19	
	Occasionally at other times	10	10	
	Quite often	4	1	NS
9	Mother satisfied with her handling of infant	27	28	
	Not satisfied	3	2	NS
10	Infant easy to manage - mostly	28	29	
	Less than mostly	2	1	NS
11	Mother has help each 2 or 3 weeks	9	15	$\chi^2=3.40$
	Once a month or less	21	15	NS (Table iv)
12	Mother has help as often as needed	25	26	
	Does not have it as much as needed	5	4	NS
13	Husband helps whenever he can	24	29	
	Occassionally	6	1	NS
14	Husband helps as often as needed	26	29	
	Does not help as often as needed	4	1	NS

Table (11a) (continued)

continued ...

Question		Control	Experimental	Significance
15	Wife's parents live locally	16	12	$\chi^2=0.60$ NS
	Husband's parents live locally	15	11	$\chi^2=0.61$ NS (Table (v) and (vi))

Table (11a) Results of Early Management Questionnaire - 3 Months.

Question		Control	Experimental	Significance
1	Infant has 3 to 5 feeds per day	24	27	
	More feeds	6	3	NS
2	Feeding very or moderately pleasant	30	28	
	Mildly pleasant or less	0	2	NS
3	No feeding problems	29	30	
	1 or more feeding problems	1	0	NS
4	Bathing very or moderately pleasant	30	30	
	Mildly or less pleasant	0	0	NS
5	Does not wake at night	26	29	
	Wakes once at night	4	1	NS
6	Mother is satisfied with sleeping habit	28	28	
	Mother is not satisfied with sleeping habit	2	2	NS
7	Mother is getting enough sleep	27	30	
	Mother is not getting enough sleep	3	0	NS

Table (11b) Results of Early Management Questionnaire - 6 months.

continued ...

Question		Control	Experimental	Significance
8	Infant cries only when hungry or tired	28	30	
	Cries occass-ionally at other times	2	0	NS
9	Mother satis-fied with handling of her baby	29	30	
	Not satisfied	1	0	NS
10	Infant easy to manage - mostly	28	30	
	Less than mostly	2	0	NS
11	Mother has help at least every 2 to 3 weeks	15	5	$\chi^2=6.08$
	Once a month or less	15	25	$p<0.02$ (Table (vii)
12	Mother has help as often as needed	27	23	
	Does not have help as often as needed	3	7	$\chi^2=1.08$ $p=0.30$ (Table (viii))
13	Husband helps whenever he can	27	29	
	Does not help whenever he can	3	1	NS

Table (11b) (continued)

continued ...

Question		Control	Experimental	Significance
14	Husband helps as often as needed	28	29	
	Does not help as often as needed	2	1	NS

Table (11b) Results of Early Management Questionnaire - 6 Months.

	problems	no problems
Control	12	18
Experimental	7	23

$\chi^2 = 1.23$, df = 1, p >0.20

Table (111) Significance of difference in numbers of mothers in each group experiencing problems in feeding, bathing, etc. their infants at 3 months.

---

	help received each 2 or 3 weeks	help once a month or less
Control	9	21
Experimental	15	15

$\chi^2 = 3.40$, df = 1, p >0.05

Table (1v) Significance of difference in the receiving of help of each group at 3 months.

	local	not local
Control	16	14
Experimental	12	18

$\chi^2 = 0.60$, df = 1, $p > 0.30$

Table (v) Significance of difference in the locality of each group's maternal parents.

---

	local	not local
Control	15	15
Experimental	11	19

$\chi^2 = 0.61$, df = 1, $p > 0.30$

Table (vi) Significance of difference in the locality of each group's paternal parents.

	help received each 2 or 3 weeks	help received once a month or less
Control	15	15
Experimental	5	25

χ^2 = 6.08, df = 1, p >0.02

Table (vii) Significance of difference in each groups receiving of help at 6 months.

---

	help received often enough	help received not often enough
Control	27	3
Experimental	23	7

χ^2 = 1.08 df = 1, p = 0.30

Table (viii) Significance of difference in the

9. 3 AGREEMENT BETWEEN JUDGES:

Using the method described by Johnson and Bolstad (1973) (see Method) agreement between two judges' coding of every fifth case (both mother and infant) was calculated. Table (ıx) shows that agreements reached an acceptable level for each of the ten categories of behaviour coded.

Behaviour	Per Cent Agreement	Range
Mother look	92.86	74.17 - 98.33
Mother vocalize	90.38	65.83 - 100.00
Mother touch	99.68	89.17 - 100.00
Mother present toy	91.20	84.19 - 100.00
Infant look	77.67	67.50 - 99.17
Infant vocalize	95.52	90.00 - 99.17
Infant touch	92.00	89.17 - 100.00
Infant respond to toy	91.18	78.33 - 100.00
Infant on knee	91.38	84.17 - 100.00
Infant on floor	98.22	75.83 - 100.00

Table (ıx) Agreement between judges.

9.4 TESTING OF HYPOTHESES:

Hypothesis 1:

Mothers in the experimental group will look at their infants in such a manner that their face is available for the infant to focus on more often than the control group.

This hypothesis was supported with significant effects due to time and groups over time also occurring (Table (x)).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	25520.83	25520.83	49.16	<0.001
Subjects	29	17360.30	598.63		
Groups x Subjects	29	12752.17	439.73		
Time	1	17812.03	17812.03	60.83	<0.001
Groups Time	1	2557.63	2557.63	8.73	<0.05
Subjects x Time	29	8642.97	298.03		
Groups x Subjects x Time	29	8341.37	287.63		

Group	Mean	Std. Dev.	Skewness
Control - 3 months	80.57	17.49	1.28
Experimental	100.50	14.63	-0.99
Control - 6 months	46.97	23.72	0.21
Experimental	85.37	17.28	-0.84

Table (x) Significance of differences in mother's looking at her infant.

Figure 3 shows that mother's looking at her infant underwent a significant decrease between 3 and 6 months in the control group only.

Hypothesis 2:

The frequency with which mothers vocalize to their infants will be higher in the experimental group.

This hypothesis was confirmed, with a significant decrease in vocalizing being apparent in both groups between the third and sixth months (see Table (xi) and Figure 4).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	19712.03	19712.03	34.65	<0.001
Subjects	29	15946.50	549.88		
Groups x Subjects	29	17044.97	587.76		
Time	1	6630.53	6630.53	27.58	<0.001
Groups x Time	1	546.13	546.13	2.27	>0.05
Subjects x Time	29	6556.47	226.09		
Groups x Subjects x Time	29	7385.87	254.69		

Group	Mean	Std. Dev.	Skewness
Control - 3 months	4.73	22.38	0.72
Experimental	71.63	19.59	-0.26
Control - 6 months	31.13	18.59	0.68
Experimental	52.5	21.47	0.03

Table (xi) Significance of the difference in mother's vocalizing to her infant.

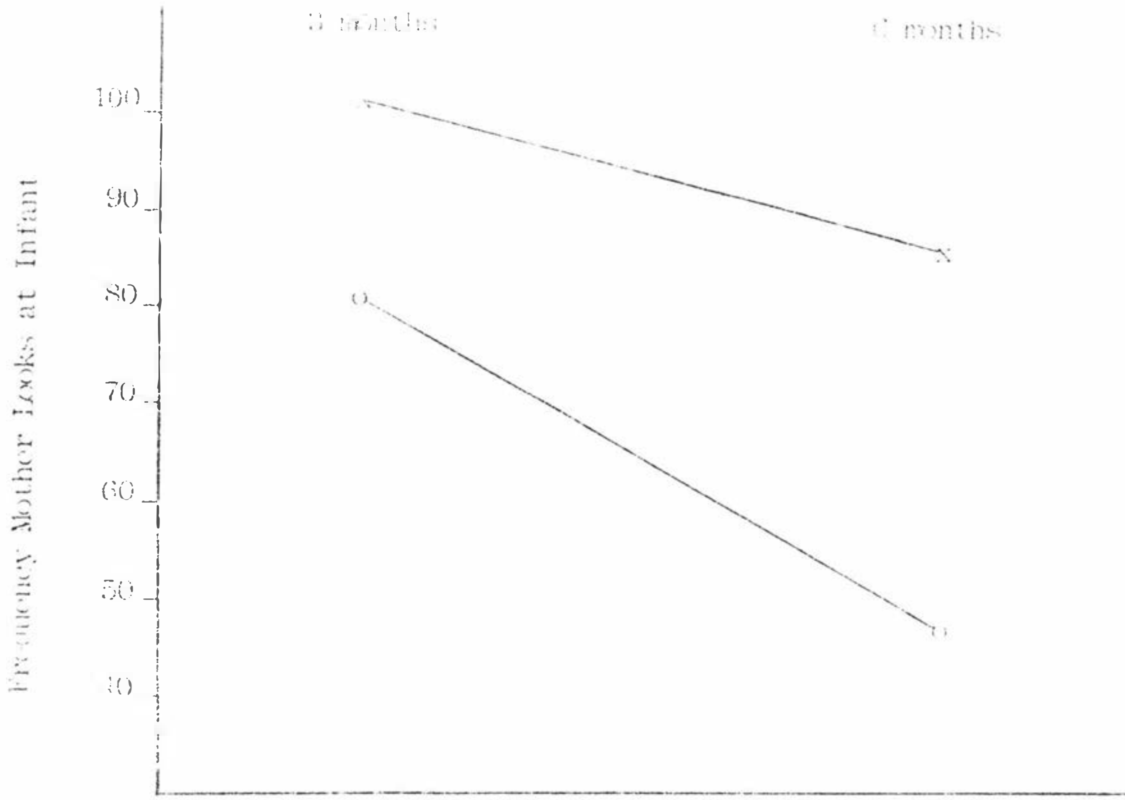


Figure 3: Frequency Mother Looks at Infant

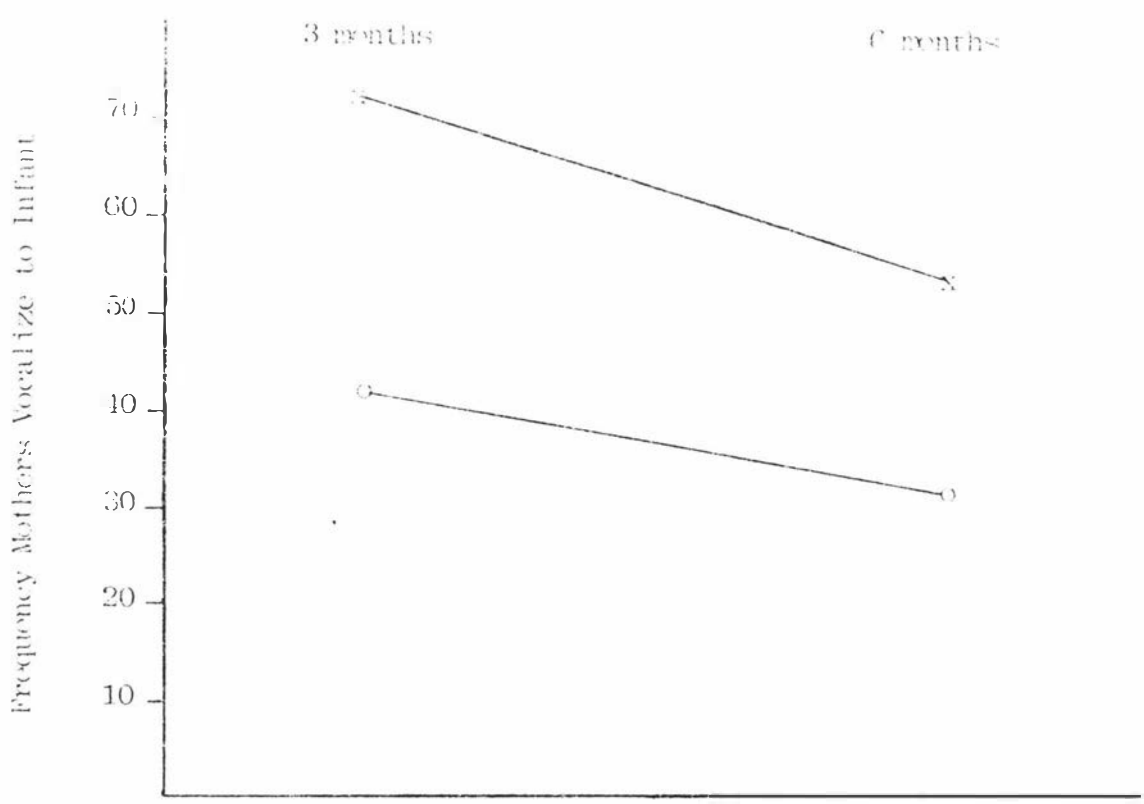


Figure 4: Frequency Mothers Vocalize to Infant

Hypothesis 3:

The frequency of chest to chest contact between mother and infant will be higher in the experimental group.

This hypothesis was not supported, the tendency for chest to chest contact being similar in both groups (Table (xii)). The probability that the mothers would respond to the crying or grizzling of their infant by chest to chest contact was also similar in both groups (Table (xiii)).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	106.41	106.41	0.52	>0.05
Subjects	29	6162.74	212.51		
Groups x Subjects	29	5748.34	198.22		
Time	1	1680.01	1680.01	8.78	<0.05
Groups x Time	1	1.01	1.01	0.01	>0.05
Subjects x Time	29	3914.74	134.99		
Groups x Subjects x Time	29	7176.74	247.47		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	13.93	17.49	2.27
Experimental	11.87	11.19	1.13
Control - 6 months	6.27	16.81	3.85
Experimental	4.56	8.89	3.37

Table (xii) Significance of the difference in chest to chest contact.

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.187	-1.47	39.72	0.149	0.22	0.89
Experimental	0.309		(separate variance)		0.34	0.71
Control - 6 months	0.063	-1.14	22.39	0.286	0.09	1.65
Experimental	0.135		(separate variance)		0.25	2.08

Table (xiii) Significance of the difference in response to cry/grizzle by chest contact.

Hypothesis 4:

The probability of a mother's responding to her infant's vocalization will be greater in the experimental group.

This hypothesis was confirmed (Table (xiv)) a significant decrease in responsiveness between the third and sixth month occurring for the experimental group only (Table (xv)) (see also Figure 5).

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.410	-4.79	58	<0.001	0.38	0.25
Experimental	0.812				0 .26	-1.47
Control - 6 months	0.267	-4.87	58	<0.001	0.35	1.21
Experimental	0.666				0.28	-0.45

Table (xiv) Significance of difference in probability of mother's responding to infant vocalizations.

Group	Mean	t-Value	D.F.	p
Control - 3 months	0.410	1.52	58	0.133
6 months	0.267			
Experimental				
3 months	0.812	2.10	58	0.04
6 months	0.666			

Table (xv) Significance of difference in probability of mother's responding to infant vocalizations at 3 months and 6 months.

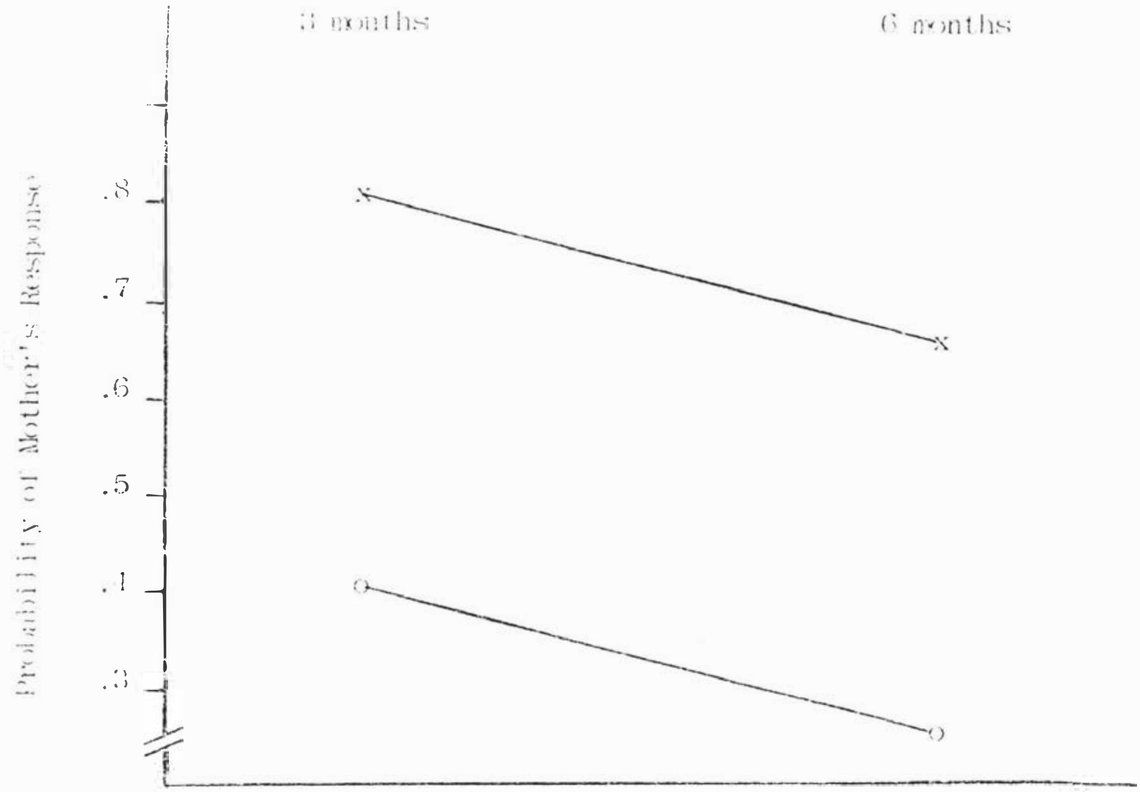


Figure 5: Probability of Mother's Response to Infant Vocalization.

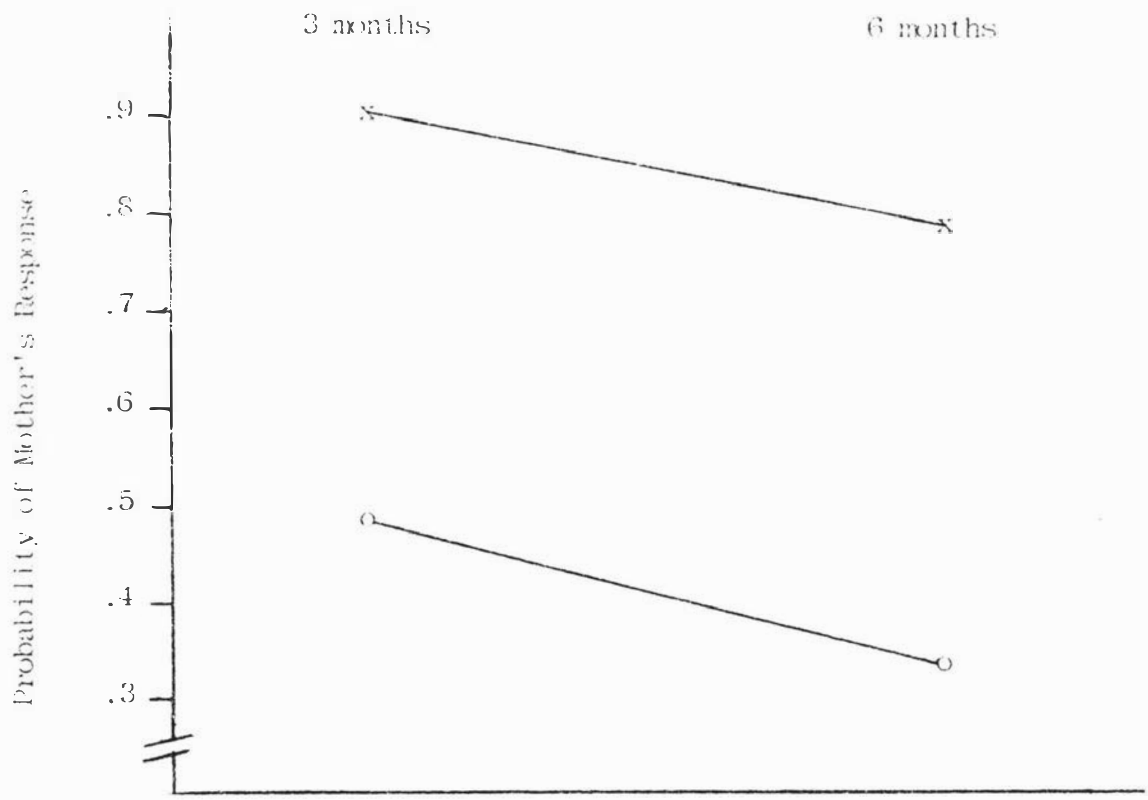


Figure 6: Probability of Mother's Response to Infant Smiles

Hypothesis 5:

The probability of a mother's responding to her infant's smile will be greater in the experimental group.

This hypothesis was confirmed, no significant change over time occurring (Tables (xvi) and (xvii)). (See Figure 6).

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.492	-4.39	45.23 (separate variance)	<0.001	0.46	-0.05
Experimental	0.912				0.25	-3.34
Control - 6 months	0.333	-4.32	58	<0.001	0.46	0.69
Experimental	0.799				0.37	-1.65

Table (xvi) Significance of difference in the probability of mother's responding to infant smiles.

Group	Mean	t-Value	D.F.	p
Control - 3 months	0.492	1.34	58	0.185
Control - 6 months	0.333			
Experimental 3 months	0.912	1.37	51.02	0.177
Experimental 6 months	0.799		(separate variance)	

Table (xvii) Significance of difference in the probability of responding to infant smiles between 3 and 6 months.

Hypothesis 6 :

Mothers in the experimental group will respond more often to their infant's cries and grizzles within two time samples of its beginning.

This hypothesis was confirmed (Table (xviii)) with no trend in responsiveness over time being apparent (Figure 7).

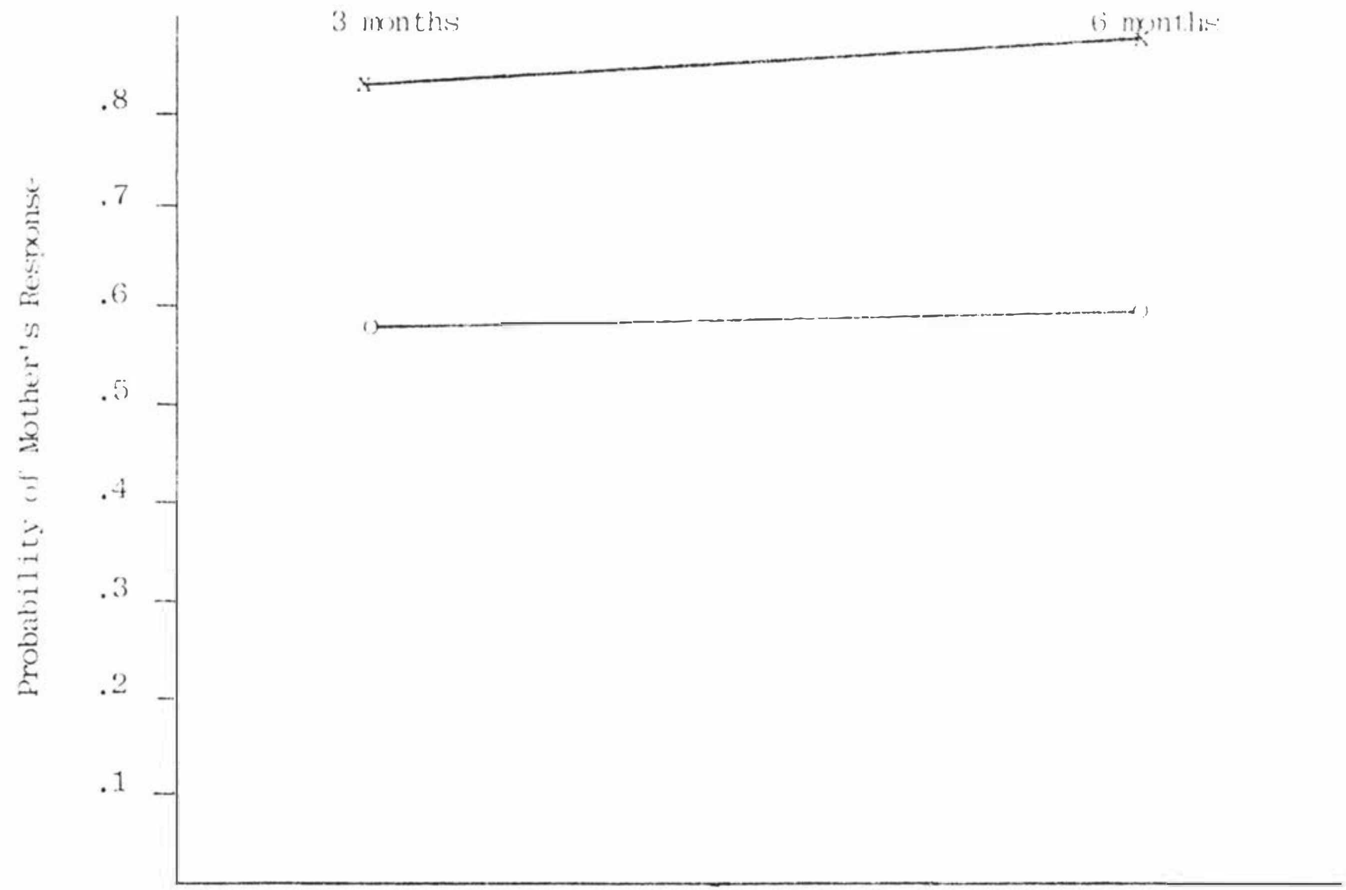


Figure 7: Probability of Mother's Response to Infant Cry/Grizzle Within Two Intervals.

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.570	-2.64	46	0.011	0.36	-0.34
Experimental	0.818				0.30	-1.79
Control - 6 months	0.582	-2.59	32	0.014	0.36	-0.30
Experimental	0.864				0.27	-2.27

Table (xviii) Significance of difference in the probability of mother's responding to their infant's cry/grizzle within 2 intervals.

Although not part of hypothesis 6 the number of infants crying or grizzling within each group, the total number of crying or grizzling intervals and the effectiveness of the mother's intervention (i.e., the probability of terminating crying within a specified number of intervals) was calculated.

There was no difference in the number of infants in each group who cried at 3 months (24 in each group) or at 6 months (Table (xix)).

	cry/grizzle	no cry/grizzle
Control	16	14
Experimental	18	12

$\chi^2 = .610$, df = 1, $p > 0.46$

Table (xix) Significance of difference in the number of infants crying/grizzling at 6 months.

The total number of intervals in which infants cried or grizzled did not differ between the two groups (Table (xx)).

The effectiveness of the mother's intervention was evaluated in two ways: First from the likelihood that if she responded to a cry or grizzle within two intervals of its occurrence the mother will be successful in terminating it within three time sample intervals of her responding (the criterion for termination of crying or grizzling was that at least three consecutive intervals with no crying/grizzling must have occurred), there being no significant difference between the two groups (Table (xxi)); and second from the probability of a mother terminating cries or grizzles within three intervals of her responding (again no significant difference was apparent between groups, see Table (xxii)).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	161.01	161.01	1.82	>0.05
Subjects	29	2729.58	94.12		
Groups x Subjects	29	2374.24	81.87		
Time	1	134.41	134.41	2.44	>0.05
Groups x Time	1	37.41	37.41	0.68	>0.05
Subjects x Time	29	1747.84	60.27		
Groups x Subjects x Time	29	1440.84	49.68		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	9.20	9.19	1.73
Experimental	5.77	7.37	1.86
Control - 6 months	5.97	8.36	1.25
Experimental	4.77	8.77	2.42

Table (xx) Significance of difference in the number of crying/grizzling intervals in each group.

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.556	-0.79	46	0.434	0.36	-0.34
Experimental - 3 months	0.643				0.40	-0.63
Control - 6 months	0.515	-0.41	32	0.684	0.41	-0.11
Experimental 6 months	0.571				0.38	-0.31

Table (xxi) Significance of difference in mother's terminating crying/grizzling within three intervals if responded within two intervals of its beginning.

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.482	-1.65	46	0.106	0.27	-0.85
Experimental - 3 months	0.638				0.38	-0.75
Control - 6 months	0.537	0.10	32	0.919	0.34	0.03
Experimental 6 months	0.524				0.39	0.02

Table (xxii) Significance of difference in mother's terminating crys/grizzles with three intervals of its beginning.

Hypothesis 7:

Mothers in the experimental group will touch their infants more often.

This hypothesis was not confirmed although there was a significant decrease in touching between three and six months. (See Table (xxiii) and Figure 8).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	326.700	326.700	3.37	>0.05
Subjects	29	3129.167	107.902		
Groups x Subjects	29	2493.300	85.976		
Time	1	1044.300	1044.300	20.88	<0.001
Groups x Time	1	56.033	56.033	1.12	>0.01
Subjects x Time	29	1331.700	45.920		
Groups x Subjects x Time	29	1567.967	54.067		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	12.07	10.32	0.94
Experimental	14.00	9.34	0.86
Control - 6 months	4.80	5.93	1.84
Experimental	9.47	8.06	0.97

Table (xxiii) Significance of difference in mother's touching of their infants.

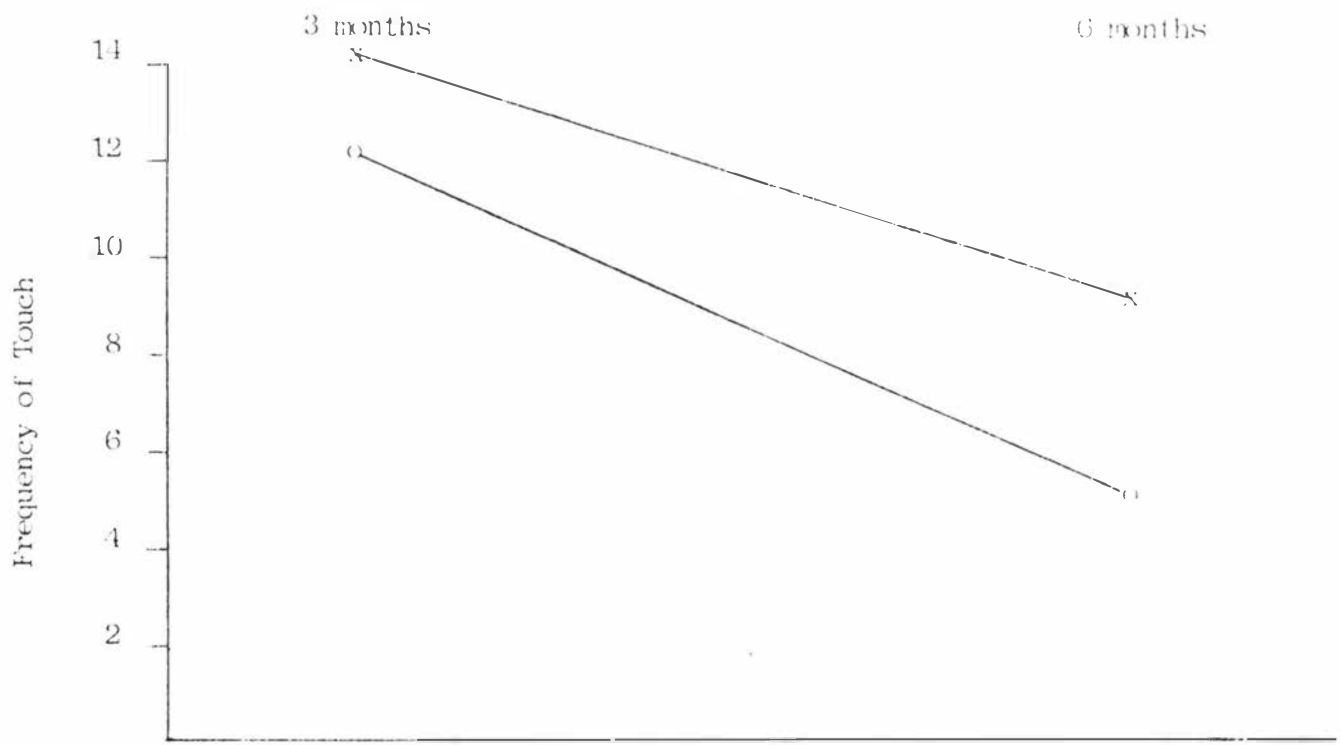


Figure 8: Frequency of Mother's Touching Their Infant.

Hypothesis 8 :

Infants in the experimental group will look at their mothers more often, the amount of looking being directly related to the mother's provision of her face. The first part of this hypothesis was confirmed (Table (xxiv) and Figure 9) with looking decreasing over time in the experimental group only.

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	19152.133	19152.133	61.10	<0.001
Subjects	29	9468.867	326.513		
Groups x Subjects	29	8705.867	300.202		
Time	1	12772.033	12772.033	51.41	<0.001
Groups x Time	1	3141.633	3141.633	12.64	<0.01
Subjects x Time	29	7001.967	241.447		
Groups x Subjects x Time	29	7409.367	255.495		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	15.93	23.42	-1.56
Experimental	51.43	22.90	0.25
Control - 6 months	5.53	6.11	1.34
Experimental	20.57	16.00	1.09

Table (xxiv) Significance of difference of infant's looking at mother.

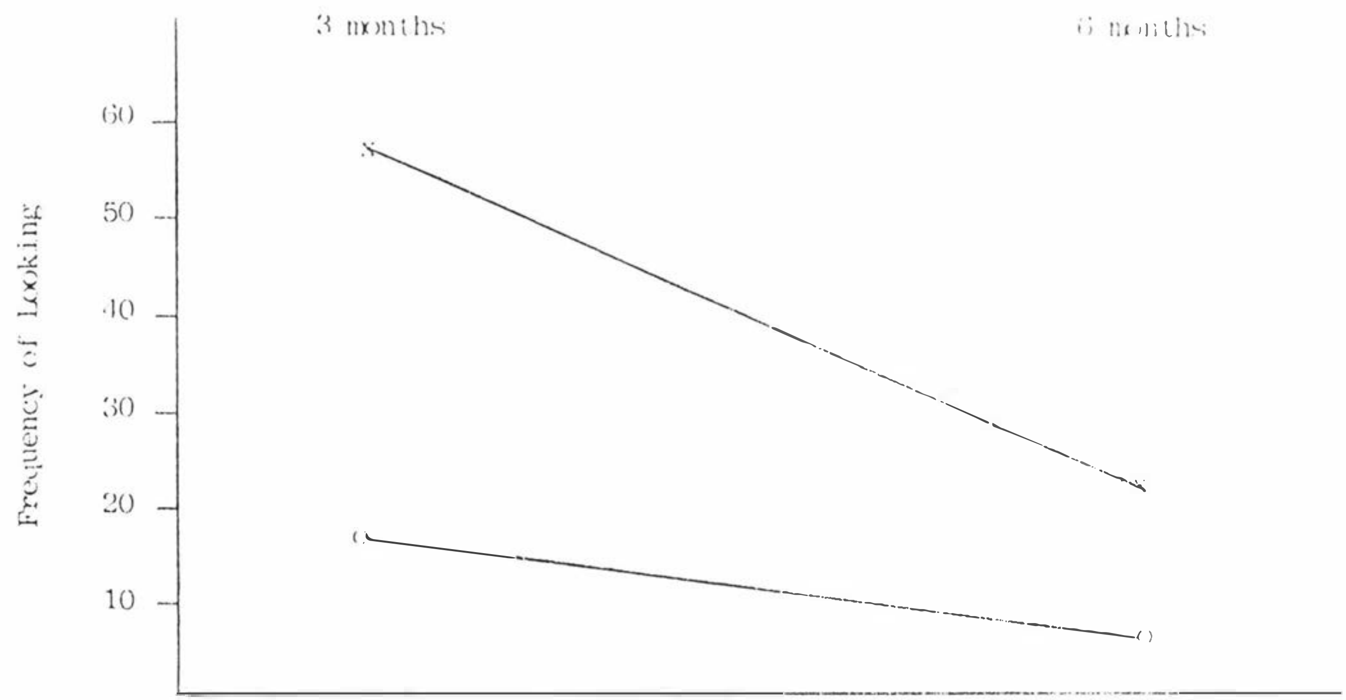


Figure 9: Frequency of Infant's Looking at Mother's Face.

To examine the second part of the hypothesis, i.e., that infant looking at the mother is directly related to the provision of her face, a multiple regression analysis of the infant's tendency to look at the mother's face with the absolute provision of her unresponsiveness face (i.e., not smiling or talking)and responsive face (smiling and talking) was undertaken. In order that two independent variables be obtained, "provision of face" was considered to have occurred only if a mother looked at her infant in an unsmiling, non-talking manner, while the "responsive face" variable consisted of the mothers looking with accompanying smiling and talking (as before "looking at" is defined as the mother's presentation of her face in such a manner that the infant is required to move his face no more than 45 degrees to reach a face to face orientation, i.e., the mother's face must be within the infant's visual field). As Table (xxvi) shows for the experimental group at both three and six months there is significant collinearity of the independent variables, however the multiple regression was carried out to see the pattern of multiple prediction. Table (xxv) indicates that except for the control group at 6 months it is mother's responsive face which contributes most to infant looking. Table (xxvi) confirms this result in every case except the control group at 6 months there being either a low or negative correlation between infant looking and mother's unresponsive face, while the correlation between responsive face and infant looking was positive.

Thus while the first part of the hypothesis was confirmed, a qualified version of the second was supported, infants in the experimental group looking at their mother's face more, this looking relating to the availability of the mother's responsive face.

CONTROL - 3 months

	Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
*	MLSV	0.330	0.109	0.109	0.561	0.413	4.435	<0.05
	MLK	0.376	0.142	0.033	0.169	0.199	1.032	>0.05
	Constant				1.689			

EXPERIMENTAL - 3 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
MLSV	0.714	0.509	0.509	0.966	0.809	18.711	<0.001
MLK	0.720	0.518	0.009	0.213	0.137	0.533	>0.05
Constant				7.595			

CONTROL-6 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
MLK	0.479	0.229	0.229	0.172	0.375	4.672	<0.05
MLSV	0.546	0.297	0.068	0.328	0.281	2.620	>o.05
Constant				-0.568			

EXPERIMENTAL - 6 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
MLSV	0.547	0.299	0.299	0.623	0.629	8.030	<0.01
MLK	0.553	0.306	0.007	0.105	0.119	0.290	>0.05
Constant				-0.728			

Table (xxv) Multiple regression of infant's tendency to look at mother with maternal "Provision of Face" and "Responsive Face".

continued ....

*   MLSV Mother looks at infant - smiles and vocalizes

MLK   Mother looks at infant - no smiling or talking.

<u>Table (xxv)</u> (continued)

CONTROL - 3 months

	MLSV	MLK	ILK
* MLSV	1.000	-0.417	0.330
MLK		1.000	0.027
ILK			1.000

EXPERIMENTAL - 3 months

	MLSV	MLK	ILK
MLSV	1.000	-0.701	0.714
MLK		1.000	-0.431
ILK			1.000

CONTROL - 6 months

	MLSV	MLK	ILK
MLSV	1.000	0.370	0.420
MLK		1.000	0.479
ILK			1.000

Table (XXVI) Intercorrelations between infant looking, maternal looking with responsive and non-responsive face.

* MLSV - mother looks at infant - smiles and talks.
MLK - mother looks at infant - no smiling or talking.
ILK - infant looks at mother.

continued ...

EXPERIMENTAL - 6 months

	MLSV	MLK	ILK
MLSV	1.000	-0.692	0.547
MLK		1.000	-0.316
ILK			1.000

Table (XXVI) (continued)

However while it is the responsiveness of the mother's face and her voice which are the important variables in determining infant orientation, it can not be stated whether continuing orientation was due to the movement and sound from the mother's face being contingent on infant orientation thus increasing the frequency of such orientation, or whether it is due to the stimulus qualities of the face and voice. Certainly some studies have indicated that a non-moving face fails to attract attention e.g., Brazelton et al. (1975), but obviously if an infant is looking at a moving, talking face then movement and sound will be occurring contingent on infant looking. Thus it is probably not possible to isolate stimulus dimensions from contingency as determinants of continuing infant orientation.

Hypothesis 9:

Infants in the experimental group will listen to their mother's voice more often.

This hypothesis could not be investigated directly, instead it was tested by intercorrelating mother's vocalizing and the infant's tendency to orientate towards her. Table (XXVII) shows that there was a significant positive relationship between a mother's vocalizing and her infant's orientation towards her, i.e., mothers who vocalized more had infants who orientated towards them more often. Thus these infants are considered to have at least potentially received more auditory stimulation.

Group	Pearson R	Significance
Control - 3 months	0.18	0.17
Experimental	0.43	0.001
Control - 6 months	0.40	0.001
Experimental	0.59	0.001

Table (XXVII) Relationship between maternal vocalization and infant looking.

Hypothesis 10:

Infants in the experimental group will vocalize more often.

This hypothesis was confirmed with a significant group by time interaction being noted (Table (XXVIII) Figure 10).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	1020.833	1020.833	17.82	<0.001
Subjects	29	1527.367	52.668		
Group x Subjects	29	1793.167	61.833		
Time	1	192.533	192.533	3.39	>0.05
Groups x Time	1	563.333	563.333	9.92	<0.01
Subjects x Time	29	1499.467	51.706		
Groups x Subjects x Time	29	1795.667	61.919		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	6.77	7.89	1.55
Experimental	8.27	6.98	1.99
Control - 6 months	4.97	4.88	1.27
Experimental	15.13	9.66	1.26

Table (XXVIII) Significance of difference in infant vocalizing to mother.

Figure 10 indicates that infant vocalizations differentiated between the two groups at 6 months only.

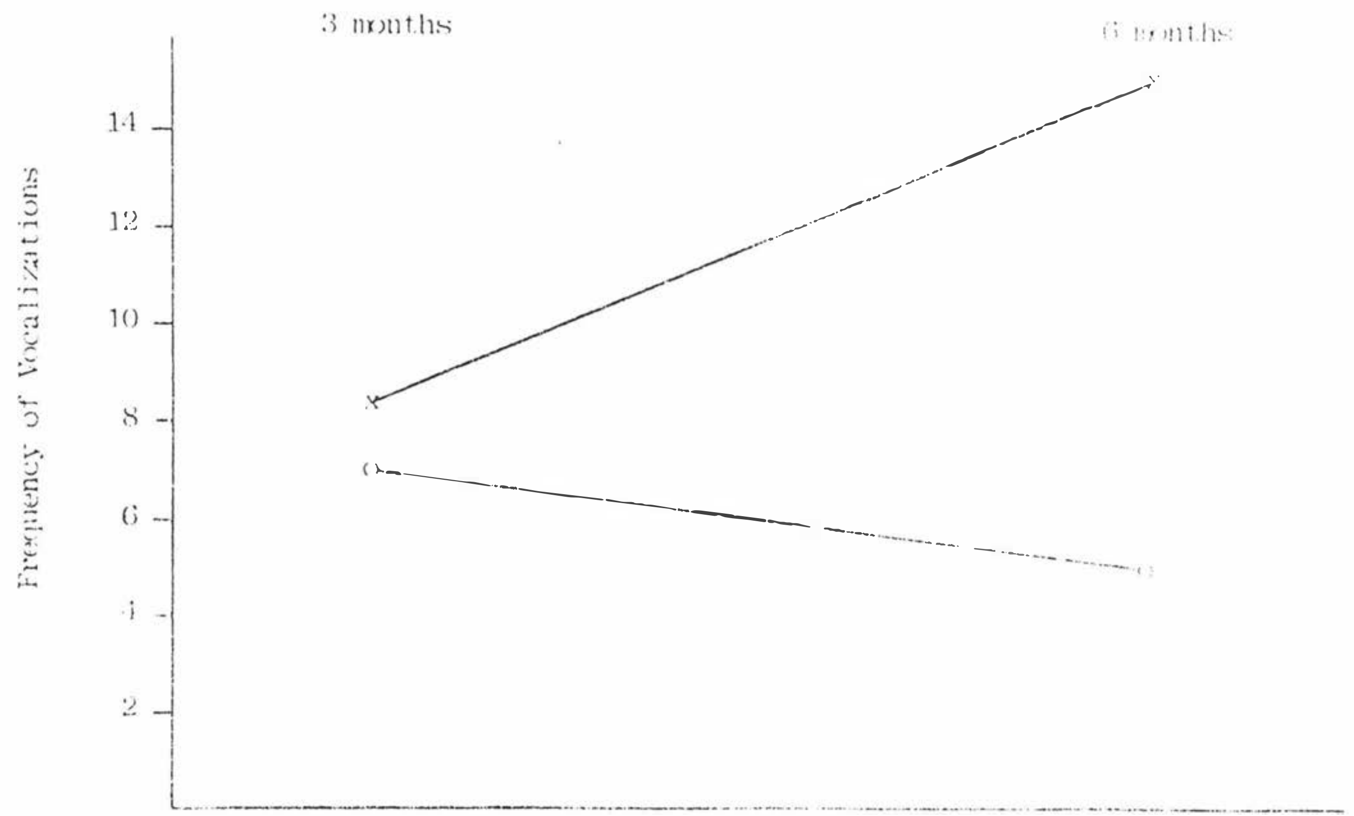


Figure 10: Frequency of Infant Vocalization

Again, it would be expected that infant behaviour would be dependent not only on the provision of opportunity to emit a behaviour but also on the mother's response to it. Table (XXIX) shows a significant relationship between infant vocalizations and mother's responsiveness.

Group	Pearson R	Significance
Control - 3 months	0.448	0.006
Experimental	0.575	0.001
control - 6 months	0.333	0.037
Experimental	0.500	0.002

Table (XXIX) Relationship between infant vocalizing and maternal responsiveness.

Hypothesis 11:

Infants in the experimental group will touch their mothers more often.

Because of infrequent touching an analysis of variance was inappropriate. As an alternative a chi square analysis was carried out on the number of infants in each group who touched their mother at least once during the session. Table (XXX) shows that there was no difference in touching at 3 months, while there was at 6 months (Table (XXXI)).

	Touch	Do not touch
Control	7	23
Experimental	4	26

$\chi^2 = 0.45$, df = 1, p=0.50

Table (XXX) Significance of difference in the number of infants touching mother when aged 3 months.

	Touch	Do not touch
Control	5	25
Experimental	15	15

$\chi^2 = 9.075$, df = 1, p<0.001

Table (XXXI) Significance of difference in the number of infants touching mother when aged 6 months.

Thus there was some degree of support for the hypothesis.

Hypothesis 12:

Mothers in the experimental group will present toys for their infant's inspection more often, they will attempt to attract their infant's attention by demonstrating the toy and will show more interest in the infant's reaction (as shown by looking at his face).

Experimental mothers did in fact present toys more often (Table (XXXII) but at 6 months only. (Figure 11).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	1960.208	1960.208	5.27	<0.05
Subjects	29	12898.042	444.761		
Groups x Subjects	29	8665.041	298.795		
Time	1	3234.408	3234.408	9.49	<0.01
Groups x Time	1	2367.408	2367.408	6.94	<0.05
Subjects x Time	29	7713.842	265.995		
Groups x Subjects x Time	29	12044.842	415.339		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	30.67	18.73	0.83
Experimental	29.87	19.22	0.09
Control - 6 months	32.17	15.46	0.89
Experimental	49.13	21.59	0.64

Table (XXXII) Significance of difference in mother's presenting of toys.

The tendency of mother's to attract their infant's attention to toys by demonstrating, shaking the toy,

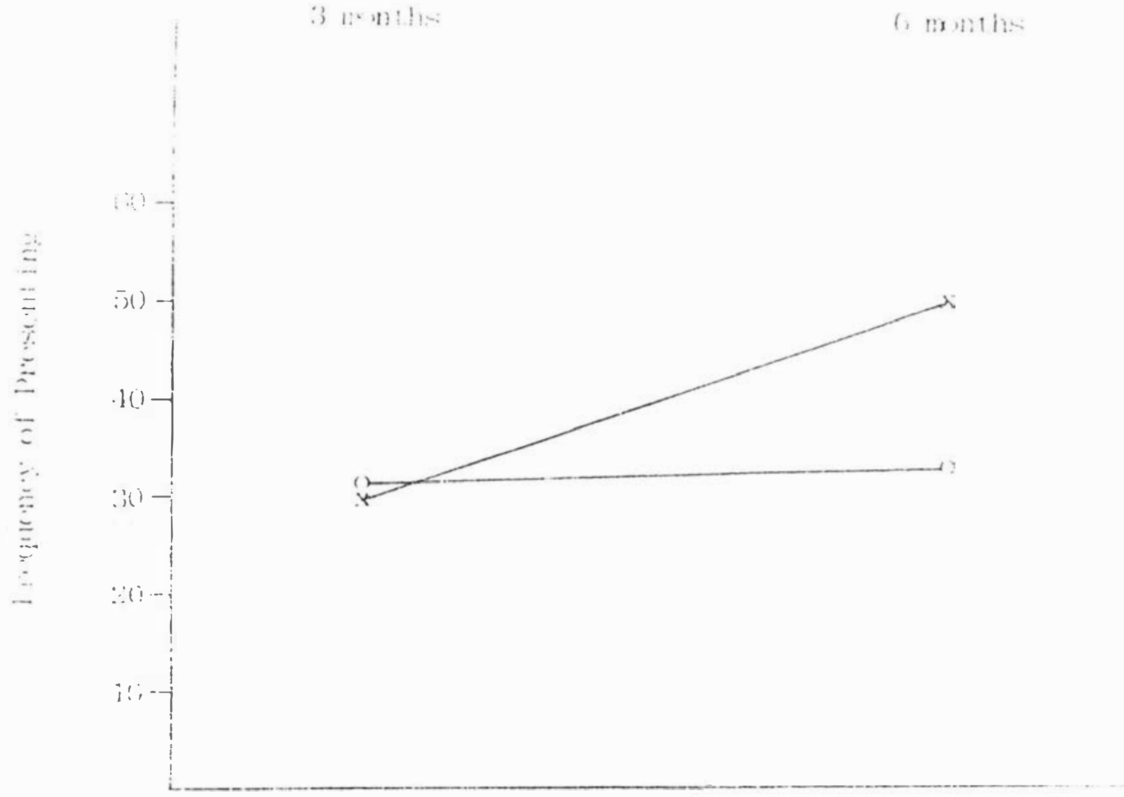


Figure 11: Frequency With Which Mothers Present Toys.

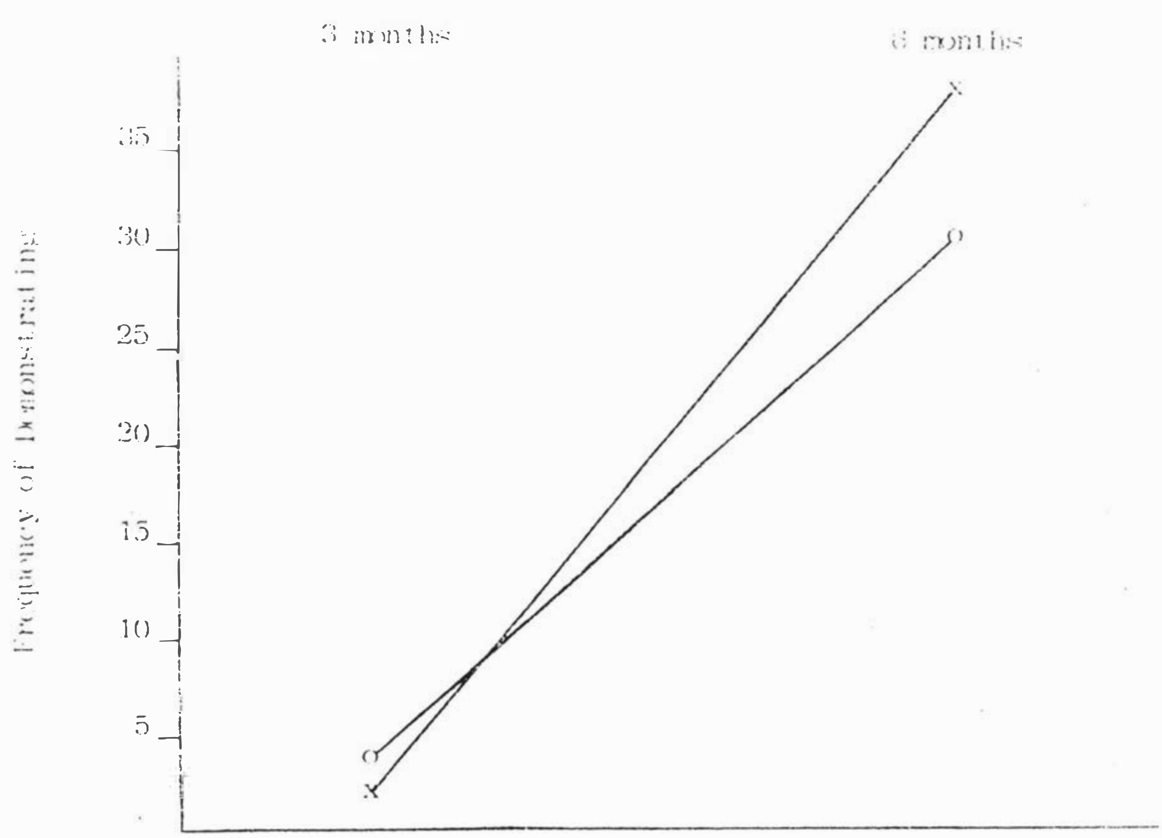


Figure 12: Frequency of Mother's Demonstrating of Toys.

but underwent an increase in both groups between 3 and 6 months (Figure 12).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	224.13	224.13	0.92	>0.05
Subjects	29	6590.87	227.27		
Groups x Subjects	29	7428.37	256.15		
Time	1	29830.53	29830.53	121.56	<0.001
Groups x Time	1	456.30	456.30	1.84	>0.05
Subjects x Time	29	7016.97	241.96		
Groups x Subjects x Time	29	7215.20	248.80		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	17.03	12.35	1.60
Experimental	19.73	14.28	0.54
Control - 6 months	20.60	13.29	1.88
Experimental	35.97	17.14	0.35

Table (XXXIII) Significance of difference between mother's demonstrating toys to infant.

A mother's watching of her infant's face as she presented toys differentiated the groups at 6 months only (Table (XXXIV), Figure 13).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	2511.68	2511.68	9.47	<0.01
Subjects	29	8692.34	299.74		
Groups x Subjects	29	6688.08	230.62		
Time	1	1.41	1.41	0.01	>0.05
Group x Time	1	2296.88	2296.88	11.36	<0.01
Subjects x Time	29	5656.34	195.04		
Group x Subjects x Time	29	6050.88	208.65		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	23.13	15.89	0.93
Experimental	23.53	16.41	0.42
Control - 6 months	14.60	8.48	0.41
Experimental	32.50	18.45	0.44

Table (XXXIV) Significance of difference in mother's watching infant's face as presents toys.

Hypothesis 13 :

Infants in the experimental group will respond to the mother's presentation of toys more often.

This hypothesis was supported at both 3 and 6 months (Figure 14, Table (XXXV)).

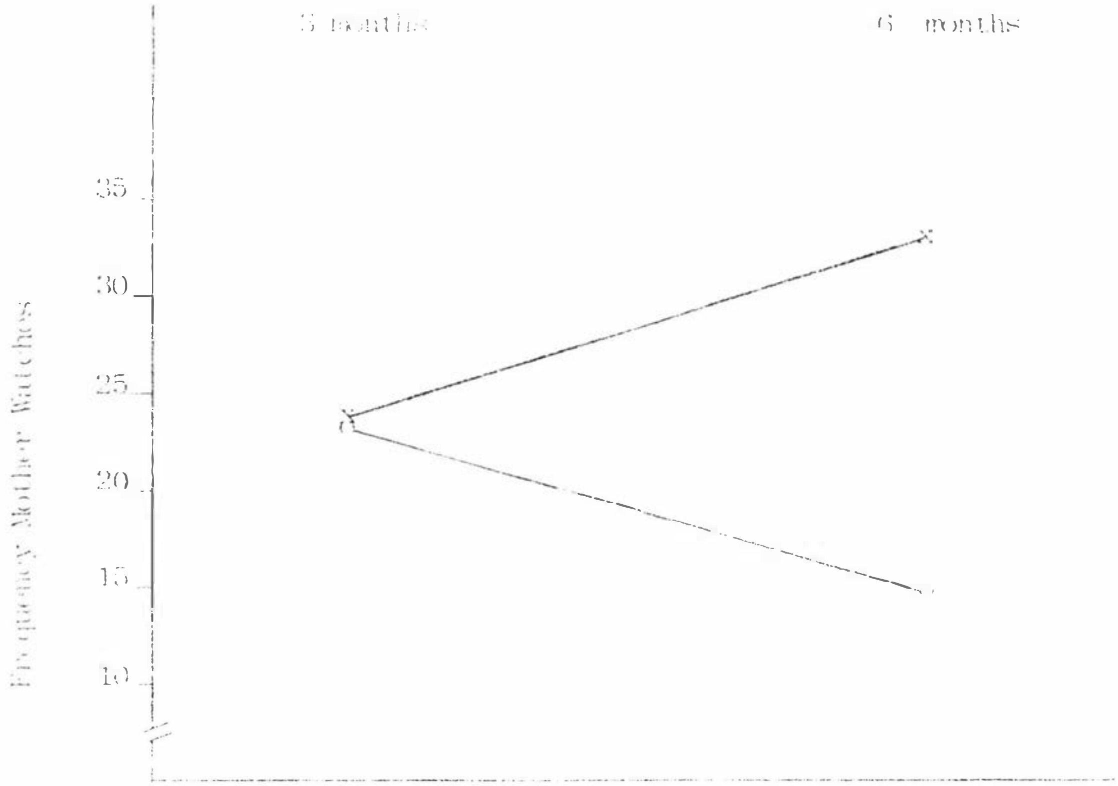


Figure 13: Frequency of Mother's Watching Infant's Face as Present Toy.

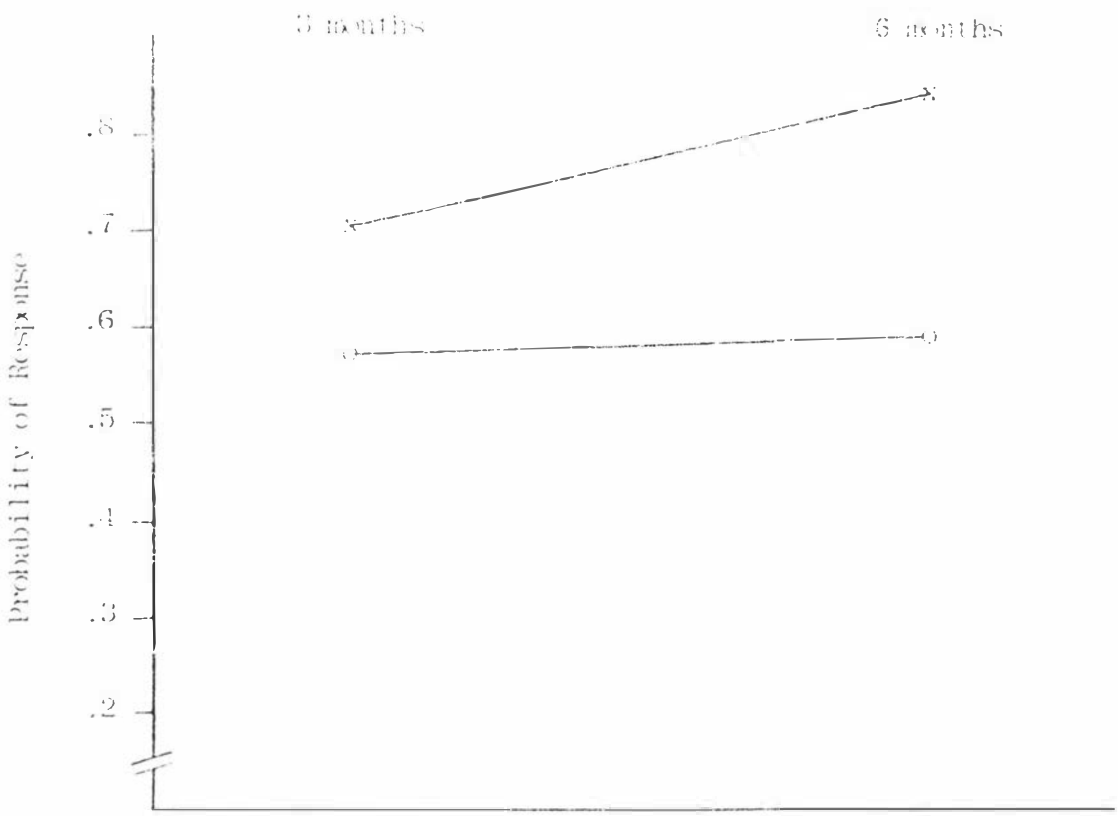


Figure 14: Probability of Infant's Responding to Presentation of Toys.

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.567	-2.18	58	0.034	0.27	-.27
Experimental - 3 months	0.715				0.26	-1.33
Control - 6 months	0.599	-6.04	58	<0.001	0.21	-.86
Experimental - 6 months	0.854				0.09	-.39

Table (XXXV) Significance of difference of probability of infant's response to toy.

However it was interesting that the manipulation of toys by infants was not different (Table (XXXVI)) suggesting that control infants played with toys independently, toys being used less often as a vehicle for interaction. As would be expected, playing with toys increased markedly when infants were aged 6 months.

The following set of hypotheses relate to reciprocal interaction (as defined in the Procedure) between mother and infant, this variable being considered to be an estimate of the degree to which the behaviour of mother and infant are complementory to each other.

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	224.13	224.13	.92	>0.05
Subjects	29	6590.87	227.27		
Groups x Subjects	29	7428.37	256.15		
Time	1	29830.53	29830.53	121.57	<0.001
Groups x Time	1	456.30	456.30	1.85	>0.05
Subjects x Time	29	7016.97	241.96		
Groups x Subjects x Time	29	7215.20	248.80		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	4.10	6.98	2.19
Experimental	2.93	3.63	1.24
Control - 6 months	31.73	20.48	0.76
Experimental	38.37	22.20	0.73

Table (XXXVI) Significance of difference of manipulation of toys by infants.

Hypothesis 14:

There will be more reciprocal interaction between mothers and infants of the experimental group.

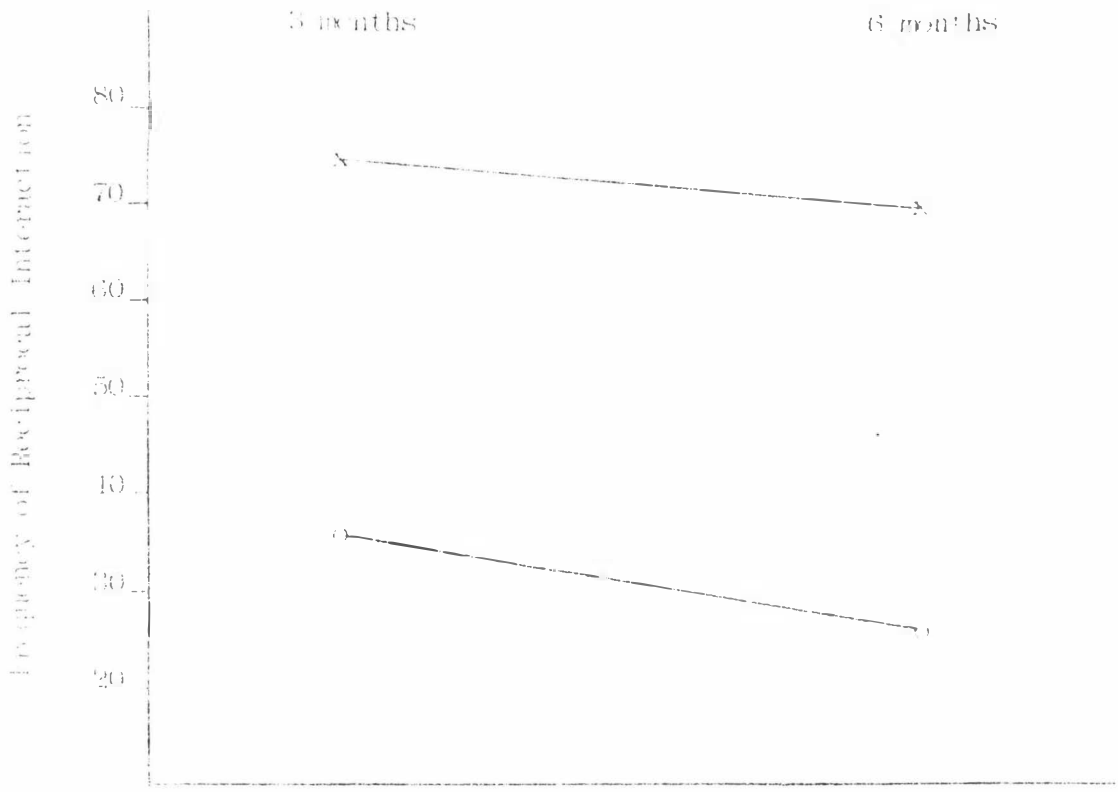
Analysis clearly supported this hypothesis (Table (XXXVII), Figure 15).

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	51129.41	51129.41	130.59	<0.001
Subjects	29	10024.18	345.66		
Groups x Subjects	29	12683.84	437.37		
Time	1	1635.41	1635.41	6.98	<0.05
Groups x Time	1	31.01	31.01	0.13	>0.05
Subjects x Time	29	6335.84	219.17		
Groups x Subjects x Time	29	7236.24	249.53		

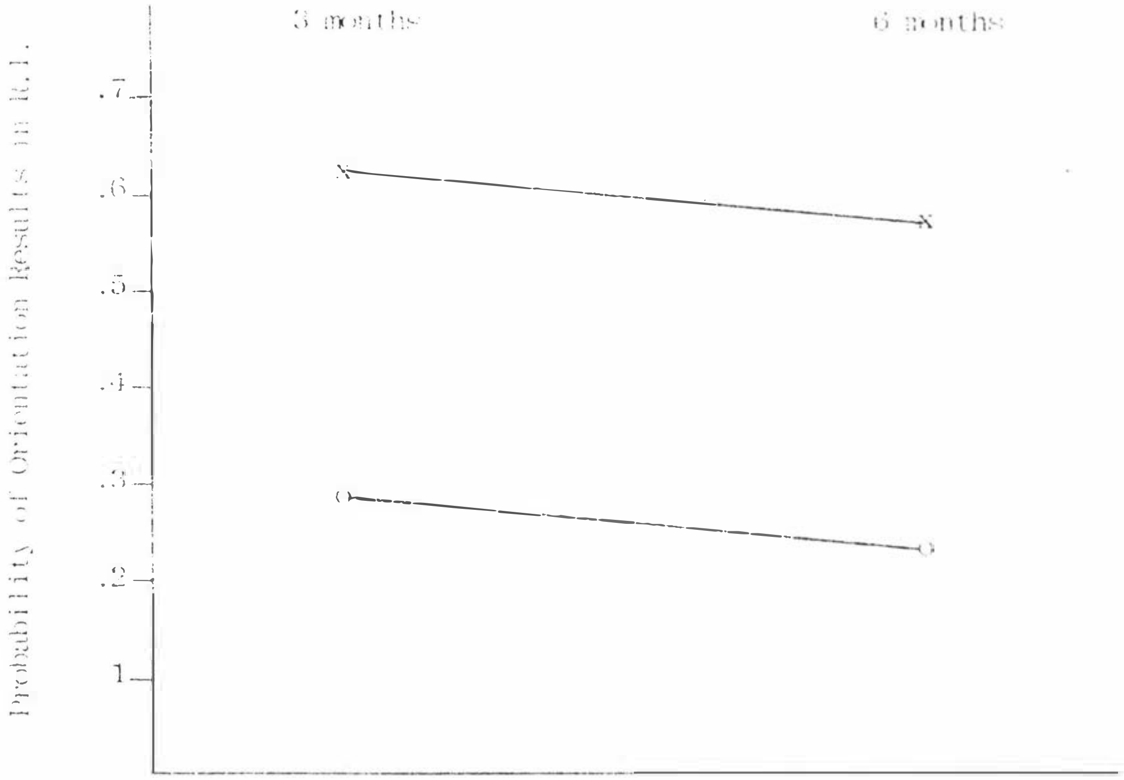
Group	Mean	Std.Dev.	Skewness
Control - 3 months	35.03	22.64	0.52
Experimental	75.30	16.18	-0.08
Control - 6 months	26.63	13.28	0.68
Experimental	68.93	17.34	-0.45

Table (XXXVII) Significance of difference in reciprocal interaction.

The probability that a mother's orientation to her infant (looking, talking, touching or presentation of toys) will result in reciprocal interaction was also higher in the experimental group (Table (XXXVIII), Figure 16).



<u>Figure 15</u>: Frequency of Reciprocal Interaction.



<u>Figure 16</u>: Probability That Mother's Orientation to Her Infant Will Result in Reciprocal Interaction.

Group	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Control - 3 months	0.293	-7.93	58	<0.001	0.18	0.52
Experimental - 3 months	0.629				0.14	-.09
Control - 6 months	0.222	-10.28	58	<0.001	0.11	0.67
Experimental - 6 months	0.573				0.15	0.52

Table (XXXVIII) Significance of difference in probability that mother's orientation to infant will result in reciprocal interaction.

Hypothesis 15:

There will be fewer intervals until the experimental group reaches a steady state of reciprocal interaction lasting for at least six consecutive intervals.

To investigate this hypothesis reciprocal interaction data was categorised according to the number of mother-infant dyads in each group in which six consecutive reciprocal interaction intervals was established within twenty intervals of the observation periods beginning, and those in which it was established after twenty intervals. Analysis unequivocally supported this hypothesis. (Tables (XXXIX), (XL), Figure 17).

	20 Intervals or fewer	More than 20
Control	6	24
Experimental	26	4

$\chi^2 = 29.53$, df = 1, $p < 0.001$

Table (XXXIX) Significance of difference in the reaching of a state of at least 6 consecutive reciprocal interactions prior to the 20th interval (3 months).

---

	20 Intervals or fewer	More than 20
Control	2	28
Experimental	22	8

$\chi^2 = 30.63$, df = 1, $p < 0.001$

Table (XL) Significance of difference in the reaching of a state of at least 6 consecutive reciprocal interactions prior to the 20th interval (6 months).

Hypothesis 16 :

Mothers and infants of the experimental group will be more likely to be engaging in reciprocal interaction during the last twenty intervals (3 minutes) of the observation session.

Confirmation was again unequivocal. (Table (XLI),

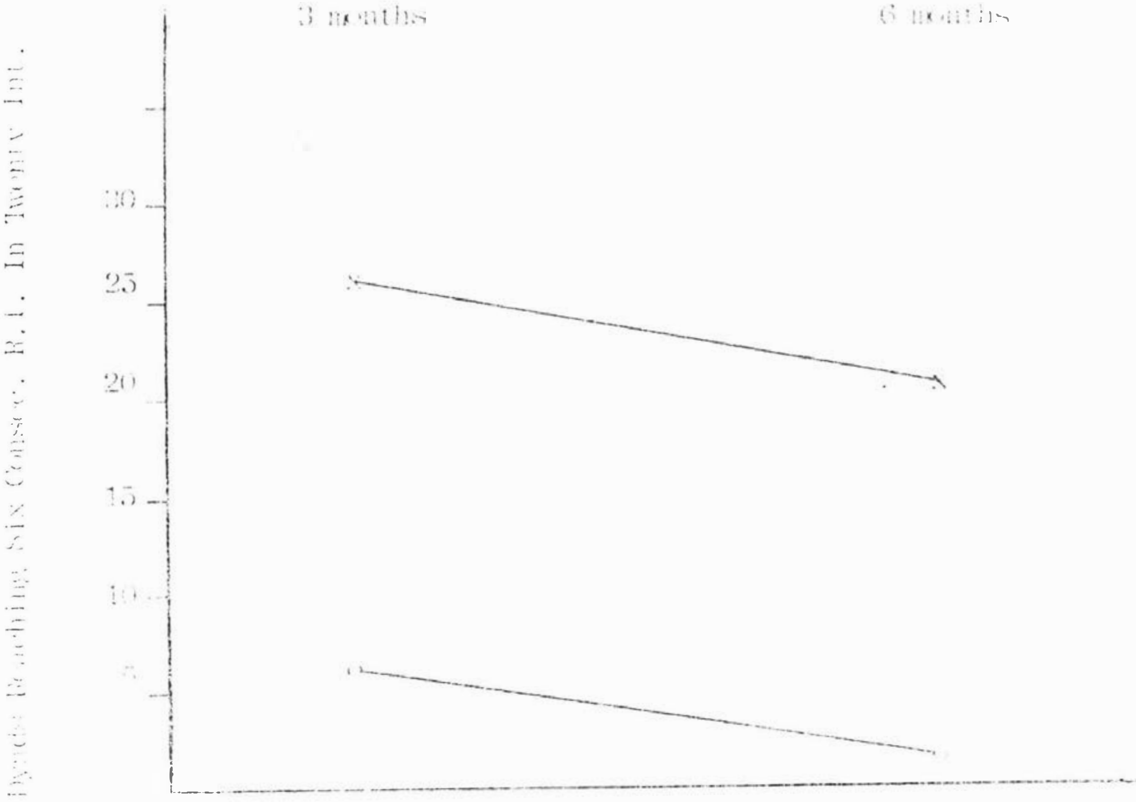


Figure 17: Mother-Infant Dyads Reaching Six Consecutive Reciprocal Interactions Within Twenty Intervals.

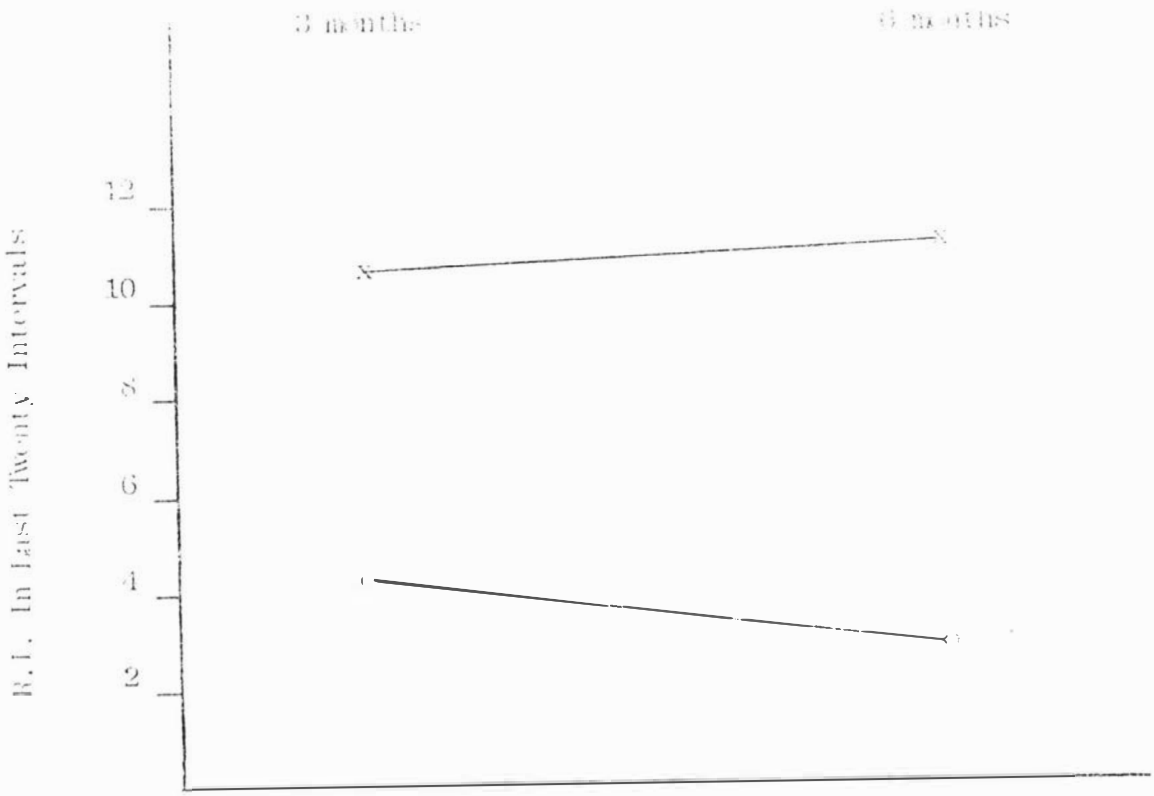


Figure 18: Frequency of Reciprocal Interaction in Last Twenty Intervals.

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	1642.80	1642.80	58.08	<0.001
Subjects	29	710.70	24.51		
Groups x Subjects	29	920.70	32.06		
Time	1	0.83	0.83	0.04	>0.05
Groups x Time	1	32.03	32.03		
Subjects x Time	29	834.67	28.78	1.18	>0.05
Groups x Subjects x Time	29	728.47	25.12		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	4.10	5.74	1.44
Experimental	10.46	5.25	0.14
Control - 6 months	2.90	4.03	2.08
Experimental	11.33	5.80	-0.27

Table (XLI) Significance of difference of reciprocal Interaction during the last 20 intervals (3 minutes).

It was also noted that it was the mother rather than the infant who tended to initiate reciprocal interaction (see Table (XLII) while the infant was more likely to terminate the exchange (see Table (XLIII), a situation similar to that described by Stern (1971,

1974) in which mothers during face to face interaction were observed to provide ongoing stimulation but to give the infant control over its duration.

Control - 3 months	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Prob. Mother initiates	0.516	7.66	29	<0.00	0.24	-0.101
Prob. Infant initiates	0.087				0.12	1.242
Experimental - 3 months						
Prob. Mother initiates	0.597	10.79	29	<0.001	0.20	-0.717
Prob. Infant initiates	0.073				0.11	1.85
Control - 6 months						
Prob. Mother initiates	0.404	8.00	29	<0.001	0.19	0.77
Prob. Infant initiates	0.074				0.08	0.88
Experimental - 6 months						
Prob. Mother initiates	0.456	9.62	29	<0.001	0.19	0.39
Prob. Infant initiates	0.080				0.07	0.34

Table (XLII) Probability of infant's and mother's initiating reciprocal interaction.

Control - 3 months	Mean	t-Value	D.F.	p	Std.Dev.	Skewness
Prob. Mother terminates	0.176	3.22	29	0.003	0.17	0.74
Prob. Infant terminates	0.334				0.17	0.45
Experimental - 3 months						
Prob. Mother terminates	0.205	4.13	29	<0.001	0.18	0.99
Prob. Infant terminates	0.434				0.17	0.05
Control - 6 months						
Prob. Mother terminates	0.167	2.40	29	0.023	0.13	1.49
Prob. Infant terminates	0.257				0.16	0.29
Experimental - 6 months						
Prob. Mother terminates	0.182	3.40	29	0.002	0.15	0.88
Prob. Infant terminates	0.327				0.16	0.44

Table (XLIII) Probability of mother's and infant's terminating reciprocal interation.

These two tables also indicate that there are no significant groups differances in the mother's or infant's initiating or terminating reciprocal interaction.

The next set of hypotheses refer to the infant's reaction to the stranger.

Hypothesis 17:

Infants in the experimental group will initially look at the stranger more often (i.e., when aged 3 months) when seated either on the mother's or stranger's knee, but the looking, particularly from the strangers knee, will undergo a significant decrease when the infant is aged 6 months.

Experimental infants certainly looked at the stranger more often from their mother's knee (Table (XLIV)) with little change over time occurring, (Figure 19) and while these infants when aged 3 months looked at the stranger when seated on his knee almost as often as when seated on their mother's knee, at 6 months this underwent a marked decrease until it was only slightly more than the control group, the control infants' looking at the stranger while on his knee failing to change significantly from 3 to 6 months (Table (XLV), Figure 20).

The relationship between maternal behaviour and the infant's tendency to look at the stranger while on his knee was investigated. To do this a composite measure of a mother's provision of her face and voice was obtained (an additive measure of maternal looking at the infant within the infant's visual field i.e., no more than 45 degrees from the infant's face, and maternal vocalizing, both being given equal weight) and inter-correlated with the infant's looking at the stranger

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	396.03	396.03	16.23	<0.001
Subjects	29	861.80	29.72		
Groups x Subjects	29	553.47	19.09		
Time	1	8.53	8.53	0.42	>0.05
Groups x Time	1	4.80	4.80	0.24	>0.05
Subjects x Time	29	713.97	24.62		
Groups x Subjects x Time	29	454.70	15.68		

Group	Mean	Std. Dev.	Skewness
Control - 3 months	8.47	4.52	0.25
Experimental	11.70	4.47	-0.38
Control - 6 months	8.53	5.19	0.09
Experimental	12.63	4.84	-1.09

Table (XLIV) Significance of difference of infant's looking at the stranger from mother's knee.

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	216.01	216.01	7.84	<0.01
Subjects	29	1034.24	35.66		
Groups x Subjects	29	560.24	19.32		
Time	1	205.41	205.41	8.44	<0.01
Groups x Time	1	297.68	297.68	12.24	<0.01
Subjects x Time	29	587.84	20.27		
Groups x Subjects x Time	29	820.58	28.29		

Groups	Mean	Std.Dev.	Skewness
Control - 3 months	4.63	4.52	0.25
Experimental	10.47	5.69	-0.38
Control - 6 months	4.90	3.59	0.55
Experimental	5.26	5.97	0.93

Table (XLV) Significance of difference of infant's looking at the stranger from stranger's knee.

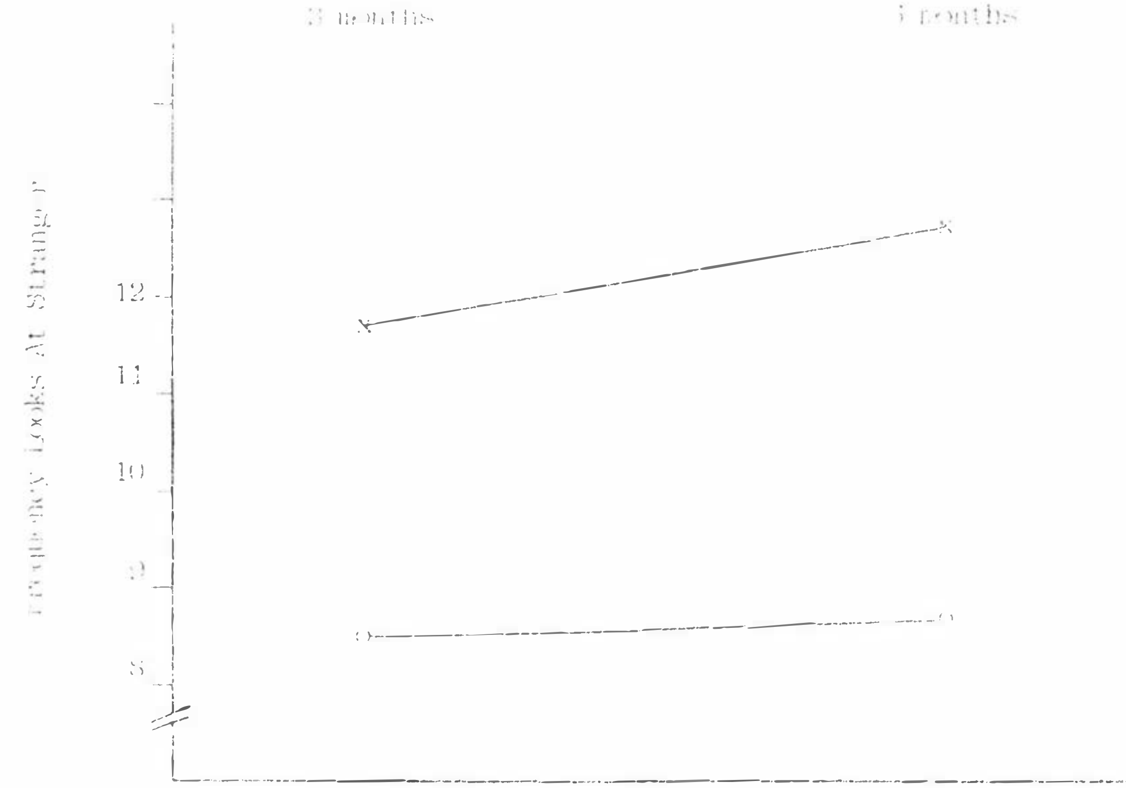


Figure 19: Frequency Infant Looks at Stranger From Mother's Knee.

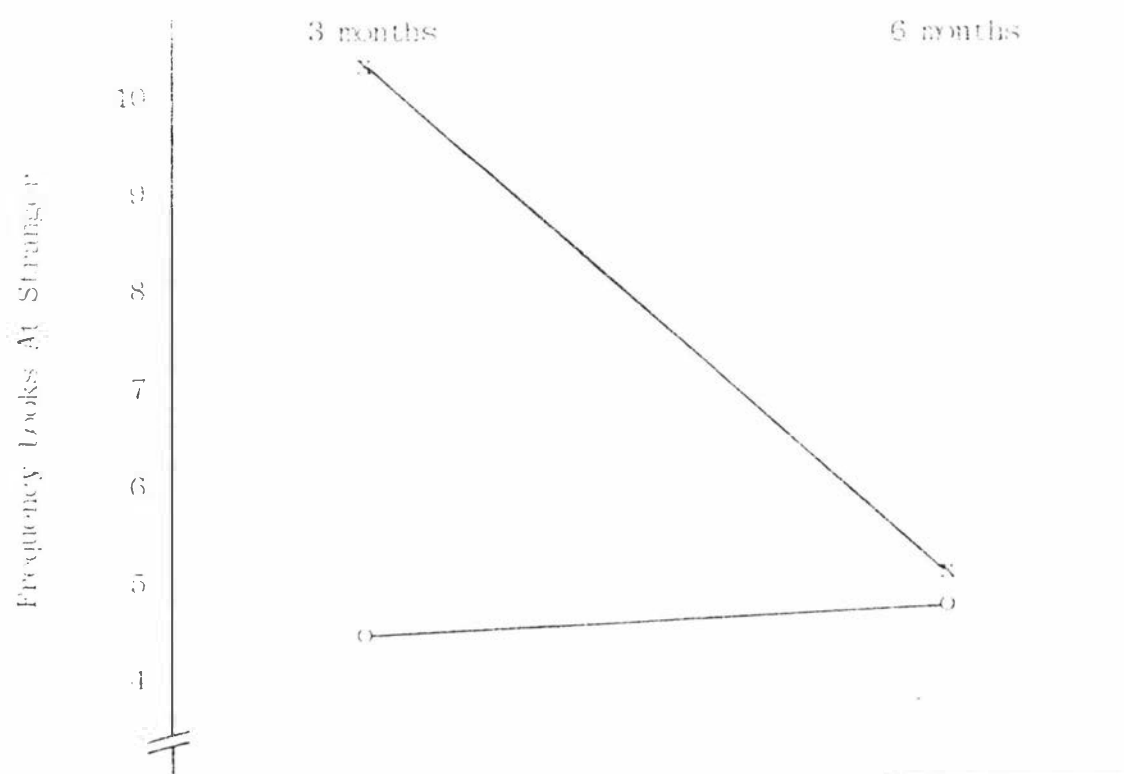


Figure 20: Frequency Infant Looks at Stranger From Stranger's Knee.

(Table (XLVI)). A composite measure was used rather than individual behaviours, Ainsworth et al. (1971), Sroufe and Waters (1977) and Waters (1978) having shown that improved reliability of measurement results from the use of categories of maternal and infant behaviours compared with using individual behaviours. The composite measure of maternal looking at and vocalizing to her infant was considered to represent a measure of maternal orientation to the infant.

When aged 3 and 6 months it can be seen that for the experimental group only, there was a positive, significant correlation between infant observing of the stranger and maternal looking and vocalizing. It was also noteworthy that for this group the relationship between infant looking at the mother and looking at the stranger was not significant ($r = .18$, $p = .17$) suggesting that looking at the stranger was not merely a generalisation of response from mother to stranger. In the case of the control group the relationship between maternal stimulation via face and voice and infant observing of the stranger failed to reach significance, a positive relationship between infant observing the mother and the stranger ($r = .39$, $p = 0.02$) suggesting that infant observing of the stranger's face was more likely to be a generalization of the infant's looking at the mother's face.

It is also noteworthy that infants in the experimental group when aged 3 months looked at the stranger's face on average more than twice as often as infants in the control group indicating the efficency of increased provision of mother's face and voice in promoting infant sociability.

While at 6 months maternal stimulation (with face and voice) also contributed to sociability, when the scatterplot of maternal stimulation and infant looking at the stranger was considered, it appeared that two trends may be present (Figure 21). In the lower middle portion of the graph is a cluster of infants who received relatively high rates of maternal stimulation but looked at the stranger infrequently, while there is another sub-group of nine individuals who also received high rates of stimulation but looked at the stranger more frequently. Separate analysis of these two sub-groups (Table (XLVII)) revealed that for the latter sub-group of nine subjects (sub-group 2 Table (XLVII)) there was a positive relationship between maternal stimulation and infant looking at the stranger and for the remainder (sub-group 1 Table (XLVII)) it was negative. However both trends were not significant. Nonetheless Figure 21 shows that for this latter sub-group (sub-group 1) there is a relatively tight distribution of infants for whom moderate values of maternal stimulation were associated with low rates of viewing of the stranger's face. Thus for this sub-group of infants there is a relationship between relatively moderate levels of maternal stimulation and low rates of infant observing the stranger, while all of the infants for whom there was a positive relationship between stimulation and looking (Group 2 Table (XLVII)) had received moderate to

		3 months		6 months	
		Control	Experimental	Control	Experimental
	*	MLKVK	MLKVK	MLKVK	MLKVK
+	LKSt	0.09	0.32	-.24	0.36
	p	0.31	0.04	0.09	0.03

Table (XLVI) Significance of relationship between mother's provision of face and voice and infant looking at stranger's face.

* Mother looking at and talking to infant.

\+ Infant looking at stranger.

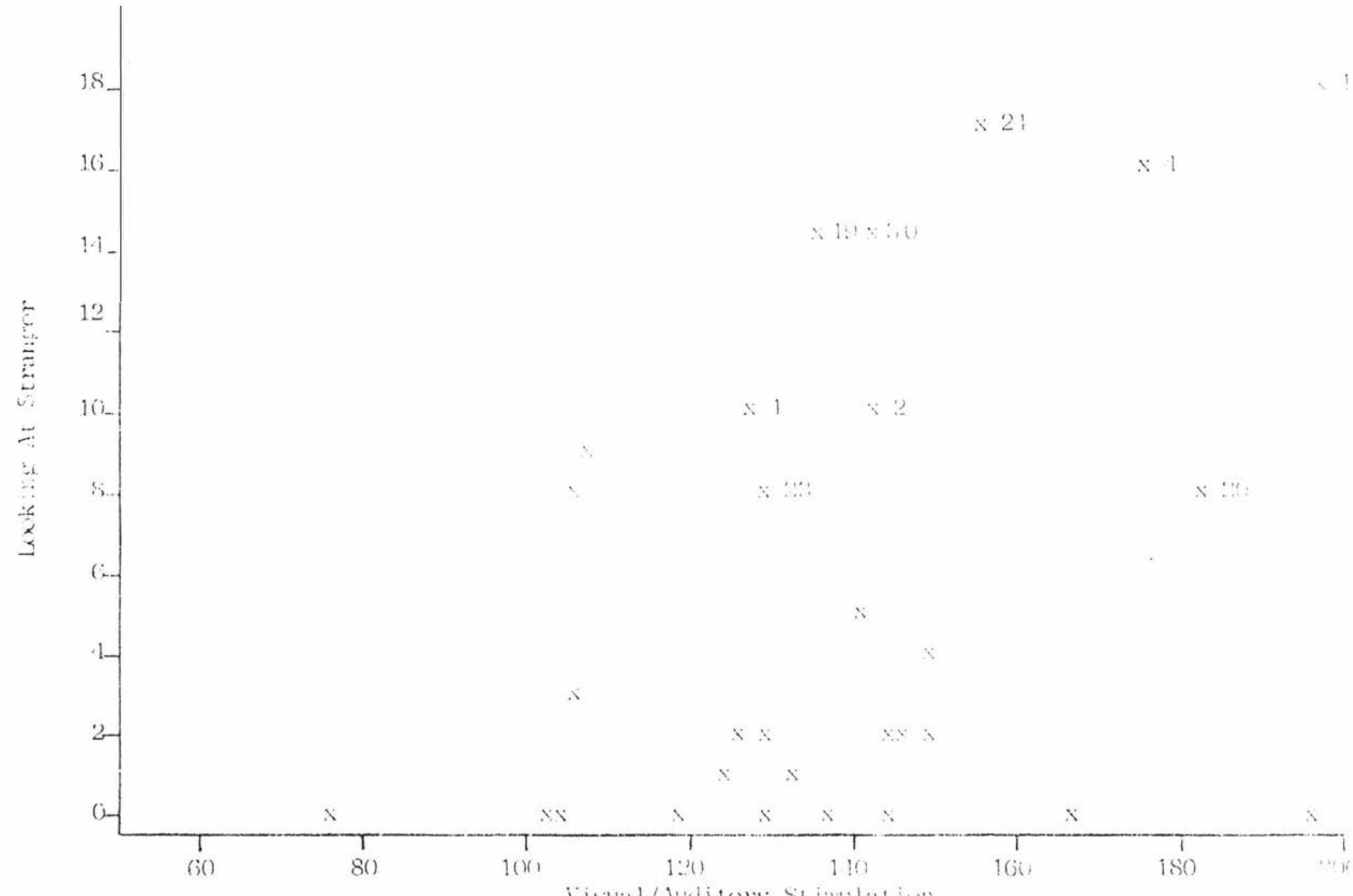


Figure 21: Scatterplot of Mother's Provision of Face and Voice and Infant Looking At The Stranger (Experimental Group - 6 Months).

high rates of stimulation (Figure 21).

	Sub-Group 1 (21 infants)	Sub-Group 2 (9 infants)
r	-0.22	0.42
p	0.17	0.13

Table (XLVII) Correlation between maternal provision of visual and auditory stimulation and infant looking at the stranger at 6 months.

For both the experimental and control groups the correlation between the infant's looking at the mother and looking at the stranger was not significant (control: $r= .02$, $p>0.05$; experimental: $r= .22$, $p>0.05$) again indicating for both groups that the tendency of the infant to look at a stranger was not merely generalization of the tendency to look at the mother, rather it varied as a function of a mother's provision of visual and auditory stimuli.

Hypothesis 18:

Infants in the experimental group will show greater fear of the stranger when aged 6 months particularly when on his knee.

While on the mother's knee crying and grizzling by infants when the stranger came near was infrequent (an average occurrence of less than one interval) and did not differentiate the two groups (Table (XLVIII).

Source of Variation	D.F.	Sum of Square	Mean Square	F	p
Group	1	5.21	5.21	1.16	>0.05
Subjects	29	125.08	4.31		
Groups x Subjects	29	132.54	4.57		
Time	1	0.68	0.68	0.20	>0.05
Groups x Time	1	0.21	0.21	0.04	>0.05
Subjects x Time	29	137.08	0.73		
Groups x Subjects x Time	29	137.54	0.74		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	0.23	1.10	5.17
Experimental	0.57	3.10	5.38
Control - 6 months	0.00	0.00	0.00
Experimental	0.50	2.74	5.38

Table (XLVIII) Significance of difference in infant crying at stranger on mother's knee.

When on the stranger's knee however, crying and grizzling occurred significantly more often in the experimental group when infants were aged 6 months (Table (XLIX), Figure 22).

Source of Variation	D.F.	Sum of Square	Mean Square	F	p
Groups	1	246.53	246.53	8.04	<0.01
Subjects	29	921.47	31.77		
Groups x Subjects	29	856.47	29.53		
Time	1	136.53	136.53	4.71	<0.05
Groups x Time	1	145.20	145.20	5.00	<0.05
Subjects x Time	29	909.47	31.36		
Groups x Subjects x Time	29	171.80	26.61		

Group	Mean	Std.Dev.	Skewness
Control - 3 months	2.03	4.00	1.78
Experimental	2.70	5.66	1.92
Control - 6 months	2.37	4.79	2.14
Experimental	7.03	7.17	0.42

Table (XLIX) Significance of difference in infant crying while on stranger's knee.

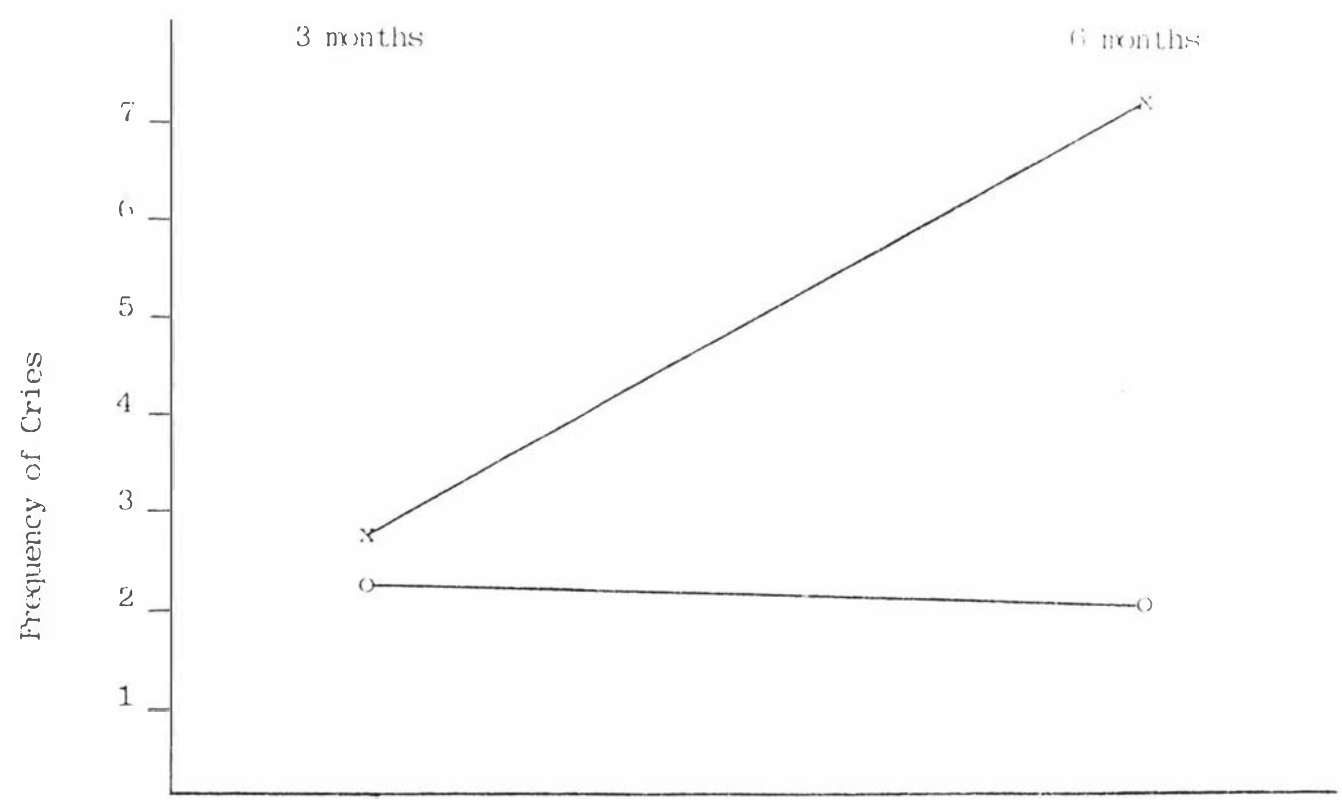


Figure 22: Frequency of Infant Cries On Stranger's Knee

Figure 22 indicates that at 3 months crying while on the stranger's knee was equivalent in the two groups, with a significant increase in the incidence of crying occurring in the experimental group at 6 months.

Because of the large decrease in infant's looking at the stranger which occurred by the age of 6 months and the possibility that while the control group may not cry, nonetheless they may well be wary of the stranger and demonstrate this by averting their faces, a composite measure of stranger fear was developed which involved both the measures of crying at the stranger and aversion of the infant's face (combined additively, both being given equal weight). Because of the low incidence of crying and averting of face which occurred at 3 months the composite measure was analysed for the 6 month observation only. On this measure the experimental group again showed more fear (Table (L)).

The relationship between maternal visual and auditory stimulation and infant negative reaction to the stranger was intercorrelated with the result that for the control group the relationship was positive and for the experimental group it was negative (Table (LI)).

Inspection of the scatterplot for the experimental infants (Figure 23) again suggested that there may well be two trends present, in the upper part of the graph there being a positive relationship between negative reaction and maternal stimulation, and in the lower half

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	442.82	442.82	7.90	<0.01
Subjects	29	1478.48	50.98		
Groups x Subjects	29	1771.68	61.09		

Group	Mean	Std.Dev.	Skewness
Control - 6 months	2.07	2.81	1.95
Experimental	17.40	9.31	-0.60

Table (L) Significance of difference of infant crying/averting face while on stranger's knee (6 months.)

	* MLKVK Control	MLKVK Experimental
Cry/Avert	0.52	-0.30
p	0.002	0.05

Table (LI) Correlation of mothers' provision of visual and auditory stimulation and infant negative reaction to the stranger.

* Mothers' looking at and talking to the infant.

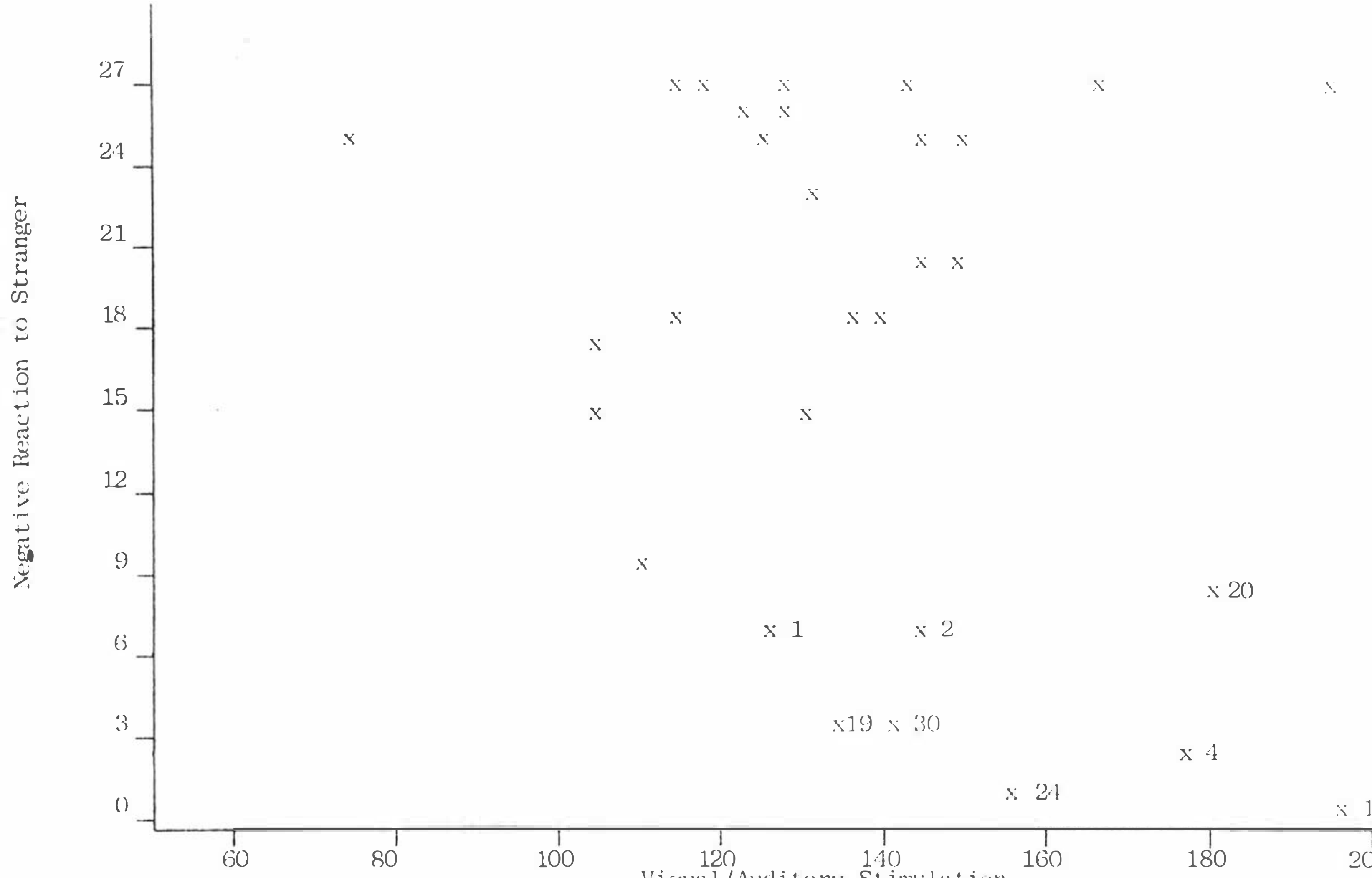


Figure 23: Scatterplot of Mother's Provision of Visual and Auditory Stimulation and Infant Negative Reaction to Strangers (Experimental Group - 6 months).

a negative relationship. While these trends were in fact found they failed to reach significance (Table (LII).

	Upper Group (22 infants)	Lower Group (8 infants)
*	MLKVK	MLKVK
Cry/avert	0.31	-0.36
p	0.08	0.19

Table (LII) Correlation between mother's provision of visual and auditory stimulation and negative reaction to stranger in the experimental group at 6 months.

* MLKVK - Mother's provision of visual and auditory stimulation.

However when those infants who displayed a lower incidence of fear of the stranger associated with high rates of maternal stimulation were identified, they were found to be the same infants as those who had demonstrated high rates of looking associated with moderate to high rates of maternal stimulation (except of course for the extra one in the latter relationship) (Table (LIII)).

				Subjects					
High/mod. stimulation									
High looking at stranger	1	2	4	11	19	20	23	24	30
High stimulation	1	2	4	11	19	20		24	30
Low negative reaction									

Table (LIII) Infants demonstrating low frequency of negative reaction to stranger and high frequency of looking at stranger's face associated with high levels of maternal stimulation, at 6 months.

Questionning of the mothers of infants in the experimental group who responded to the stranger's approach with little indication of fear and who had received high rates of visual and auditory stimulation from their mothers, revealed that six of the eight infants had shown unequivocal fear of a stranger within the previous two weeks, suggesting that for this group increased provision of the mothers face and voice may have accelerated the infant's discriminating of the stranger as different from the mother and by the age of 6 months were already passing through the stage of negative reactions to strangers.

The relationship between infant observing of the stranger at 3 months and negative reaction at 6 months provided further evidence for the existence of this sub-group of experimental infants. For both experimental and control groups there was a non-significant negative relationship between infant regarding of the stranger at 3 months and negative reaction at 6 months (Table (LIV)). However when the scatterplot of the experimental group was examined (Figure 24) again a small sub-group of infants appeared most of whom displayed relatively high rates of looking at the stranger at 3 months and a low incidence of aversive reaction at 6 months.

	Control	Experimental
	Look at stranger	Look at stranger
Cry/Avert face	(3 months)	(3 months)
(6 months)	-0.02	-0.24
p	0.46	0.10

Table (LIV) Correlation of negative reaction to stranger at 6 months and looking at stranger at 3 months.

For this small group the relationship (although not significant) was between higher rates of looking at the stranger at 3 months, and lower levels of aversive reaction at 6 months, while for the remainder the opposite relation tended to hold (Table (LV)).

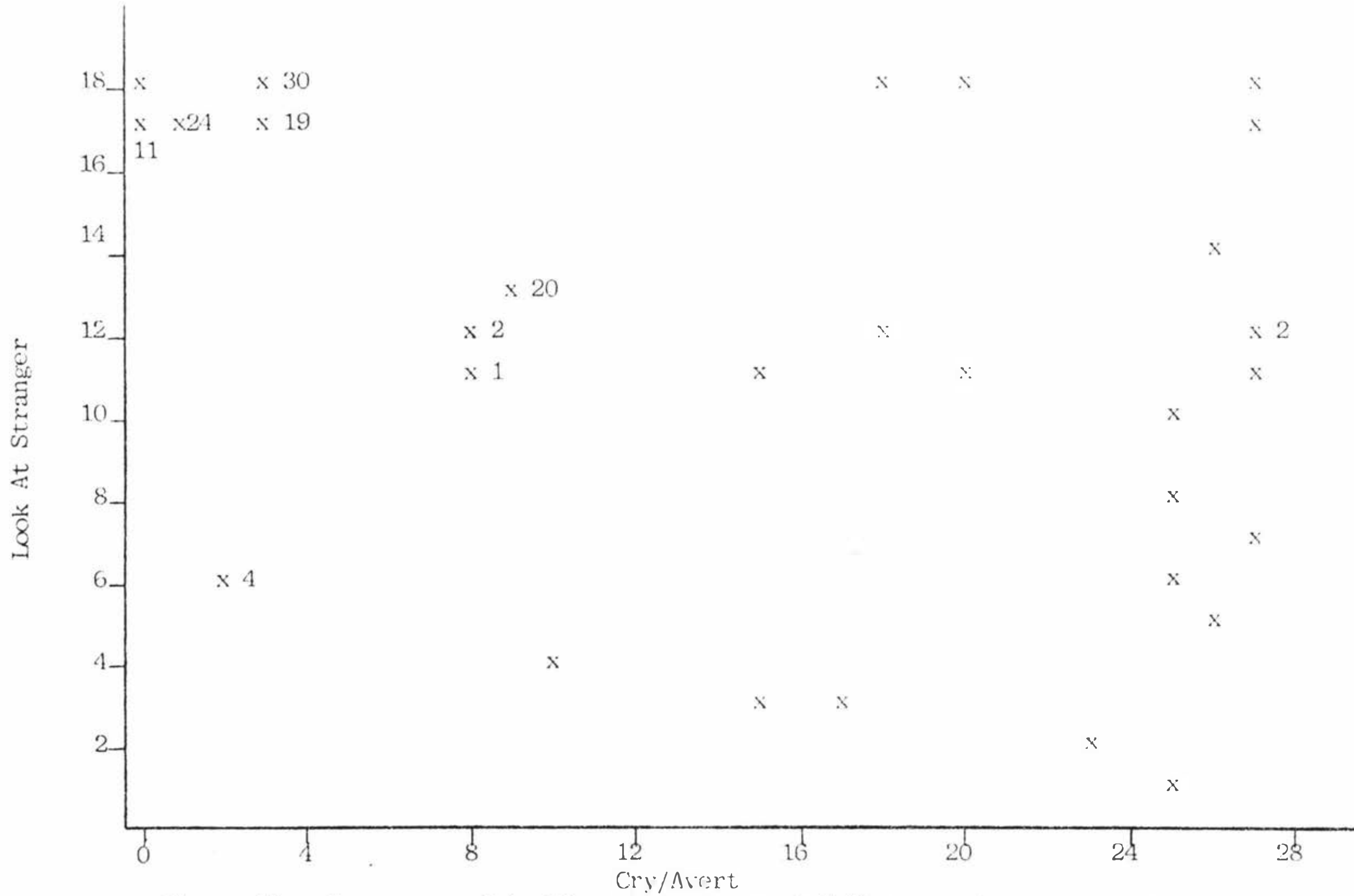


Figure 24: Frequency of Looking at Stranger at 3 Months and Cry/Avert at 6 Months (Experimental Group).

	Look at stranger 3 months -(8 subjects)	Look at stranger 3 months -(22 subjects)
cry/avert face (6 months)	-0.36	0.26
p	0.19	0.12

Table (LV) Relationship between looking at stranger at 3 months and aversion at 6 months (experimental group).

When those individuals in the smaller sub-group were identified they again tended to be those for whom there had been a relationship at 6 months between higher levels of maternal and auditory stimulation and looking at rather than avoiding contact with the stranger (Table (LVI). Bearing in mind that a significant positive relationship between sociable interaction of an infant and stranger and maternal visual and auditory stimulation was found at 3 months (Table (XLVI) then it appears for the sub-group of infants in Table (LVI) high rates of maternal stimulation at 3 months were associated with greater infant sociability, which was transformed into negative reaction to the stranger before 6 months and by 6 months of age these infants were emerging into the stage of accepting the stranger. Such results suggest an important relationship between the mother's provision of her voice and face and infant social development, i.e., social development is accelerated through increased specific stimulation from the caretaker. Of course these results must be viewed tentatively because of the relatively small numbers involved.

High/mod. stimulation	Subjects								
High looking at stranger (6 months)	1	2	4	11	19	20	23	24	30
High stimulation	1	2	4	11	19	20		24	30
Low negative reaction (6 months)									
High look at stranger (3 months)	1	2	4	11	19	20		24	30
Low negative reaction (6 months)									

Table (LVI) Infants displaying relatively high rates of sociability to the stranger who had received high rates of maternal visual and auditory stimulation.

Hypothesis 19:

If attachment can be defined as a mode of relating to a specific figure, then it would be expected that if the experimental manipulation has enhanced attachment then this will be reflected in the increased tendency of the experimental group infants to look at, touch and vocalize to their mothers more often, and to respond more often to her presentation of toys, while their mothers will be expected to look at, vocalize to and touch their infants more often, they will also respond more often to infant signals and will present toys for inspection more often.

The data analyses required for this hypothesis have been carried out in preceding hypothesis testing, all analyses upholding the hypothesis except that of the frequency of mother's touching of the infant, the groups being undifferentiated in their tendency to display this behaviour. (See hypotheses 1, 2, 5, 6, 7, 8, 10, 11, 12 and 13).

Hypothesis 20:

With attachment defined as the quality of the interaction between mother and infant, then if the experimental manipulation were successful the infants and mothers of the experimental group would demonstrate improved reciprocal responsiveness to each other.

This hypothesis was confirmed, ratification of hypotheses 14, 15 and 16 providing the necessary support,

Source of Variation	D.F.	Sum of Squares	Mean Square	F	p
Groups	1	18081.08	18081.08	53.22	<0.001
Subjects	29	10557.24	364.04		
Groups x Subjects	29	9146.18	315.39		
Time	1	10101.68	10101.68	37.86	<0.001
Groups x Time	1	869.41	869.41	3.25	>0.05
Subjects x Time	29	8087.58	278.88		
Groups x Subjects x Time	29	7384.84	254.65		

Group	Mean	Std.Dev.	Skewness
Control -			
3 months	28.70	17.07	0.58
Experimental	58.63	21.53	-0.18
Control -			
6 months	15.73	10.87	0.92
Experimental	34.90	18.45	0.58

Table (LVII) Significance of difference in infant orientation to mother.

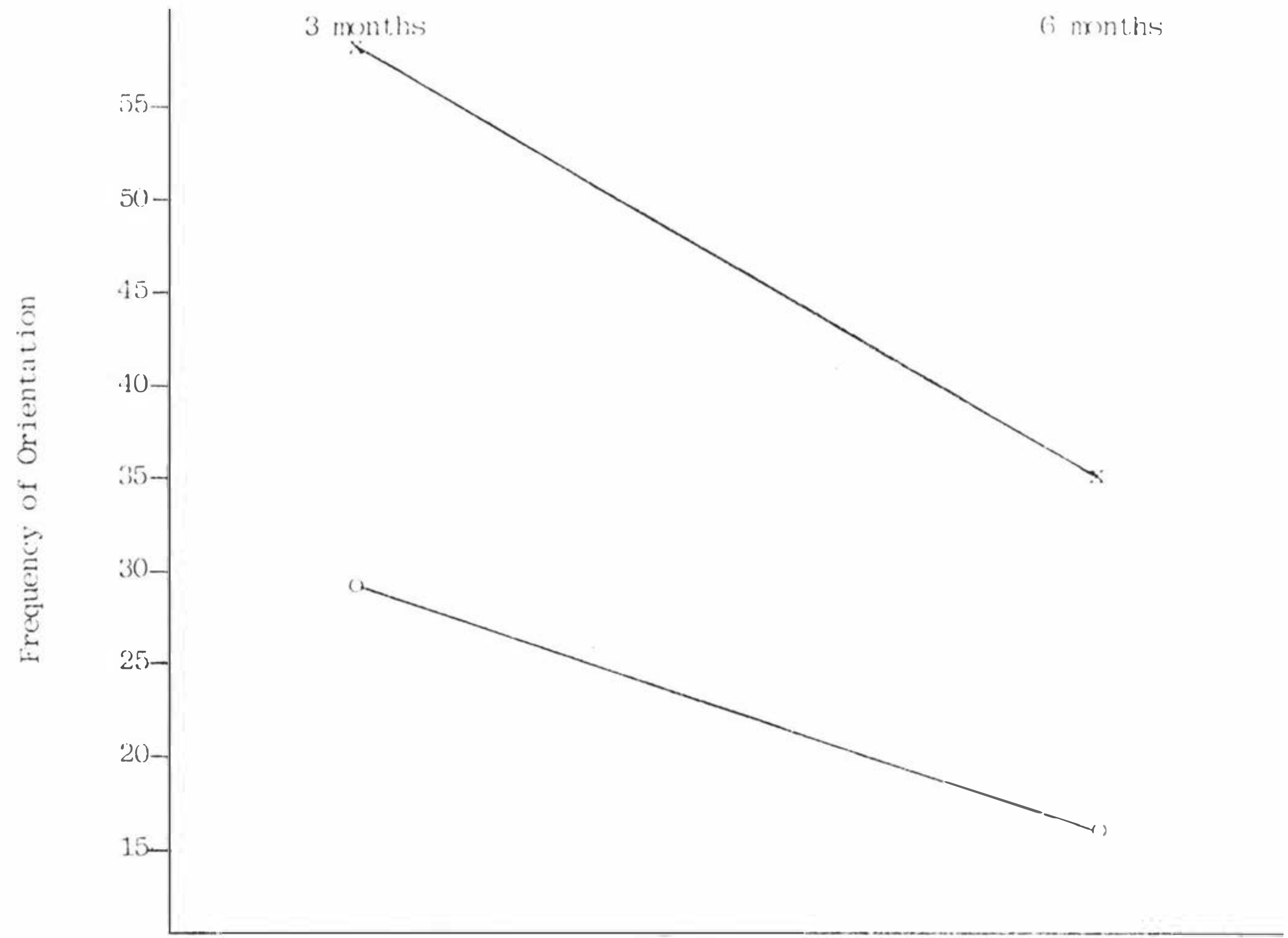


Figure 25: Frequency of Infant's Orientation Towards Mother.

i.e., the experimental group engaged in reciprocal interaction more frequently, they reached a steady state of at least six consecutive intervals of reciprocal interaction within a significantly shorter time, this state of reciprocal interaction endured throughout the observation period, and the mother's orientation to the infant was more likely to result in reciprocal interaction.

Hypothesis 21:

The stimulus control of the mother over the infant will be greater for the experimental group.

Stimulus control was measured in terms of the tendency of the infant to orientate itself to the mother (looks in neutral fashion - no vocalizing, smiles at mother, touches mother, vocalizes (while looking at mother). The experimental infants made an on average over twice as many orientations to the mother (Table (LVII) strongly supporting the hypothesis (Figure 25).

Hypothesis 22:

Infant looking at and listening to the mother will relate to the mother's provision of her face, voice and chest, and mother's orientation to her infant will be predicted from the infant's emitting of signals (smiles and vocalizations but not cries and grizzles because of their infrequent occurrence).

Hypothesis 23:

Infant looking at the mother's face and listening to her voice will be predicted from the mother's provision of her responsive face (smiling, moving and talking) while the mother's emitting of behaviour to her infant will be relatively independent of infant behaviour.

These two hypotheses were presented together because analysis of data enabled them to be tested at the same time. Table (LVIII) shows that collinearity of independent variables was present and thus multiple regression analysis was not appropriate. Nonetheless, such an analysis was conducted to investigate the order in which variables were entered, i.e., they were entered according to which accounted for the most variance of the dependent variable. In all cases it is a responsive face variable which enters first (either mother look and smile at infant, or look, smile and vocalize). (Table (LIX).

The intercorrelation matrix clarifies the results further, in the case of the experimental group it is the mother's responsive face (either smiling or smiling and talking) which predicts infant orientation to the mother, while mere looking or vocalizing has either a negative or close to zero relationship to infant looking. For the control group the pattern is similar except for the 6 month observation where maternal provision of a responsive face or looking at the infant alone predict infant looking equally. However it should be remembered that on average the tendency of experimental

CONTROL - 3 months

	MLSV	MLK	MLKSM	MVK	ILK
* MLSV	1.000	-.417	0.521	0.235	0.330
MLK		1.000	-.147	-.533	0.027
MLKSM			1.000	0.109	0.334
MVK				1.000	-.254
ILK					1.000

EXPERIMENTAL - 3 months

	MLSV	MLK	MLKSM	MVK	ILK
MLSV	1.000	-.701	0.177	-.396	0.714
MLK		1.000	-.019	-.167	-.431
MLKSM			1.000	-.450	0.285
MVK				1.000	-.580
ILK					1.000

CONTROL - 6 months

	MLSV	MLK	MLKSM	MVK	ILK
MLSV	1.000	0.370	0.559	0.013	0.420
MLK		1.000	0.325	-.156	0.479
MLKSM			1.000	-.198	0.483
MVK				1.000	0.057
ILK					1.000

Table (LVIII) (continued)

EXPERIMENTAL - 6 months

	MLSV	MLK	MLKSM	MVK	ILK
* MLSV	1.000	-.692	0.029	0.218	0.547
MLK		1.000	0.123	-.647	-.316
MLKSM			1.000	-.352	-.197
MVK				1.000	0.041
ILK					1.000

Table (LVIII) Intercorrelations between infant's looking and maternal looking, smiling and vocalizing.

* MLSV - Mother looks, smiles and vocalizes at infant.

MLK - Mother looks - no smile, no vocalizing.

MLKSM - Mother looks and smiles - no vocalizing.

MVK - Mother vocalizes - no looking or smiling.

ILK - Infant orientates to mother.

CONTROL - 3 months

	Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
*	MLKSM	0.334	0.111	0.111	0.687	0.215	1.189	>0.05
	MVK	0.443	0.196	0.085	-.644	-.348	4.003	>0.05
	MLSV	0.509	0.259	0.062	0.406	0.299	2.188	>0.05
	Constant				10.263			

EXPERIMENTAL - 3 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
MLSV	0.714	0.509	0.509	0.340	0.284	1.399	>0.05
MVK	0.784	0.614	0.105	-1.478	-.521	8.985	<0.05
MLK	0.802	0.643	0.028	-.496	-.319	2.027	>0.05
Constant				61.726			

Table (LIX) Multiple regression analysis of infant's looking at mother with mother's look, smiling and vocalizing.

* MLKSM - mother smiles at, looks at infant - no vocalizing.

MLSV - mother smiles, looks and talks to infant.

MLK - mother looks only - no talking or vocalizing.

MVK - mother vocalizes - no talking, looking or smiles.

continued ...

CONTROL - 6 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
MLKSM	0.484	0.234	0.234	0.356	0.354	3.281	>0.05
MLK	0.592	0.349	0.116	0.165	0.360	4.407	<0.05
MVK	0.621	0.386	0.036	0.119	0.182	1.250	>0.05
MLSV	0.625	0.390	0.004	0.100	0.085	0.189	>0.05
Constant				-1.991			

EXPERIMENTAL - 6 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
MLSV	0.547	0.299	0.299	0.609	0.616	6.507	<0.05
MLKSM	0.586	0.344	0.045	-.676	-.278	2.651	>0.05
MVK	0.610	0.373	0.029	-.388	-.169	0.488	>0.05
MLK	0.611	0.373	0.000	0.031	0.035	0.013	>0.05
Constant				13.847			

Table (LIX) (continued)

Source of Variation	D.F.	Sum of Square	Mean Square	F	p
Groups	1	18625.21	18625.21	69.36	<0.001
Subjects	29	6104.08	210.49		
Groups x Subjects	29	9471.54	326.60		
Time	1	2851.88	2851.88	20.09	<0.001
Groups x Time	1	60.21	60.21	.42	>0.05
Subjects x Time	29	3985.88	137.44		
Groups x Subjects x Time	29	4245.54	146.39		

Group	Mean	Std.Dev.	Skewness
Control -			
3 months	14.03	12.89	1.37
Experimental	40.37	19.14	0.68
Control -			
6 months	5.70	5.23	0.48
Experimental	29.20	16.16	0.80

Table (LX) Significance of the difference in mother's provision to her infant of a moving, talking, smiling face.

group infants to look at their mother's face was almost four times that of the control group (Table (XXIV)) at both three and six months and the experimental mother's presentation of a responsive face was at least three times that of the control mothers, (Table (LX) Figure 26) giving evidence of its potency as an elicitor of infant orientation to the mother's face.

Thus while it was true that mother's provision of face and voice predicted infant looking at mother, it was specifically the mother's moving, smiling, talking face which predicted infant looking, this result providing support for the more specific hypothesis 23, rather than hypothesis 22.

With regard to the mother's provision of her chest the relationship between infant orientation to the mother and mother's provision of her chest reached borderline significance for the control group only at 3 months and even this relationship was a negative one (Table (LXI).

		Control	Experimental
3 months	r	-0.29	-.0.05
	p	0.06	0.39
6 months	r	-0.17	0.22
	p	0.18	0.12

Table (LXI) Significance of relationship between mother's provision of chest and infant orientation to mother.

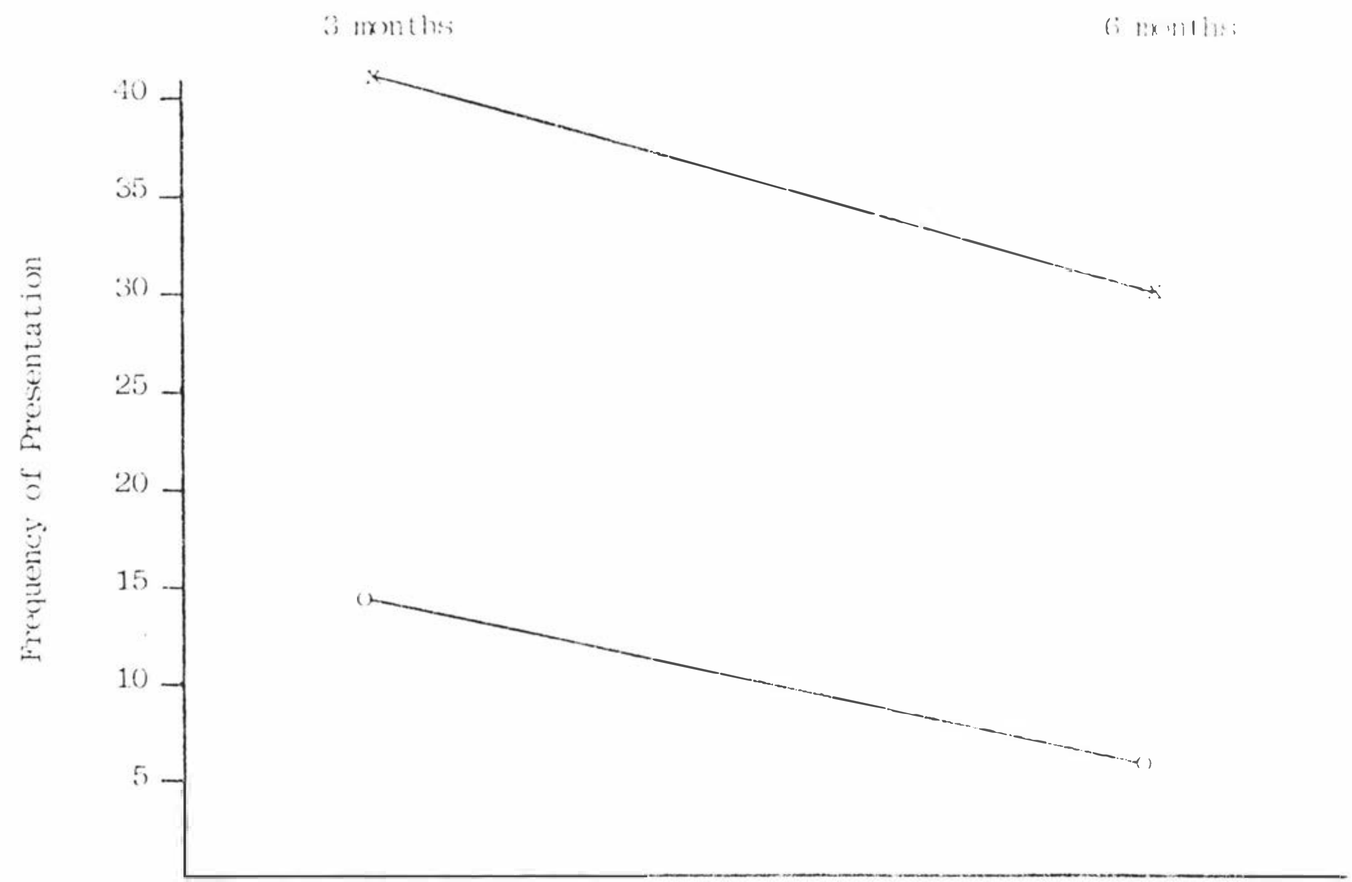


Figure 26: Frequency of Mother's Presentation of Her Looking, Smiling, Talking Face.

Thus the mother's provision of her chest did not predict infant orientation towards her, thus failing to provide support for hypothesis 22.

It was expected that if infant orientation to the mother were the result of instinctive responses to the mother's face, voice and chest (as suggested by Bowlby, 1958, 1969) then infant orientation to the mother would be predicted from the mother's presentation of face, voice and chest, however if it were due to the infant's disc rimination of moving, complex, contoured, symmetrical visual stimuli, and wide band, relatively low frequency sound, then a stimulus complex made up of these components would be prepotent in eliciting infant attention.
The results support the latter proposition, the stimulus complex of mother's smiling, moving, talking voice predicting high rates of infant orientation, while face, voice and chest alone generally did not (in fact more often predicted low levels of infant looking or were not predictive of infant looking at all).

With regard to the second portion of these two hypotheses, i.e., the relationship between infant signals and maternal orientation to the infant, Table (LXII) shows that the mother's orientation to her infant was relatively independent of infant signals, confirming hypothesis 23.

Therefore the results of the testing of these two

CONTROL - 3 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
Infant Cry	0.215	0.046	0.046	-0.436	-0.171	0.696	>0.05
Smile	0.240	0.058	0.011	0.729	0.114	0.309	>0.05
Vocalize	0.241	0.058	0.000	0.032	0.024	0.015	>0.05
Constant				82.263			

EXPERIMENTAL - 3 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
Infant vocalize	0.393	0.155	0.155	-0.224	-0.229	1.230	<0.05
Smile	0.499	0.249	0.095	-0.536	-0.357	4.566	>0.05
Cry	0.553	0.305	0.056	-0.667	-0.305	2.096	<0.05
Constant				100.118			

CONTROL - 6 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
Infant Smile	0.392	0.154	0.154	5.303	0.374	4.661	<0.05
Cry	0.429	0.185	0.031	0.456	0.161	0.817	>0.05
Vocalize	0.441	0.195	0.010	-0.114	-0.104	0.340	>0.05
Constant				39.780			

Table (LXII) Multiple regression of mother's orientation to infant with infant smile, vocalize and cry/grizzle (i.e., Infant Signals).

continued ...

EXPERIMENTAL - 6 months

Variable	Mult.R.	R.SQ.	R.SQ. Change	B	Beta	F	p
Infant Smile	0.292	0.085	0.085	0.673	0.326	2.969	>0.05
Cry	0.394	0.155	0.070	-0.584	-0.297	2.468	>0.05
Vocalize	0.407	0.166	0.010	0.195	0.109	0.320	>0.05
Constant				80.876			

Table (LXII) (continued)

hypotheses have not provided support for attachment being the result of infant's instinctive responding to the mother the result of her face, voice and ventral surface, and maternal responding the result of instinctive processes aroused by the infant's signals. Rather it is more parsimonious to view attachment as the result of the infant signals bringing the mother in to close contact with the infant where he shows selective responding to her face and voice because the organisation of the infant's nervous system is such that the stimulus dimensions represented by the mother's face and voice are readily perceived.

CHAPTER 10

DISCUSSION AND CONCLUSIONS

10. 1 GENERAL:

This study was designed to teach mothers to interact with their infants in such a way that they would increase the frequency with which their face, voice and ventral surface was available to the infant and to become more aware of infant signals and the importance of responding to them. The manipulation was successful except for one behaviour (provision of ventral surface), mothers in the experimental group providing their face within the infant's visual field more often, they vocalized more frequently and responded more consistently to infant signals (crying, smiling and vocalizing). In turn the infants in this group looked at their mother's face and "listened" to her voice more often (listening was defined as orientation towards the mother as she spoke) and presented more signals (smiling and vocalizing) to her.

The reason for chest to chest contact failing to undergo an increase is due possibly to two factors:

1. Chest to chest contact is generally a maternal response to distress in the infant and, probably because of the relative novelty of the laboratory situation, there was infrequent

failing to reach significance and thus it would be expected that chest to chest contact would occur equally in both groups;

2. Chest to chest contact and face to face contact are not mutually exclusive, i.e., it is difficult to hold or be held in a chest to chest contact position and achieve face to face regard. Because the experimental group was characterised by high rates of face to face regard, then this would tend to preclude high rates of chest to chest contact as well.

Thus through manipulation of specific caretaker behaviour, changes not only in the caretaker's behaviour occurred, but also in that of the infant.

The effect of this change in mother and infant behaviours was to bring about an enhancement in the reciprocal quality of their relationship, i.e., when a mother in the experimental group orientated to her infant this orientation was much more likely to result in reciprocal interaction, an interaction pattern in which the behaviour of mother and infant was complementary to each other. Relatively lengthy, unbroken sequences of this style of interaction were more rapidly established in the experimental group (the majority within the first 3 minutesof observation, while many of the control group failed to establish a pattern) and endured throughout the observation session. In contrast to the experimental group, during the final stages of the observation (the last 3 minutes) it was not uncommon for mothers of the control group to appear bored with the proceedings, mothers tending to consult their watches and to look out of the window, while their infants would sit scanning rather than fixating any particular stimulus. The experimental mothers and infants on the other hand were still likely to be engaged in reciprocal interaction at relatively high rates. It was also noted that most of the control group mothers expressed relief that the experimenter had returned, again in contrast to the experimental group who were less likely to do so.

Thus from teaching mothers to look at, talk to, hold their infants close and to respond to their signals, the reciprocal interaction of the mother and infant has been enhanced when such enhancement is measured in terms of frequency, speed of initiation and endurence of reciprocal interaction.

Although not specifically a focus for investigation it was observed that in both groups mothers tended to initiate reciprocal interaction while their infants would tend to terminate it. This result was in keeping with the findings of Stern (1971, 1974) who reported that it was the mother who tended to provide the opportunity for reciprocal exchange, but followed her infant's lead in allowing it's termination. Thus it is not true to suggest that the mother's of the control group were any less sensitive to their infant's attentional needs, rather they were less aware of the stimulus value their face and voice has for the infant.

While it was clear from the results the infant's tendency to orientate towards the mother could be predicted from the availability of the mother's smiling, talking, moving face, it was not clear what brought about the orientation of the mother to the infant. While infant signals may have initiated such orientation, they did not maintain it, in fact it was apparent that variables other than those measured were responsible for maintaining maternal orientation. It may be that the answer will be found in some measure of the "stimulus value" which the infant has for the mother, i.e., relating this hypothesis to the writer's conclusion to Chapter 7.3 in which a possible mechanism for early positive affect to the newborn was discussed, infants whose mothers await their birth with a high degree of positive expectation and who are in a high state of arousal immediately following the delivery of the infant, may tend to label this state of arousal as "maternal feelings" and thus seek contact with the infant more frequently and to be more powerfully reinforced by that infant's orientation to them. Such a condition would be expected to relate to a mother's tendency to initiate and maintain reciprocal interaction with her infant. However this speculation needs detailed study before any reliance can be placed on it as an interpretation to explain a mother's continuing orientation to her infant.

10. 2 RESPONSE TO STRANGER:

When the stranger approached the infant while on his mother's knee, most looked at his face (although the control infants looked on average only 8 times out of a possible 18, while the experimental infants looked an average 12 times) and there was a very low incidence of crying in either group. Such a finding gives supportive evidence for Ainsworth's (1967, 1973) concept of the mother as a secure base from which the infant can explore, particularly when these observations are compared with those made of the experimental group while the infant was on the stranger's knee when aged 6 months when the rate of looking at his face dropped dramatically to around 5 observation intervals out of a possible 18. The general lack of crying at the stranger while on the mother's knee compared with that which occurred while on the stranger's knee also gives evidence of the security function of the mother.

When aged 3 months for the experimental group only, there was a significant relationship between the mother's provision of her moving, talking face and the infant's observing of the stranger, i.e., sociable interaction with the stranger, this observing, especially when on the stranger's knee, occurring much more often than in the control group. This illustrates the importance of the mother's face and voice in the development of sociability external to the mother-infant situation.

When aged 6 months the relationship between infant observation of the stranger and maternal behaviour again revealed that for the experimental infants the mother's provision of visual and auditory stimulation related significantly to the infant's tendency to look at the stranger, but with the possibility of two seperate trends being observed. The first was one in which for 9 infants there was a significant relationship between increasing maternal stimulation and social responsiveness to the stranger, while for the remainder the relationship was one involving moderate rates of maternal stimulation and infrequent looking at the stranger. When negative reactions to the stranger were considered, for the control group increasing provision of maternal face and voice predicted increased aversive reaction, while for the experimental group the opposite relationship held. Again for the experimental group two trends were suggested by the scatterplot, for a small group of 8 infants high rates of maternal stimulation predicted lower rates of aversive reaction, while for the majority the reverse was the case. With one exception the small group of 6 month old experimental infants who had received high rates of maternal stimulation and continued to display relatively high rates of looking at the stranger were also those who had displayed little sign of negative behaviour to the stranger. Further to this these same infants had displayed the highest rates of sociable interaction with the stranger when aged 3 months.

Thus this sub-group of experimental group infants who had received high rates of maternal stimulation were more sociable to (i.e., more positive to) the stranger at both 3 and 6 months. It was concluded that this group was developmentally advanced due to the receiving of high rates of auditory and visual stimulation, this conclusion being confirmed when mothers were questioned, at least 6 of the group having displayed unequivocal aversive reactions to a stranger within the previous two weeks. Of the control group infants who displayed little sign of negative reaction to the stranger all had received relative to the experimental infants,low rates of maternal stimulation, and none had previously displayed any indication of stranger anxiety.

Therefore it is concluded that this sub-group of experimental infants were in fact socially precocious compared with the remaining experimental infants (the majority of whom displayed unequivocal evidence of fear of the stranger) this precocity being associated with the mother's provision of high rates of visual and auditory stimulation, i.e., her moving, smiling, talking face.

Considering the remainder (the majority) of the experimental infants, significently more cried at the stranger when on his knee compared with the control group. Again this was associated with relatively high (compared with the control group) rates of provision of maternal auditory and visual stimulation. These results are noteworthy when the review of the studies of the age of onset of stranger anxiety is considered (see Chapter 4.7). The conclusion from those studies was that clear negative reactions are not expected before the sixth month, the norm being between the seventh and nineth months. This finding was reported even when the stranger's approach culminated in picking the infant up. Therefore the infants in the experimental group, the majority of whom displayed negative reactions to the stranger, can be categorised as socially advanced compared with both the infants in the control group and those in the studies reveiwed in Chapter 4.7.

While few studies were found which investigated caretaker behaviour and infant wariness of strangers, two in particular (Brody and Axelrad, 1971; Moss et al., 1969) suggested that auditory and visual stimulation in particular by the caretaker is related to the acceptance of the stranger without displays of fear. The small sub-group of the experimental group provide support for this relationship, all these infants interacting with the stranger with little display of fear and all having received high rates of maternal stimulation. However in the two studies (Brody and Axelrad, 1971; and Moss et al.,1969) the infants were aged 8 to 9 months and therefore it is not known whether these infants had previously demonstrated aversive behaviour to strangers, i.e., it is not known whether the auditory and visual stimulation had hastened the infants through the stage of fear of strangers or had actually resulted in the infants never having displayed such behaviour. Studies reviewed in Chapter 4.7 would suggest that when the stranger's approach to the infant culminates in a pick-up or attempted pick-up that a fear response at some time between the ages of 7 and 9 months is the usual finding. Thus it is presumed that the infants in the Brody and Axelrad (1971) and Moss et al. (1969) studies would have displayed fear to a stranger at an earlier age. Therefore the results are considered to support the Brody and Axelrad (1971) and Moss et al. (1969) conclusion, the experimental group infants being considered to be developmentally advanced in their social behaviour compared with the control group such advancement being associated with increased levels of auditory and visual stimulation by the caretaker.

The results when viewed in the light of the available literature are most unusual, no studies having been discovered in which clear negative behaviour to the stranger was the norm by 6 months of age. It is therefore even more noteworthy to have found a small sub-group of experimental infants who had apparently passed through this stage and who were now viewing the stranger as a novel object.

The finding that there was a positive relationship between the availability of the mother's face and voice and infant negative reaction to strangers and that the increased availability of this source of stimulation for the experimental group infants lead to advancement in displaying of such negative behaviour as well as accelerating movement through this stage, indicates that there is a very important relationship between the caretaker's face and voice and infant social behaviour external to the mother-infant relationship, i.e., mothers who look at their infants frequently within the infant's visual field, with a smiling, talking face, will have infants whose social development generally is accelerated.

It is also interesting to view the results in the light of three further studies. Brossard (1974) and Paradise and Curcio (1974) were able to relate stranger anxiety to superior development of the concept of person permanance, and Bell (1970) provided some evidence that mothers who provide high rates of stimulation have infants whose acquisition of object permanance is superior. One could conclude therefore that the cognitive development of the infants of the experimental group is likely to be more advanced than that of the control group, and that this advancement would be the result of high rates of maternal visual and auditory stimulation.

10. 3 RESULTS VIEWED IN TERMS OF CURRENT THEORIES OF THE ATTACHMENT RELATIONSHIP:

From the theoretical positions of Rosenthal (1973), that attachment is the interaction, and Gewirtz (1961, 1972a, 1976) who defines attachment as a quality of the interaction, it was clear that the experimental procedure had significantly increased the frequency and improved the quality of the interaction compared with the control group, and hence the degree of attachment between mother and infant has also been improved. For Gewirtz one way in which the quality of interaction is defined is in terms of the control the mother has over the behaviour of her infant, i.e., her power as a discriminitive stimulus for the emitting of infant behaviour.
The results indicated the superiority of the

experimental group mothers, their infants smiling, looking and vocalizing more often in the presence of their mother than the control group, further supporting the contention that the experiment had effected a positive change in the attachment relationship.

From the point of view that attachment is a mode of relating to a specific figure (Ainsworth, 1972; Sroufe and Waters, 1977) again the experimental procedure enhanced the attachment relationship. Infants in the experimental group looked at their mother's face and vocalized more (although it could not always be established that vocalizing was to the mother, nonetheless it co-varied with mother's responsiveness to it), they responded more often to her presentation of a toy. Toy play was more often a part of an ongoing interaction pattern and infant behaviour to the stranger indicated the improvement of the mother's function as a secure base to explore novelty (Ainsworth 1967, 1973). In the case of the mothers their mode of relating was also that which represented increased attachment. They provided more opportunity for the infant to look at their face and to listen to their voice, they were more responsive to the infant's signals, they presented play objects more often, and showed more interest in the infant's reaction to the objects.

Thus it seems clear that the modification of certain specific behaviours has been successful in the promotion of the attachment relationship when this relationship is seen as a mode of relating.

The finding that the improved attachment of the mothers and infants in the experimental group is described equally well by the "attachment is the interaction" model of Rosenthal (1973), "attachment is a quality of the interaction" model of Gewirtz (1961, 1972b, 1976) and the "attachment as an organisational construct" model of Ainsworth (1972) and Sroufe and Waters (1977) requires comment. As discussed previously in Chapter 5.2, particularly in regard to the latter two models, there are basic similarities in these models, e.g., they acknowledge that the attachment relationship is the result of the reciprocal responses of mother and infant to each other, and knowledge of this pattern of interaction can enable accurate predictions regarding the behaviour of the partners in different situations to be made; they invoke the concept of caretaker control over infant behaviour as a measure of attachment; and allow for initial response biases of the partners. From the similarities of these models it would be expected that analogous findings from this study would be predicted by each and in fact as already presented, the three models have enabled an improvement in the relationship of mother and infant to be described.

It is also important to note that none of the models contributed more to the understanding of the relationship than the other indicating that, in the present context at least, they are merely describing the same behaviour in somewhat different terms.

10. 4. RESULTS VIEWED IN THE LIGHT OF ETHOLOGICAL THEORY VERSUS THE AUTHOR'S REFORMULATION:

The question now is whether the pattern of interaction brought about by the manipulation of specific infant and mother behaviours is best described in terms of species-specific stimuli being prepotent as elicitors of instinctive responses in mothers and infants as the ethological school would suggest (e.g. Bowlby, 1958, 1969) or whether the data best fit the alternative explanation put forward by the author that attachment is the result of four specific behavioural systems, two being the result of the structure of the infant's nervous system causing the stimuli of the mother's face and voice to be prepotent as elicitors of attention, and two being the signals of the infant (especially distress) and the need for nutrition bringing the mother into close contact with the infant where the stimuli of her face and voice are within the infant's optimal range of detection, and when in this position of orientation high rates of attention to the caretaker's face and voice occur. This situation of mutual orientation in close proximity is seen as providing a matrix within which elaboration of infant and caretaker behaviour can occur in a direction which promotes the social development of the infant in particular and the "fine tuning" of the mother's behaviour by the infant.

The evidence from this study is that the moving, smiling, talking face of the mother had a high stimulus value for the infant in evoking high rates of attention, while the still face, or voice alone did not. Such findings are in accordance with those of studies which have given evidence for the importance of contour (e.g., McCall and Kagan, 1967), complexity (e.g., Jones-Malfese, 1975), symmetry (e.g., Fagan, 1972) and movement (e.g., Haith, 1966) as determinants of infant visual attention, and low frequency, wide band sound as determinants of auditory attention (e.g., Hutt et al., 1968). The results also gave evidence of the minimal importance of infant signals in relation to maternal orientation to the infant, suggesting that while these signals may initiate orientation of mother to infant, they do not contribute to its maintenance.

There was congruence between the findings of this study that the mother's moving, smiling, talking face attracted high rates of infant attention and research regarding infant visual and auditory perception, thus supporting the author's reformulation of Bowlby's (1958, 1969) theory, i.e., that the attachment between mother and infant has its origins in the infant's orientation to the caretaker, this orientation being the result of the stimulus properties of her moving, talking face bringing about and maintaining infant attention to the mother's face where elaboration of infant behaviour through imitation, modelling and differential reinforcement will occur in a social direction (because the caretaker is a social being), infant signals merely serving to bring mother and infant into close contact.

If, on the other hand, Bowlby's original (1958, 1969) formulation were more appropriate then it would not have been expected that the mother's face or voice alone would predict low levels of infant orientation, rather it would be expected that if responding were innately determined then the power of the mother's face and voice to elicit attention should have been similar whether presented seperately or in combination. These results, together with the failure of infant signals to relate significantly to the mother's orientation to her infant precludes the characterizing of the mother's face and voice and infant signals as elicitors of instinctive responding, i.e., releasing stimuli, thus failing to support the ethological model.

10. 5 SUMMARY:

When viewed in their entirety the results have indicated that the degree of attachment demonstrated by the experimental group has been enhanced, whether this affectional bond is viewed in terms of a mode of relating to a specific figure, the degree of control of the mother over her infant's behaviour, or as a quality of the interaction. However they have offered little support for the concept of attachment being the result of instinctive species-specific behaviours of the mother and infant, rather it is more parsimonious to view it as the result of infant receptor characteristics bringing about a high probability of orientation of the infant to the mother's moving, talking, smiling face. From this initial orientation develops an interactional system based on the reciprocal responding of the partners, the caretaker playing the leading role in initiating the reciprocal exchange by making her face and voice available.

Within this interactional system the foundation for the infant's social behaviour is laid down, with improved levels of caretaker auditory and visual stimulation leading to advanced infant social development both within and outside of the caretaker-infant relationship.

In the case of the control group, this group of average mothers was characterized by having provided significantly less auditory and visual stimulation to their infants and by being significantly less successful in engaging their infants in reciprocal interaction. The outcome of this was that their infants were less well advanced in their social development and tended to play independently of their mothers and to ignore her overtures (i.e., a control mother's orientation to her infant was significantly less likely to result in a reciprocal response from her infant) and to be relatively less responsive to strangers (whether considered in terms of positive or negative behaviours). For the mothers of these infants the difficulty in engaging their infant seemed to result in more rapid loss of interest in the interaction and more boredom.

Thus the improved provision by a mother of her moving, smiling, talking face has, at least within the duration of the study, had important implications for the relationship of mother with infant, infant with mother, and infant with stranger. It is noteworthy that such changes were the result of a 17 minute film, giving evidence that the information in the film was easy for the mothers to understand and adapt to their own interaction with their infants, and to maintain for the 6 months of the study with no further information being provided. This illustrates the efficacy of the approach used, not only as a research tool, but as a means of mass education of mothers, (and for that matter, fathers too) as to the importance of their moving, talking face for the building up of a reciprocal relationship with their infant, and for the infant's integration in to a social world.

CHAPTER 11

FUTURE DIRECTIONS

11.1 APPLICATION OF THE FINDINGS:

It was clear that the experimental program provided information of the kind which enabled mothers to relate with greater skill to their infants. While no enquiry was made regarding the satisfaction that mothers felt in their relationship with their infants, observations suggested that mothers in the experimental group were less likely to appear bored with their infant by the end of the session, and were more likely to be continuing in reciprocal interaction. Such an observation provides evidence for the existence of greater satisfaction being gained by the experimental mothers from contact with their infants.

For the infants, a mother's increased provision of her moving, smiling, talking face apparently resulted in increased orientation to the mothers face and the beginning of lengthy runs of reciprocal exchange, i.e., a relationship characterised by the "in-tuneness" of the partners. This in turn resulted in developmental gains in the infant's social behaviour outside of the mother-infant relationship.

These results suggest that making the information contained in the film generally available to mothers could result in a significant enhancement in the quality of the relationship of mothers and their young infants, and so it is intended to pursue the remaking of the experimental film so that it can be used during antenatal programs of the kind conducted by the Plunket Society and Parents' Centre.

11.2 SUGGESTIONS FOR FURTHER RESEARCH:

11.2.1 Consideration of the Father's Contribution:

Recent literature has considered the father in interaction with his infant with some consistent results being reported. The tendency of infants to protest when separated from mother or father at home or in the laboratory is not different (Cohen and Campos, 1974; Kotelchuck et al., 1975; Ross et al., 1975; Spelke et al., 1973) and when under stress infants intensify their attachment to (usually proximity to) whichever parent is present (Feldman and Ingham, 1975; Lamb, 1976b; Willemson et al., 1974). However if both parents are available the mother is usually preferred (Lamb, 1976b, 1976d). While no preference for either parent was obvious when stress was low, Lamb (1975, 1977) reports potentially important qualitative differences in the kind of interaction in which mothers and infants and fathers and infants engaged. Whereas mothers most often held the infants for caretaking functions, the father was more likely to hold the infant for play, and therefore the infants more often responded postively to play with their fathers. In view of these findings it would be interesting to extend the present study to include fathers in order to ascertain whether the father's increased provision of face and voice would improve his stress reducing qualities. It would also be of interest to note whether mothers who had taken part in the experimental manipulation were now as successful as the fathers in initiating play with their infants.

11.2.2 Research Relating to the Importance of First Contact With the Infant:

Research pertaining to evidence for the importance of early extended contact of mother and infant was reviewed in Chapter 7.2. These studies revealed that extended contact of mother and infant immediately after birth brought about important changes in the mother's behaviour, e.g., she was more likely to stand by the infant during a paediatric examination and to comfort the infant if it cried, she spoke to the infant more often and was less likely to leave the infant when she went out, etc. The writer suggested in that section that an important feature of this early contact may be that it occurs at a time when the mother's level of arousal is high and is thus likely to be labelled by her as due to her infant's birth. Such an interpretation by the mother was expected to predict greater tendencies to maintain contact with the infant. It is also expected that a similar mechanism may be operating for fathers who are present during their wife's labour and the birth of the infant, an expectation which would be worthwhile investigating.

It was also suggested in that section that if the mother's first extended contact with her infant was after her high level of arousal had subsided, then she may interprete this as a low level of maternal feeling and thus tend to seek contact with her infant less often. This suggestion also requires elucidation.

Research relating to the foregoing is considered important in the light of the absence of the finding of a relationship describing a mother's tendency to orientate to her infant. It is considered that such a relationship may be found from an investigation of the mother's level of arousal during her first extended contact with the infant. Of course a similar investigation is required for fathers.

11.2.3 Relationship of the Findings to Future Peer Relationships of the Infant:

An attempt was made in this study to relate maternal provision of auditory and visual stimulation to the infant's interacting with a stranger. It was shown that the social development of the infant, when measured in terms of response to a stranger, was significantly advanced, possibly due to the mother's provision of her moving face and voice. Thus it would be expected that the mother's provision of her face and voice may relate to the infant's forming successful peer relationships.

It would be worthwhile therefore following up as many as possible of the individuals in the groups of this study and in particular to observe the young child's first visit to Kindergarten. It would be predicted that the children who were in the experimental group will show signs of integrating in to Kindergarten more readily.

11.2.4 Study of What Constitutes an Adaptive Mother-Infant Relationship:

Recent research e.g., Ainsworth et al. (1971); Waters (1978), has focussed on dimensions or categories of maternal behaviour and the relationship between such measures and the infant's subsequent reaction to separation from and reunion with the mother. This kind of approach has important implications for the treatment of maladaptive caretaker-infant dyads, particularly if the relationship between what were considered to be the ambivalent or rejecting infant behaviours (which had been related to certain maternal styles) and subsequent peer relationships were elucidated. Such information, together with that gained from investigation of maternal stimulation and subsequent peer relating, would provide a sound basis for preventative programs aimed at avoiding maternal-infant interaction which would be maladaptive to the infant's subsequent integration into a social world.

11.3 PREVENTION OF A MALADAPTIVE MOTHER-INFANT RELATIONSHIP:

Pollitt (1965) has suggested that depression in a mother may sometimes be seen following a particularly difficult relationship between a mother and one of her children. Thoman (1975a) has commented on her observation of infants whose state was difficult to interprete and to which accurate maternal responses would therefore be less likely. These two studies, together with those which demonstrate early synchrony of mother and infant behaviour (e.g., Brazelton et al., 1975; Condon, 1977; Condon and Sander, 1974) suggest that where the development of synchrony or reciprocal interaction is made difficult by factors such as the indeterminant state of the infant, then mothers may well find interaction with their infant insufficiently rewarding and may fail to build up a reciprocal relationship. However the results of the present study have shown that it is the mother's talking, smiling face which attracts high rates of attention from the infant, and which therefore lays the foundation for the development of a synchronous relationship. Thus it is suggested that where such a relationship is failing to develop then the mother needs to spend time in close contact with her infant in a face to face orientation to aid both infant and mother to become familar with the rhythm of the reciprocal exchange and so form a reciprocal relationship based on the unique pattern of the exchange between mother and infant. It may be that mothers of infants who display lack of consistency in behavioural states and state transitions need to be relieved of as many housekeeping functions as possible in order that they can spend much time in close, quiet contact with the infant so each can learn the other's rhythm.

APPENDIX 1

DEMOGRAPHIC AND PERINATAL VARIABLES

Control Group

Age	Education	Social Class
20	3	3
27	8	2
26	8	2
22	3	2
26	5	1
20	2	3
26	6	1
21	4	3
26	8	1
29	5	4
25	3	2
25	4	2
26	3	4
26	7	2
23	3	3
29	4	3
28	4	3
22	3	3
27	4	4
25	4	1
24	4	2
23	2	3
25	5	3
21	6	4
25	4	4
25	5	3
20	4	4
21	4	3
32	5	3
24	3	1

Experimental Group

Age	Education	Social Class
24	5	3
26	7	4
25	5	3
28	8	1
31	6	3
25	4	3
25	5	2
24	7	4
23	7	4
23	7	2
32	6	3
27	3	3
29	6	1
31	2	2
25	3	2
24	3	2
20	3	3
26	4	3
21	3	2
26	4	4
28	9	1
25	7	2
30	3	2
24	4	2
22	7	4
29	9	3
24	4	4

Experimental Group

Age	Education	Social Class
25	3	3
29	4	1
25	4	2

Table (LXIII) Age, years of secondary and tertiary education and social class of mothers.

Control Group

Apgar 1min	Apgar 10min	Gestation (wks)	Birthweight (kg)	Breast Fd. (mth)	Pethidine (mg)	Phenergan (mg)	Induction	Epidural Anaesthesia
9	10	40	3.6	3	100			
9	10	39	3.3	2.5	100			
9	10	40	3.3	6	100	50		
9	10	40	3.7	1.5	50	25		
8	10	40	4.2	6	100			
8	10	41	3.7	0	100	50	x	x
8	10	40	3.9	0	150	25		
8	10	38	2.9	0	100	50	x	x
8	10	40	3.2	6	100		x	x
8	10	39	3.5	6	50	25		
10	10	40	3.2	0	50	25		
8	10	39	2.9	4				
9	10	41	3.9	6	100	50		
9	10	38	2.9	6	50			
8	10	42	3.8	1.5	150		x	x
9	10	41	3.7	6			x	
8	10	41	3.8	6	66	33		
9	10	40	3.4	2	100			
9	10	39	2.8	6			x	x
9	10	41	3.6	6	100			
9	10	41	3.3	3	100			
9	10	40	3.5	0	66	33	x	
9	10	39	2.9	1				x
9	10	41	2.9	6	66	33		x
8	10	41	3.9	6	66	33		
8	10	41	3.5	6	150	50	x	
8	9	41	3.3	3	100			x
9	10	40	4.2	3	100			
9	10	39	4.5	5	100		x	x
8	10	40	3.1	6	66	33		

Table (LXIV) Summary of birth and breast feeding data.

(continued)

Experimental Group

Apgar 1min	10min	Gest-ation (wks)	Birth-weight (kg)	Breast Fd. (mth)	Pethi-dine (mg)	Phene-rgan (mg)	Induc-tion	Epidural Anaes-thesia
9	10	40	2.5	6	66	33		
9	10	40	3.8	1				
9	10	39	2.5	6				
9	10	40	2.7	3	100			
9	10	41	3.2	6				
9	10	40	3.3	6	100			
9	10	38	2.8	2.5	100			
9	10	40	3.1	2				x
8	10	39	3.5	6	100			
9	10	40	3.4	6	100	50		
9	10	39	3.1	3	66	33	x	x
9	10	40	3.5	3	100			
9	10	40	3.3	4.5	100	50		x
8	9	37	3.4	6				
9	10	40	3.5	2	100	50		
8	9	40	4.0	6	100	50	x	x
9	10	40	2.7	1	100		x	x
8	10	39	2.8	1	100	50	x	
9	10	41	3.7	6	100	50		
8	10	40	3.5	6	200	50		
8	10	40	3.7	6	160	50	x	
9	10	41	3.6	6	100		x	x
9	10	40	3.2	0	100	50		
9	10	40	2.9	3.5	200	50		
9	10	40	3.3	6	66	33	x	x
9	10	41	2.9	0	175	50	x	
8	10	40	3.0	4.5	200			x
9	10	40	2.9	1	100			x
9	10	41	3.5	4.5	100			
8	10	41	4.1	6	100		x	

Table (LXIV) Summary of birth and breast feeding data.

Control (approx. 7 days after birth)	Experimental (7 days after birth)	Experimental (after training film)
0.5	1.5	7.5
2	1.5	7.5
2	0	8
5	2.5	7
2.5	2.5	8
2.5	4	7.5
2	1	8
3	0.5	8
3	2	8
2	2	7.5
0.5	1	8
1.5	1.5	8
1.5	1	8
3	2.5	8
0.5	2	8
3	2.5	8
1.5	1	8
0	3	8
2	1	8
3	1	8
0	2.5	8
0.5	3.5	8
0	2	8
4	2.5	8
1.5	2.5	8
1.5	2.5	8
1.5	2.5	8
2	1	8
0.5	2	8
1	1.5	8

Table (LXV) Score out of 8 on knowledge of target infant and mother behaviours.

APPENDIX 2

RATIONALE FOR THE PROJECT GIVEN TO MOTHERS OF EACH GROUP

"Mrs X, I am Tony Page and I was wondering if you would be interested in helping me in a project which aims at finding out the way in which mothers and babies get to know each other. In particular I am interested in finding out which things mothers do with their babies that the baby finds most interesting. If you are interested I would like to have you fill out a questionnaire in a few moments and then when your baby is aged 3 months and 6 months, I would like to film the two of you playing together for approximately 20 minutes and also to see how he/she reacts to a stranger".

For the experimental group the following was added:

"In order to find out which behaviours are the most important in helping mothers and babies to get to know each other, I have made a film of some of these which I would like you to have a look at. It takes about 15 minutes and I would show it to you after you have been at home for a week or two".

For the control group the following was added:

"In order to find out whether your experience of Y's birth has anything to do with your getting to know each other, I would like you to fill out another questionnaire with me after you have been home for a week or two".

APPENDIX 3

QUESTIONNAIRE RELATING TO A MOTHER'S KNOWLEDGE OF THE TARGET BEHAVIOURS

NAME:

DATE:

1. Can babies see very well immediately after birth?

2. How can you help your baby to recognise you more readily?

3. Does bringing up wind have anything to do with helping your baby to recognise you?

4. Can babies hear very well immediately after birth?

5. How should you hold your baby mostly?

6. Is your baby's smiling under your control or not? Specify what you mean.

7. Is your baby's babbling under your control? Specify what you mean.

8. Is your baby's crying under your control? Specify what you mean.

APPENDIX 4

QUESTIONNAIRE RELATING TO PREGNANCY, BIRTH AND FAMILY HISTORY

Your Name . . . .

1. How soon after the birth did you handle your baby again?
2. When did you first feed your baby?
3. Is your baby fed by breast or bottle?
4. How many times a day (24 hour period) is your baby fed?
5. Was your husband present for the whole of the delivery?
6. If not was he present for part of the delivery?
7. If he was present for only part of the delivery, why did he leave?
8. If he was not at any part of the delivery, for what reason did he not attend?
9. When did your husband first handle your baby?
10. How often does he visit you?
11. How often does he visit your baby?
12. Expectations of labour and delivery:
    - (a) How long did you expect labour (from the time of first contraction until the birth) to be?
    - (b) How much discomfort did you expect during labour and delivery?
        1. little
        2. some (minor to moderate but bearable)
        3. moderate to severe

(c) What procedures did you expect to be used during labour and delivery?

Did you expect to have -

1. relaxants
2. anaesthetics (general or local)
3. forceps
4. stitches
5. a specialist in attendance

13. Actual experience of the labour and delivery:

(a) How long did the labour actually take?

(b) How much discomfort did you experience during the labour and delivery?

1. little
2. some (minor to moderate but bearable)
3. moderate to severe
4. extreme

(c) What procedures were used during the labour and delivery?

1. relaxants
2. anaesthetics (general or local)
3. forceps
4. stitches
5. a specialist in attendance

14. Expectation of your feeling for your baby:

(a) There is wide variation in first feelings for a new infant from no feeling or little feeling to a very strong feeling, what did you expect yours would be?

1. immediate love feelings
2. fast development of love feelings

3. gradual development of love feelings

4. slow development of love feelings

(b) How anxious did you think you would be when you were first caring for your baby?

1. not anxious

2. a little anxious

3. moderately anxious

4. very anxious

15. Actual experience of first feelings for your baby:

(a) How have your feelings for your baby developed?

1. immediate development of love feelings

2. fast development of love

3. gradual development of love

4. slow development of love

(b) How anxious do you feel when caring for your baby?

1. not anxious

2. a little anxious

3. moderately anxious

4. very anxious

16. How did you feel about your baby during pregnancy?

(a) not much feeling (i.e. baby was there and growing).

(b) mild interest (i.e. interest in what the baby was like, what sex, etc, but this did not occur very often).

(c) moderately interested (quite frequent thoughts about what the baby would be like).

(d) strong interest (frequent thinking of the child together with giving the child a name, interested in what he or she was doing, what stage of development had been reached, etc.).

17. How well prepared for the birth did you feel?
    (a) you were feeling ready for the birth.
    (b) you did not feel ready but were glad labour was starting.
    (c) you did not feel ready and this made you feel a little anxious when labour started.
    (d) you did not feel ready and this made you feel very anxious when labour started.
18. How anxious did you feel about the approach of childbirth?
    (a) not anxious
    (b) a little anxious
    (c) moderately anxious
    (d) you were dreading it
19. How excited did you feel about the approaching childbirth?
    (a) relaxed and calm
    (b) a little excited
    (c) moderately excited
    (d) very excited
20. How do you feel when feed time is coming?
    (a) you look forward to it eagerly
    (b) you look forward to it happily
    (c) you look forward to it with little interest
    (d) you do not look forward to it.
21. How do you feel when you are holding your baby close?

(a) a warm loving feeling

(b) a warm feeling

(c) no special feeling

(d) it is hard to hold your baby close

22. When the feed has finished how do you feel about sending your baby back to the nursery?

(a) you don't want to

(b) you do not mind because your baby will not be far away

(c) you are quite pleased to relax

(d) you are glad to be alone again.

QUESTIONNAIRE RELATING TO CURRENT FAMILY STATUS

1. How many years have you been married?
2. Do you live in your (a) own home
(b) rented accommodation
(c) other (specify)
3. How many times have you shifted house since you have been married?
4. How long have you been in your present home?
5. Are you currently living in the same town as your parents?
6. Are you currently living in the same town as your husband's parents?
7. What hobbies do you have? (include clubs you belong to)
8. What about your husband, what are his hobbies?
9. Do you go to Church
10. If YES how often do you go?
11. What about your husband, what is his attendance record?
12. What employment have you had and how long were you at each position?
13. When did you finish work?
14. What employment has your husband had, and how long has he been at each position?
15. What is his present employment?
16. How often do you see your parents?
17. How often do you see your husband's parents?
18. How many children were there in your family?
19. What position were you, e.g. oldest, youngest etc.?

20. How many times did your family shift when you were living at home?

21. How many of those were to a different town?

22. Were you ever separated from your parents when you were a child?

23. If YES when was this, and for how long?

24. When you lived at home were your parents living together?

25. If they separated, did either your mother or father remarry when you were living at home?

26. How would you describe your mother and father's marriage?

    (a) very much happier than average

    (b) happier than average

    (c) average

    (d) less happy than average

    (e) much less happy than average

27. At what age did you leave home?

28. How much education have you had?

29. How many different schools did you attend?

30. With regard to your knowledge of children which of the following have you experienced?

    (a) baby brother or sister

    (b) baby nephews or nieces

    (c) neighbouring babies

    (d) helped to look after baby's in a day nursery situation

    (e) attended classes on child care

    (f) read books or saw films on child care

    (g) no experience

31. Which of the following do you think are important in looking after a baby?

(a) establish a routine

(b) let your baby decide when feeding and bathing should happen

(c) cuddling

(d) talking to your baby

(e) making sure your baby does not become too demanding

(f) getting your baby to fit in with your pattern of living.

APPENDIX 5

SIX KEY WAYS OF HELPING YOU AND YOUR BABY TO GET TO KNOW EACH OTHER

1. Within a few minutes of birth a baby is more interested in looking at a human face than most other objects. It seems important then that your baby should be able to look at your face as much as possible. Your baby can look at you most readily if you hold him during feeding, bathing, playing, etc., so that both your faces are facing one another.

   When bringing up wind, hold your baby over your shoulder. This makes him more alert so he can be more interested in looking at your face.

2. As soon as he is born, your baby is able to know the direction sound is coming from. A baby also rapidly begins to associate voices with faces. To make this happen more quickly, talk to your baby often, in fact, whenever the two of you are together (during feeding, bathing, changing, etc.).

3. Hold your baby close against your chest with baby in an upright position. Your baby can now use his grasping reflex and this closeness and being able to hold you gives baby a warm secure feeling.

4. Your baby's smile is one of the most rewarding things he can do to you and it is under your control. If you respond to smiling by smiling in return, talking, stimulating, etc., smiling will happen much more

often.

5. Your baby's babbling is also greatly influenced by what you do. If you respond to his babbling by smiling and talking and stimulating in return, he will babble more.

6. Crying is your baby's way of signalling that he needs attention. In time you may learn that different cries mean that he needs different things, e.g., hungry, in pain, bored, etc. However, if you respond quickly to his crying, your baby will learn other ways of getting your attention, and will cry less.

APPENDIX 6

When phoned for the three and six month follow up the following was said to the mothers.

"Hello Mrs X, it's Tony Page from Nelson Hospital speaking. Remember I saw you and little Y just after he/she was born and I was interested in the way in which mothers and babies do things together. I would like to film you playing with him/her some time over the next week. The best time is about one hour after he/she has had a feed and is nice and alert. When would be a good time?"

APPENDIX 7

INSTRUCTIONS TO EACH MOTHER REGARDING FILMING PROCEDURE

"Mrs X first I want to film Y's reaction to a stranger. To do this I want you to place him/her on your knee facing away from you. Mr S is going to come and sit near Y and for a few moments will just look at him/her, and then will try to make Y look at him. He is then going to put Y on his knee and will go through the same procedure again. Please can you make sure that you do not try to attract Y's attention while Mr S is with him/her".

When the sequence with the stranger was completed the mother was given the following instructions.

"Mrs X I am now going to leave you and Y for about a quarter of an hour, you can just sit and play together, or perhaps Y may be interested in the toys, you can just please yourself".

APPENDIX 8

QUESTIONNAIRE FOR 3 AND 6 MONTH FOLLOW UP

NAME

DATE

1. How often does your baby have to be fed?
   (a) more than 5 feeds a day
   (b) 4 - 5 feeds
   (c) 3 or fewer
2. Do you find feeding:
   (a) very pleasant
   (b) moderately pleasant
   (c) mildly pleasant
   (d) not very pleasant
   (e) not pleasant
   (f) ghastly
3. Do you have any special problems during feeding, i.e. does your baby:
   (a) bring up food excessively
   (b) have problems with wind
   (c) have difficulty in tolerating some foods
   (d) take only very small feeds
   (e) never seem to be full up
   (f) any other problems
4. Do you find bathing:
   (a) very pleasant
   (b) moderately pleasant

(c) mildly pleasant

(d) not very pleasant

(e) not pleasant

(f) ghastly

5. Does your baby sleep, i.e., wakes only:

(a) once a night

(b) two or three times a night

(c) more than three times a night

6. Are you satisfied with your baby's sleeping habits?

7. Are you getting enough sleep, i.e.,

(a) 7 to 8 hours a night

(b) 5 to 6 hours a night

(c) less than 5 hours

8. Does your baby cry only when he is:

(a) hungry or tired

(b) hungry or tired and occasionally at other times

(c) hungry or tired and quite often at other times

(d) hungry or tired and often at other times

(e) most of the time

9. Do you feel satisfied with the way you do things with your baby?

(a) always

(b) mostly

(c) more often than not

(d) occasionally

(e) never

10. Is your baby easy to manage?

(a) always

(b) mostly

(c) more often than not

(d) occasionally

(e) never

11. How often do you get help from your parents, relations or friends with your baby (i.e., they help you for at least 2 hours)?

(a) most days

(b) 2 or 3 times a week

(c) once a week

(d) once every 2-3 weeks

(e) once a month or less

12. Is this happening as much as you need it?

13. How often does your husband help with your baby?

(a) whenever he can

(b) most of the times when he can

(c) more often than not when he can

(d) occasionally when he can

(e) never when he can

14. Does this happen as often as you need it?

15. (a) Do your parents live in Nelson?

(b) Do your husband's parents live in Nelson?

BIBLIOGRAPHY

AINSWORTH, M.D.S. The development of infant-mother interaction among the Ganda. In B.M. Foss (ed.) Determinants of Infant Behaviour. Vol. 2. Methuen: London, 1963.

AINSWORTH, M.D.S. Patterns of attachment behaviour shown by the infant in interaction with his mother. Merrill-Palmer Quart., 1964, 10: 51-58.

AINSWORTH, M.D.S. Infancy in Uganda: Infant Care and the Growth of Love. Johns Hopkins Press: Baltimore, 1967.

AINSWORTH, M.D.S. Object relations, dependency and attachment: A theoretical review of mother-infant relationships. Child Dev., 1969, 40: 969-1025.

AINSWORTH, M.D.S. Attachment and dependency: A comparison. In J.L. Gewirtz (ed.), Attachment and Dependency. Winston: Washington, 1972.

AINSWORTH, M.D.S. The development of infant-mother attachment. In B.M. Caldwell and H.N. Riccuiti (eds.), Review of Child Development Research, Vol. 2 University of Chicago Press: Chicago, 1973.

AINSWORTH, M.D.S., and Bell, S.M. Some contemporary patterns of mother-infant interaction in the feeding situation. In A. Ambrose (ed.), Stimulation in Early Infancy. Academic: London, 1969.

AINSWORTH, M.D.S., and Bell, S.M. Attachment, exploration and separation illustrated by the behaviour of one-year-olds in a strange situation. Child Dev., 1970, 41: 49-67.

AINSWORTH, M.D.S., and Bell, S.M. A rejoinder to Gewirtz and Boyd. Child Dev., 1977, 48: 1208-1216.

AINSWORTH, M.D.S., Bell, S.M., and Stayton, D.J. Individual differences in strange situation behaviour of one year olds. In H.R. Schaffer (ed.), The Origins of Human Social Relations. Academic: London, 1971.

AINSWORTH, M.D.S., Bell, S.M., and Stayton, D.J. Individual differences in the development of some attachment behaviours. Merrill-Palmer Quart., 1972, 18: 123-143.

AINSWORTH, M.D.S., Bell, S.M., and Stayton, D.J. Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M.P.M. Richards (ed.), Integration of a Child into a Social World. Cambridge University Press: London, 1974.

AINSWORTH, M.D.S., and Wittig, B.A. Attachment and exploratory behaviour of one-year-olds in a strange situation. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 4. Methuen: London, 1969.

ALEKSANDROWICZ, M.K. The effect of pain-relieving drugs administered during labour and delivery on the behaviour of the newborn: a review. Merrill-Palmer Quart., 1974, 20: 121-141.

AMBROSE, J.A. The development of the smiling response in early infancy. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 1. Methuen: London, 1961.

AMBROSE, J.A. The concept of a critical period for the development of social responsiveness in early infancy. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 2. Wiley: New York, 1963.

AMBROSE, J.A. A personal communication to Bowlby. In J. Bowlby, Attachment and Loss, Vol.1: Attachment. Hogarth: London, 1969.

ANTONUCCI, T. Attachment: A life-span concept. Human Dev., 1976, 19: 135-142.

APGAR, V.S. A proposal for a new method of evaluation of the newborn infant. Current Res. Anes. Analg., 1953, 32: 260-267.

ARONSON, E., and Rosenbloom, S. Space perception in early infancy: Perception within a common auditory-visual space. Science, 1971, 172: 1161-1163.

ASHTON, R. State and the auditory reactivity of the human infant. J. Exp. Child Psychol., 1971, 12: 339-346.

BAKEMAN, R., and Brown, J.U. Behavioural dialogues: An approach to the assessment of mother-infant interaction. Child Dev., 1977, 48: 195-203.

BAN, P.L., and Lewis, M. Mothers and fathers, girls and boys: Attachment behaviour in the one-year-old. Merrill-Palmer Quart., 1974, 20: 195-204.

BANKIOTES, F.G., Montgomery, A.A. and Bankiotes, P.G. Male and female auditory reinforcement in infant vocalizations. Dev. Psychol., 1972, 6: 476-481.

BARNETT, C.R., Leiderman, P.H., Grobstein, R. and Klaus, M. Neonatal Separation: the maternal side of interactional deprivation. Pediatrics, 1970, 45:197-205.

BECKWITH, L. Relationships between infants' vocalizations and their mothers' behaviours. Merrill-Palmer Quart., 1971, 17: 211-226.

BELL, R.Q. Stimulus control of parent or caretaker behaviour by offspring. Dev. Psychol., 1971, 4: 63-72.

BELL, R.Q. and Costello, N.S. Three tests for sex differences in tactile sensitivity in the newborn. Biol. Neonat., 1964, 335-347.

BELL, R.Q., and Darling, J.F. The prone head reaction in the human neonate: Relation with sex and tactile sensitivity. Child Dev., 1965, 36: 943-949.

BELL, S.M. The development of the concept of object as related to mother-infant interaction. Child Dev., 1970, 41: 291-311.

BELL, S.M., and Ainsworth, M.D.S. Infant crying and maternal responsiveness. Child Dev., 1972, 43: 1171-1190.

BENCH, J. Square-wave stimuli and neonatal auditory behaviour: Some comments on Ashton (1971), Hutt et al. (1968) and Lenard et al. (1969). J. Exp. Child Psychol., 1973, 16: 521-527.

BENJAMIN, J.D. Further comments on some developmental aspects of anxiety. In H.S. Gaskill (ed.), Counterpoint. International Universities Press, New York, 1963.

BIJOU, S.W., and Baer, D.M. Child Development, Vol. 1. A Systematic and Empirical Theory. Appleton-Century-Crofts: New York, 1961.

BIJOU, S.W., and Baer, D.M. Child Development Vol. 2. Universal Stage of Infancy. Appleton-Century-Crofts, 1965.

BIRNS, B., Blank, M., Bridger, W.H., and Escalona, S.K. Behavioural inhibition in neonates produced by auditory stimuli. Child Dev., 1965, 36: 639-645.

BISHOP, M.B. Mother-child interaction and the social behaviour of children. Psychol. Monogr., 1951, 65: Whole No. 11.

BLEHAR, M.C., Lieberman, A.F., and Ainsworth, M.D.S. Early face to face interaction and its relationship to later infant-mother attachment. Child Dev., 1977, 48: 182-194.

BLOOM, K. Eye contact as a setting event for infant learning. J. Exp. Child Psychol., 1974, 17: 250-263.

BLOOM, K. Social elicitation of infant vocal behaviour. J. Exp. Child Psychol., 1975, 20: 51-58.

BLOOM, K. and Esposito, A. Social conditioning and its proper control procedure. J. Exp. Child Psychol., 1975, 19: 209-222.

BOWER, T.G.R., Broughton, J.M., and Moore, M.K. Infant responses to approaching objects: an indicator of response to distal variables. Percept. Psychophys., 1970a, 9: 193-196.

BOWER, T.G.R., Broughton, J.M. and Moore, M.K. The coordination of visual and tactual input in infants. Percept. Psychophys., 1970b, 8: 51-53.

BOWLBY, J. The nature of the child's tie to his mother. Int. J. Psychoanal., 1958, 39: 350-373.

BOWLBY, J. Attachment and Loss, Vol. 1: Attachment. Hogarth: London, 1969.

BOWLBY, J., Ainsworth, M.D.S. Boston, M., and Rosenbluth, D. Effects of mother-child separation. B.J. Med. Psychol., 1956, 29: 211-247.

BRACKBILL, Y. Extinction of the smiling response in infants as a function of reinforcement schedule. Child Dev., 1958, 29: 115-124.

BRACKBILL, Y., Kane, J., Manniello, R.L. and Abramson, D. Obstetric meperidine usage and assessment of neonatal status. Anesthesiology, 1974, 40: 116-120.

BRAZELTON, T.B. Psychophysiological reactions in the neonate, 1. The value of observation of the neonate. J. Pediat., 1961a, 58: 508-512.

BRAZELTON, T.B. Psychophysiological reactions in the neonate, II. Effect of maternal medication on the neonate and his behaviour. J. Ped., 1961b, 58: 513-518.

BRAZELTON, T.D. Neonatal Behavioural Assessment Scale. Levenham: Suffolk, 1973.

BRAZELTON, T.D., Koslowski, B., and Main, M. The origins of reciprocity: the early mother infant-interaction. In M. Lewis and L.A. Rosenblum, (eds.), The Origins of Behaviour Vol. 1, The Effect of the Infant on Its Caregiver. Wiley: New York, 1974.

BRAZELTON, T.B., Tronick, E., Adamson, L. Als, H., and Wise, S. Early mother-infant reciprocity. In R. Porter, and M. O'Connor (eds.), Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Amsterdam, 1975.

BRETHERTON, I., and Ainsworth, M.D.S. Responses of one-year-olds to a stranger in a strange situation. In M. Lewis, and L.A. Rosenblum (eds.), The Origins of Fear. Wiley: New York, 1974.

BRODY, S. and Axelrad, S. Maternal stimulation and social responsiveness in infants. In H.R. Schaffer (ed.), The Origins of Human Social Relations. Academic: New York, 1971.

BROOKS, J., and Lewis, M. Attachment behaviour in thirteen-month-old opposite-sex twins. Child Dev., 1974 , 45: 243-247.

BROSSARD, M.D. The infant's conception of object permanence and his reaction to strangers. In T. Gouin Decarie (ed.), The Infant's Reaction to Strangers. Int. Universities Press: New York, 1974.

BROWN, J.V., Bakeman, R., Snyder, P.A., Fredrickson, W.T., Morgan, S.T., and Hepler, R. Interactions of black inner-city mothers with their newborn infants. Child Dev., 1975, 46: 677-686.

BURG, A., and Hulbert, S. Dynamic visual acuity as related to age, sex and static acuity. J. Appl. Psychol., 1961, 45: 111-116.

CAIRNS, R.B. Development, maintanence, and extinction of social attachment behaviour in sheep. J. Comp. Physiol., 1966 , 62: 298-306.

CALDWELL, B.M. The usefulness of the critical period hypothesis in the study of filiative behaviour. Merrill-Palmer Quart., 1962, 8: 229-242.

CALL, J.D. Newborn approach behaviour and early ego development. Int. J. Psychoanal., 1964, 45: 286-294.

CAMPBELL, D. Sucking as an index of mother-child interaction. In J.F. Bosma (ed.), Fourth Symposium on Oral Sensation and Perception: Development in the Fetus and Infant, Thomas: Illinois, 1973.

CAMPOS, J.J., Emde, R.N., Gaensbauer, T., and Henderson, C. Cardiac and behavioural interrelationships in the reactions of infants to strangers. Dev. Psychol., 1975, 11: 589-601.

CARON, A.J., Caron, R.F., Caldwell, R.C., and Weiss, S.J. Infant perception of the structural properties of the face. Dev. Psychol., 1973, 9: 385-399.

CARPENTER, G.C. Visual regard of moving and stationary faces in early infancy. Merrill-Palmer Quart., 1974, 20: 181-194.

CARPENTER, G.C., and Stechler, G. Selective attention to mother's face from week 1 through week 8. Proc. 75th Ann. Conv. A.P.A., 1967, 2: 153-154.

CARPENTER, G.C,, Teece, J.T., Stechler, G., Friedman, S. Differential visual behaviour to human and humanoid faces in early infancy. Merrill-Palmer Quart., 1970, 16: 91-108.

CLARKE-STEWART, K.A. Interactions between mothers and their young children: characteristics and consequences. Monogr Soc. Res. Child Dev.,1973, 38: Serial No. 153.

COATES, B., Anderson, E.P., and Hartup, W.W. Interrelations in the attachment behaviour of human infants. Dev. Psychol., 1972a, 6: 218-230.

COATES, B., Anderson, E.P., and Hartup, W.W. The stability of attachment behaviours in human infants. Dev. Psychol., 1972b, 6: 231-237.

COHEN, L.B., Deloache, J.S., Rissman, M.W. The effect of stimulus complexity on infant visual attention and habituation. Child Dev., 1975, 46: 611-617.

COHEN, L.J. The operational definition of human attachment. Psychol. Bull., 1974, 81: 207-217.

COHEN, L.J., and Campos, J.J. Father, mother, and stranger as elicitors of attachment behaviours in infancy. Dev. Psychol., 1974, 10: 146-154.

COLLARD, R.R. Social and play responses of first-born and later-born infants in an unfamilar situation. Child Dev., 1968, 39: 325-334.

COLLIS, G.M., and Schaffer, H.R. Synchronization of visual attention in mother-infant pairs. J. Child Psychol. Psychiat., 1975, 16: 315-320.

CONDON, W.S. A primary phase in the organisation of infant responding behaviour. In H.R. Schaffer (ed.), Studies in Mother-Infant Interaction. Academic: London, 1977.

CONDON, W.S., and Ogston, W.D. A segmentation of behaviour. J. Psychiat. Res., 1967, 5: 221-235.

CONDON, W.S., and Sander, L.W. Neonate movement is synchronized with adult speech: interactional participation and language acquisition. Science, 1974, 183: 99-101.

CONDRY, S.M., Halton, M.,Jr., and Neisser, U. Infant sensitivity to audio-visual discrepancy: a failure to replicate. Bull. Psychon. Sci., 1977, 9: 431-432.

CONWAY, E., and Brackbill, Y. Delivery medication and infant outcome: An empirical study. Monogr. Soc. Res. Child Dev., 1970, 35: Serial No. 137.

CORTER, C.M. A comparison of mother's and a stranger's control over the behaviour of infants. Child Dev., 1973, 44: 705-713.

CORTER, C.M., Rheingold, H.L., and Eckerman, C.O. Toys delay the infant's following of his mother. Dev. Psychol., 1972, 6: 138-145.

COX, F.N. and Campbell, D. Young children in a new situation with and without their mothers. Child Dev., 1968, 39: 123-131.

CRANDALL, V.C., Katkovsky, W., and Crandall, V.J. Children's belief in their own control of reinforcements in intellectual-academic achievement situations. Child Dev., 1965, 36: 91-109.

CRANDALL, V.J., Katkovsky, W., and Preston, A. Motivational and ability determinants of young children's intellectual achievement behaviours. Child Dev., 1962, 33: 643-661.

DAVID, M., and Appell, G. Mother-child relation. In J.G. Howells (ed.), Modern Perspectives in International Child Psychiatry. Oliver and Boyd: Edinburgh, 1967.

DAVIS, A. American status systems and the socialization of the child. In C. Kluckhohn and H.A. Murray (eds.), Personality in Nature Society and Culture. Knopf: New York, 1959.

DAVIS, W.C., and Phares, E. Parental antecedents of internal-external control of reinforcement. Psychol. Reps., 1969, 24: 427-436.

de CHATEAU, P., and Wiberg, B. Long-term effect on mother-infant behaviour of extra contact during the first hour post partum. I First observations at 36 hours. Acta Paediatr. Scand., 1977a, 66: 137-143.

de CHATEAU, P., and Wiberg, B. Long-term effect on mother-infant behaviour of extra contact during the first hour post partum. II. A follow-up at three months. Acta Paediatr. Scand., 1977, 66: 145-151.

DODWELL, P.C., Muir, D., and Franco, D. Responses of infants to visually presented objects. Science, 1976, 194: 209-211.

DOLLARD, J., and Miller, N.E. Personality and Psychotherapy. McGraw-Hill: New York, 1950

DUNN, J.F. Consistency and change in styles of mothering. In R. Porter and M. O'Connor (eds.), Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Amsterdam, 1975.

DUNN, J. Bernal, and Richards, M.P.M. Observations on the developing relationship between mother and baby in the neonatal period. In H.R. Schaffer (ed.), Studies in Mother-Infant Interaction. Academic: London, 1977.

ECKERMAN, C.O., and Whatley, J.L. Infants' reactions to unfamiliar adults varying in novelty. Dev. Psychol., 1975, 11: 562-566.

EIMAS, P.D., Siqueland, E.R., Jusczyk, P., and Vigorito, J. Speech perception in infants. Science, 1971, 171: 303-306.

EMDE, R., Gaensbauer, T., and Harmon, R. Emotional expression in infancy: A biobehavioural study. Psychol. Iss., 1976, 10 (whole No. 37.)

ENGEL, R., Crowell, D., and Nishijima, S. Visual and auditory response latencies in neonates. In Felicitation Volume in Honour of C.C. De Silva. Kularatne: Ceylon, 1968.

ETZEL, B.C., and Gewirtz, J.L. Experimental modification of caretaker - maintained high-rate operant crying in a 6 - and a 20 - week old infant (Infans tyrannotearus): extinction of crying with reinforcement of eye contact and smiling. J. Exp. Child Psychol., 1967, 5: 303-317.

FAGAN, J.F.F. III. Infants recognition memory for faces. J. Exp. Child Psychol., 1972, 14: 453-476.

FANTZ, R.L. Pattern vision in young infants. Psychol. Rec., 1958, 8: 43-47.

FANTZ, R.L. The origin of form perception. Scient. Amer., 1961, 204: 66-72.

FANTZ, R.L. Pattern vision in newborn infants. Science, 1963, 140: 296-297.

FANTZ, R.L. Ontogeny of perception. In A.M. Schrier, H.F. Harlow, and F. Stolinrtz (eds.), Behaviour of Non-Human Primates, Vol. 2. Academic Press: New York, 1965.

FANTZ, R.L. Pattern discrimination and selective attention as determinants of perceptual development from birth. In A.H. Kidd and J. Rivoire (eds.), Perceptual Development in Children. Int. Universities Press: New York, 1966.

FANTZ, R.L., and Fagan, J.F. Visual attention to size and number of pattern details by term and preterm infants during the first six months. Child Dev., 1975, 46: 3-18.

FANTZ, R.L., and Miranda, S.B. Newborn infant attention to form of contour. Child Dev., 1975, 46: 224-228.

FELDMAN, S.S. and Ingham, M.E. Attachment Behaviour: A validation study in two age groups. Child Dev., 1975, 46: 319-330.

FINKLESTEIN, N.W. and Ramey, C.T. Learning to control the environment in infancy: Child Dev., 1977, 48: 806-819.

FITZGERALD, H.E. Autonomic pupillary reflex activity during early infancy and its relation to social and non-social stimuli. J. Exp. Child Psychol., 1968, 6: 470-482.

FLEENER, D.E., and Cairns, R.B. Attachment behaviours in human infants: discriminative vocalization on maternal separation. Dev. Psychol., 1970, 2: 215-223.

FOGEL, A. Temporal organisation in mother-infant face-to-face interaction. In H.R. Schaffer (ed.), Studies in Mother-Infant Interaction. Academic Press: London, 1977.

FREDRICKSON, W.T. and Brown, J.V. Posture as a determinant of visual behaviour in newborns. Child Dev., 1975, 46: 579-582.

FREEDMAN, D.G. The infant's fear of strangers and the flight response. J. Child Psychol. Psychiat., 1961, 2: 242-248.

FREEDMAN, D.G. Smiling in blind infants and the issue of innate vs acquired. J. Child Psychol. Psychiat., 1964, 5: 171-184.

FREEDMAN, D.G. Hereditory control of early social behaviour. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 3. Methuen: London, 1965.

FREEDMAN, D.G. Genetic variations on the homonid theme: Individual, sex, and ethnic differences. In F.I. Monks, W.W. Hartup, and J. de Witt (eds.), Determinants of Behavioural Development. Academic: New York, 1972.

FREEDMAN, D.G., and Keller, B. Inheritance of behaviour in infants. Science, 1963, 140: 196-198.

FREUD, A. Psychonanalysis and education. Psychoan. Stud. Child, 1954, 9: 9-15.

GARDNER, D.B. Hawkes, G.R. and Burchinal, L.G. Noncontinuous mothering in infancy and development in later childhood. Child Dev., 1961, 32: 225-234.

GEWIRTZ, J.L. A program of research on the dimensions and antecedents of emotional dependence. Child Dev., 1956, 27: 205-221.

GEWIRTZ, J.L. A learning analysis of the effects of normal stimulation, privation and deprivation on the acquisition of social motivation and attachment. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 1. Methuen: London, 1961.

GEWIRTZ, J.L. Attachment, dependence, and a distinction in terms of stimulus control. In J.L. Gewirtz (ed.), Attachment and Dependency. Winston: Washington, 1972a.

GEWIRTZ, J.L. On the selection and use of attachment and dependence indices. In J.L. Gewirtz (ed.), Attachment and Dependency. Winston: Washington, 1972b.

GEWIRTZ, J.L. The attachment acquisition process as evidenced in the maternal conditioning of cued infant responding (particularly crying). Hum. Dev.,1976, 19: 143-155.

GEWIRTZ, J.L., and Boyd, E.F. Mother-infant interaction and its study. Adv. Child Dev. Behav., 1976, 11: 141-163.

GEWIRTZ, J.L., and Boyd. E.F. Experiments on mother-infant interaction underlying attachment acquisition: the infant conditions the mother. In T. Alloway, P. Pliner, and L. Krames (eds.), Advances in the Study of Communication and Affect, Vol. 3: Attachment Behaviour. Plenum: New York, 1977a.

GEWIRTZ, J.L., and Boyd, E.F. Does maternal responding imply reduced infant crying? A critique of the 1972 Bell and Ainsworth report. Child Dev., 1977b, 48: 1200-1207.

GOLDBERG, S., and Lewis, M. Play behaviour in the year-old infant: early sex difference. Child Dev., 1969, 40: 21-31.

GOLDFARB, W. Effects of early institutional care on adolescent personality. J. Exp. Ed., 1943, 12: 106-129.

GOREN, C.C., Sarty, M., and Wu, P.Y.K. Visual following and pattern discrimination of face-like stimuli by newborn infants. Pediatrics, 1975, 56: 544-549.

GREGG, C.L., Haffener, M.E., and Korner, A.F. The relative efficacy of vestibular - proprioceptive stimulation and the upright position in enhancing visual pursuit in neonates. Child Dev., 1976, 47: 309-314.

GREENBERG, D.J., Hillman, D., and Grice, D. Infant and stranger variables related to stranger anxiety in the first year of life. Devl. Psychol., 1973, 9: 207-212.

GREENMAN, G.W. Visual behaviour of newborn infants. In A. Solint and S. Provence (eds.), Modern Perspectives in Child Development. Int. Universities Press: New York, 1963.

HAAF., R.A. Complexity and facial resemblance as determinants of response to facelike stimuli by 5-and 10- week-old infants. J. Exp. Child Psychol., 1974, 18: 480-487.

HAAF, R.A. Visual response to complex facelike patterns by 15- and 20- week-old infants. Dev. Psychol., 1977, 13: 77-78.

HAAF, R.A., and Bell, R.Q. A facial dimension in visual discrimination by human infants. Child Dev., 1967, 38: 893 -899.

HAAF, R.A., and Brown, C.J. Infants' responses to facelike patterns: Developmental changes between 10 and 15 weeks of age. J. Exp. Child Psychol., 1976, 22:155-160.

HAITH, M.M. The response of the human newborn to visual movement. J. Exp. Child Psychol., 1966, 3: 235-243.

HARLOW, H.F. The nature of love. Am. Psychologist, 1958, 13: 673-683.

HARLOW, H.F. The development of affectional patterns in infant monkeys. In B.M. Foss, (ed.), Determinants of Infant Behaviour, Vol. 1. Methuen: London, 1961.

HARLOW, H.F. The maternal affectional system. In B.M. Foss, (ed.), Determinants of Infant Behaviour, Vol. 2. Methuen: London 1963.

HETZER, H., and Ripin, R. Fruhestes lernen des sauglings in der ernchrungssituation. Z. Psychol., 1930, 118.

HETZER, H., and Tudor-Hart, B.H. Die frühesten reaktionen auf die menschliche stimme. Quelle Stud Jugenkinde, 1927: 5.

HILTON, Irma. Differences in the behaviour of mothers toward first-and later-born children. J. Pers. and Soc. Psychol., 1967, 7: 282-290.

HILTON, I. The dependent first-born and how he grew. Paper presented at the meeting of the A.P.A., San Francisco, 1968.

HORE, T. Social class difference in some aspects of the nonverbal communication between mother and preschool child. Aust. J. Psychol., 1970, 22: 21-27.

HUTT, S.J. Square wave stimuli and neonatal behaviour: reply to Bench. J. Exp. Child Psychol., 1973, 16: 530-533.

HUTT, S.J., Hutt, C., Lenard, H.G., von Bernuth, H., and Muntjewerft, W.J. Auditory responsivity in the human neonate. Nature, 1968, 218: 888-890.

JACKLIN, C.N., Maccoby, E.E. and Dick, A.E. Barrier behaviour and toy preference: Sex differences (and their absence) in the year-old child. Child Dev., 1973, 44: 196-200.

JACOBS, B.S., and Moss, H.A. Birth order and sex of sibling as determinants of mother-infant interaction. Child Dev., 1976, 47: 315-322.

JAFFE, J. and Feldstein, S. Rhythms of Dialogue. Academic: New York, 1970.

JAFFE, J., and Stern, D.N., and Peery, J.C. "Conversational" coupling of gaze behaviour in prelinguistic human development. J. Psycholing. Res., 1973, 2: 321-329.

JOHNSON, S.M., and Bolstad, O.D. Methodological Issues in Naturalistic Observations: Some problems and solutions for field research. In L.A. Hamerlynch, L.C. Handy, and E.I. Mash (eds.), Behaviour Change: Methodology, Concepts and Practice. Research Press: Illinois, 1973.

JONES-MALFESE, V. Individual Differences in Neonatal Preferences for Planometric and Sterometric Visual Patterns. Child Dev., 1972, 43: 1289-1296.

JONES-MALFESE, V. Preferences of infants for regular and distorted facial stimuli. Child Dev., 1975, 46: 1005-1009.

KAGAN, J., Henker, B.A., Hen-Tov, A., Levine, J. and Lewis, M. Infants differential reaction to distorted and familiar faces. Child Dev., 1966, 37: 519-532.

KAGAN, J. and Lewis, M. Studies of attention in the human infant. Merrill-Palmer Quart., 1965, 11: 95-127.

KAGAN, J., and Tulkin, S.R. Social class differences in child rearing during the first year. In H.R. Schaffer (ed.), The Origins of Human Social Relations. Academic: London, 1971.

KATKOVSKY, W., Crandall, V.C. and Good, S. Parental antecedents of children's beliefs in internal-external control of reinforcements in intellectual situations. Child Dev., 1967, 38: 765-776.

KAYE, K. Toward the origin of dialogue. In H.R. Schaffer (ed.), Studies in Mother-Infant Interaction. Academic: London, 1977.

KENNELL, J.H., Jerauld, R., Wolfe, H., Chesler, D., Kreger, N.C., McAlpine, W., Steffa, M., and Klaus, M.H. Maternal behaviour one year after delivery and extended post-partum contact. Dev. Med. Child Neurol., 1974, 16: 172-179.

KLAUS, M.H., Jerauld, R., Kreger, N.C., McAlpine, W., Steffa, M., and Kennell, J.H. Maternal attachment: Importance of the first post-partum days. The New Eng. J. Med., 1972, 286: 460-463.

KLAUS, M.H. and Kennell, J.H. Mothers separated from their newborn infants. Ped. Clin. N. Am., 1970, 17: 1015-1037.

KLAUS, M.H., Kennell, J.H., Plumb, N. and Zuehlke, S. Human maternal behaviour at the first contact with her young. Pediatrics, 1970, 46: 187-192.

KLAUS, M.H., Trause, M.A., and Kennell, J.H. Does human maternal behaviour after delivery show a characteristic pattern. In R. Porter, and M. O'Connor (eds.), Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Amsterdam, 1975a.

KLAUS, M.H., Trause, M.A. and Kennell, J.H. Evidence for a sensitive period in the human mother. In R. Porter and M. O'Connor (eds.), Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Admsterdam, 1975b.

KOCH, H.L. The relation of "primary mental abilities" in five-and six-year-olds to sex of child and characteristics of his sibling. Child Dev., 1954, 25: 209-223.

KOGAN, K.L. and Gordon, B.N. A mother-instruction program: documenting change in mother-child interactions. Child Psychiat. Hum. Dev., 1975, 5: 189-200.

KOOPMAN, P.R. and Ames, E.W. Infants' preferences for facial arrangements: A failure to replicate. Child Dev., 1968, 39: 481-487.

KORNER, A.F. Neonatal, startles, smiles, erections and reflex sucks as related to state, sex and individuality. Child Dev., 1969, 40: 1039-1053.

KORNER, A.F. Visual alertness in neonates: individual differences and their correlates. Percept. Mot. Skills, 1970, 3: 499-509.

KORNER, A.F. Individual differences at birth: Implication for early experience and later development. Am. J. Orthopsychiat., 1971, 41: 608-619.

KORNER, A.F. Sex differences in newborns with special reference to differences in the organization of oral behaviour. J. Child Psychol. Psychiat., 1973, 14: 19-29.

KORNER, A.F. The effect of the infant's state, level of arousal, sex, and ontogenetic stage on the caregiver. In M. Lewis, and L.A. Rosenblum (eds.), The Origins of Behaviour. Vol. 1: The Effect of the Infant On Its Caregiver. Wiley: New York, 1974.

KORNER, A.F., and Beason, L.M. The association of two congenitally organized behaviour patterns in the newborn: Hand-mouth coordination and looking. Percep. Mot. Skills, 1972, 35: 115-118.

KORNER, A.F., Chuck, B., and Dontchos, S. Organismic determinants of spontaneous oral behaviour in neonates. Child Dev., 1968, 39: 1145-1157.

KORNER, A., and Grobstein, R. Visual alertness as related to soothing in neonates: Implications for maternal stimulation and early deprivation. Child Dev., 1966a, 37: 867-876.

KORNER, A.F., and Grobstein, R. Individual differences at birth. J. Am. Acad. Child Psychiat., 1966b, 6: 676-690.

KORNER, A.F. and Kraemer, H.L. Individual differences in spontaneous oral behaviour: In J.F. Bosma (ed.), Third Symposium on Oral Sensation and Perception: The Mouth of the Infant. Thomas: Illinois, 1972.

KORNER, A.F., and Thoman, E.B. Visual alertness in neonates as evoked by maternal care. J. Exp. Child Psychol., 1970, 10: 67-78.

KORNER, A.F., and Thoman, E.B. The relative efficacy of contact and vestibular - proprioceptive stimulation in soothing neonates. Child Dev., 1972, 43: 443-453.

KOTELCHUCK, M., Zelazo, P.R., Kagan, J. and Spelke, E. Infant reaction to parental separations when left with familiar and unfamiliar adults. J. Genet. Psychol., 1975, 126: 255-262.

LAMB, M.E. Fathers: Forgotten Contributors to Child Development. Human Dev., 1975, 18: 245-266.

LAMB, M.E. Proximity seeking attachment behaviours: A critical review of the literature. Genet. Psychol. Monogr., 1976a, 93: 63-89.

LAMB, M.E. Twelve-month-olds and their parents: Interaction in a laboratory playroom. Dev. Psychol., 1976b, 12: 237-244.

LAMB, M.E. Effects of stress and cohort on mother- and father-infant interaction. Dev. Psychol., 1976d, 12: 435-443.

LAMB, M.E. Father-infant and mother-infant interaction in the first year of life. Child Dev., 1977, 48: 167-181.

LEIDERMAN, P.H., and Seashore, M.J. Mother-infant neonatal separation: Some delayed consequences. In R. Porter and M. O'Connor (eds.), Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Amsterdam, 1975.

LEIDERMAN, P.H., Leifer, A.D., Seashore, M.J., Barnett, C.R., and Grobstein, R. Mother-infant interaction: Effects of early deprivation, prior experience and sex of infant. In J.I. Nurnberger (ed.), Biological and Environmental Determinants of Early Development, Vol. 51. Williams and Wilkins: Baltimore, 1973.

LEIFER, A.D., Leiderman, P.H., Barnett, C.R. and Williams, J.A. Effects of mother-infant separation on maternal attachment behaviour. Child Dev., 1972, 43: 1203-1218.

LENARD, H.G., von Bernuth, H., and Hutt, S.J. Acoustic evoked responses in newborn infants: the influence of pitch and complexity of the stimulus. Electroen. Clin. Neurophysiol., 1969, 27: 121-127.

LEVY, D.M. Behavioural Analysis. Thomas: Illinois, 1958.

LEWIS, M. Infants' responses to facial stimuli during the first year of life. Dev. Psychol., 1969, 1: 75-86.

LEWIS, M. State as an infant - environment interaction: an analysis of mother infant interaction as a function of sex. Merrill-Palmer Quart., 1972a, 18: 95-121.

LEWIS, M. Mothers and fathers, girls and boys: Attachment behaviour in the one-year-old. In F.J. Monks, W.W. Hartup, and J. de Wit (eds.), Determinants of Behavioural Development. Academic: New York, 1972b.

LEWIS, M. and Goldberg, G. Perceptual-cognitive development in infancy: A generalized expectancy model as a function of mother-infant interaction. Merrill-Palmer Quart., 1969, 15: 81-100.

LEWIS, M., Goldberg, S., and Rausch, M. Attention distribution as a function of novelty and familiarity. Psychonom. Sci., 1967, 7: 227-228.

LEWIS, M., Kagan, J., Campbell, H., and Kalafat, J. The cardiac response as a correlate of attention in infants. Child Dev., 1966, 37: 63-71.

LEWIS, M., and Lee-Painter, S. An interactional approach to the mother-infant dyad. In M. Lewis, and L.A. Rosenblum (eds.), The Origins of Behaviour. Vol. 1: The Effect of the Infant on its Caregiver. Wiley: New York, 1974.

LIPSITT, L.P. and Levy, N. Electrotactual threshold in the human neonate. Child Dev., 1959, 30: 547-554.

LYONS-RUTH, K. Bimodal perception in infancy: Response to auditory-visual incongruity. Child Dev., 1977, 48: 820-827.

McARTHUR, C. Personalities of first and second children. Psychiatry, 1956, 19: 47-54.

McCALL, R.B., and Kagan, J. Attention in the infant: Effects of complexity, contour, perimeter, and familiarity. Child Dev., 1967, 38: 939-952.

McCALL, R.B. and Kagan, J. Individual differences in the infant's distribution of attention to stimulus discrepency. Dev. Psychol., 1970, 2: 90-98.

MacDONALD, A.P., Jr. Internal - external locus of control: Parental antecedents. J. Consult. Clin. Psychol., 1971, 37: 141-147.

MACCOBY, E.E., and Feldman, S.S. Mother-attachment and stranger-reactions in the third year of life. Monog. Soc. Res. Child Dev., 1972, 37 (whole No. 146).

MACCOBY, E.E., and Jacklin, C.N. Stress, activity and proximity seeking: sex differences in the year-old child. Child Dev., 1973, 44:34-42.

MARTIN, R.M. Effects of familiar and complex stimuli on infant attention. Dev. Psychol., 1975, 11: 178-185.

MASTERS, J.C., and Wellman, H.M. The study of human attachment: A procedural critique. Psychol. Bull., 1974, 81: 218-237.

MELTZOFF, A.N., and Moore, M.K. Imitation of facial and manual gestures by human neonates. Science, 1977 198: 75-78.

MENDELSON, M.J. and Haith, M.M. The relation between audition and vision in the human newborn. Monogr. Soc. Res. Child Dev., 1976, 41: Serial No. 167.

MERRILL, B. A measurement of mother-child interaction. J. Ab. Soc. Psychol., 1946, 41: 37-49.

MESSER, S.B., and Lewis, M. Social class and sex differences in the attachment and play behaviour of the year-old infant. Merrill-Palmer Quart., 1972, 18: 295-306.

MILLER, W.S., and Schaffer, H.R. Visual-manipulative response strategies in infant operant conditioning with spatially displaced feed-back. J. Exp. Child Psychol., 1972, 14: 442-453.

MILLS, M., and Melhuish, E. Recognition of mother's voice in early infancy. Nature, 1974, 252: 123-124.

MIRANDA, S.B., and Fantz, R.L. Distribution of visual attention by newborn infants among patterns varying in size and number of details. Proc. 79th Ann. Conf. A.P.A., 1971, 6: 181-182.

MOFFETT, A. Stimulus complexity as a determinant of visual attention in infants. J. Exp. Child Psychol., 1969, 8: 173-179.

MOFFITT, A.R. Intensity discrimination and cardiac reaction in young infants. Dev. Psychol., 1973, 8: 357-359.

MORGAN, G.A., and Ricciuti, H.N. Infant responses to strangers during the first year of life. In B.M. Foss (ed.), Determinants of Infant Behaviour Vol. 4. Methuen: London, 1969.

MORSE, P.A. The discrimination of speech and nonspeech stimuli in early infancy. J. Exp. Child Psychol., 1972, 14: 477-492.

MOSS, H.A. Sex, age and state as determinants mother-infant interaction. Merrill-Palmer Quart., 1967, 13: 19-36.

MOSS, H.A. Early sex differences and mother-infant interaction. In R.C. Friedman, R.M. Richart, and R.L. Vande Wiele (eds.), Sex Differences in Behaviour. Wiley: New York, 1974.

MOSS, H.A., and Robson, K.S. Maternal influences in early social visual behaviour. Child Dev., 1968, 39: 401-408.

MOSS, H., Robson, K. and Pederson, K. Determinants of maternal stimulation of infants and consequences of treatment for later reactions to strangers. Dev. Psychol., 1969, 1: 239-246.

NISBETT, R.E., and Schachter, S. Cognitive manipulation of pain. J. Exp. Soc. Psychol., 1966, 2: 227-236.

OSOFSKY, J.D. Neonatal characteristics and mother-infant interaction in two observational situations. Child Dev., 1976, 47: 1138-1147.

OSOFSKY, J.D., and Danzger, B. Relationships between neonatal characteristics and mother-infant interaction. Dev. Psychol., 1974, 10: 124-130.

PAPOUŠEK, H. Experimental studies of appetitional behaviour in human newborns and infants. In H.W. Stevenson, E.H. Hess, and H.L. Rheingold (eds.), Early Behaviour: Comparative and Developmental Approaches. Wiley: New York, 1967.

PAPOUŠEK, H. and Papoušek, M. Mirror image and self-recognition in young human infants: I. A new method in experimental analysis. Dev. Psycholbiol., 1974, 7: 149-157.

PAPOUŠEK, H., and Papoušek, M. Cognitive aspects of preverbal social interaction between human infants and adults. In R. Porter and M. O'Connor (eds), Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Admsterdam, 1975.

PAPOUŠEK, H., and Papoušek, M. Mothering and cognitive headstart: Psychobiological considerations. In H.R. Schaffer (ed.), Studies in Mother-Infant Interaction. Academic: London, 1977.

PARADISE, E.B., and Curcio, F. Relationship of cognitive and affective behaviours to fear of strangers in male infants. Dev. Psychol., 1974, 10: 476-483.

PARSLEY, N.J., and Rabinowitz, F.M. Crying in the first year: An operant interpretation of the Bell and Ainsworth (1972) findings. Child Study Journal, 1975, 5: 83-89.

PIAGET, J. (1937) The Construction of Reality in the Child. Basic Books: New York, 1954.

PIAGET, J. (1947) The Psychology of Intelligence. Routledge and Kegan Paul: London, 1950.

PIPP, S.L., and Haith, M.M. Infant visual scanning of two-and three-dimensional forms. Child Dev., 1977, 48: 1640-1644.

POLLITT, J. Depression and Its Treatment. Heinemann: London, 1965.

POWELL, J., Martindale, A., and Kulp, S. An evaluation of time-sample measures of behaviour. J. App. Behav. Anal., 1975, 8: 463-469.

PRECHTL, H.R.F. Problems of behavioural studies in the newborn infant. In D. Lehrman, R. Hinde, and E. Shaw (eds.), Advances in the Study of Behaviour, Vol. 1. Academic: New York, 1965.

PREMACK, D. Toward empirical behaviour laws: I. Positive reinforcement. Psychol. Rev., 1959, 66: 219-233.

PROVENCE, S., and Lipton. R.C. Infants In Institutions. Int. Univer. Press: New York, 1962.

RAND, L.S.W. and Jennings, K.D. Reactions of infants and young children to a stranger in an unfamiliar setting. J. Genet. Psychol., 1978, 132: 197-209.

REPP, A.C., Roberts, D.M., Slack, D.J., Repp, C.F. and Berkler, M.S. A comparison of frequency, interval, and time-sampling methods of data collection. J. App. Behav. Anal., 1976, 9: 501-508.

RHEINGOLD, H.L. The effect of a strange environment on the behaviour of infants. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 4. Methuen: London, 1969.

RHEINGOLD, H.L., and Bayley N. The later effects of an experimental modification of mothering. Child Dev., 1959, 30: 363-372.

RHEINGOLD, H.L., and Eckerman, C.O. The infant's free entry into a new environment. J. Exp. Child Psychol., 1969, 8: 271-283.

RHEINGOLD, H.L., and Eckerman, C.O. The infant separates himself from his mother. Science, 1970, 168: 78-83.

RHEINGOLD, H.L. and Eckerman, C.O. Departures from the mother. In H.R. Schaffer (ed.), The Origin of Human Social Relations. Academic New York, 1971.

RHEINGOLD, H.L., Gewirtz, J.L. and Ross, H.W. Social conditioning of vocalizations in the infant. J. Comp. Physiol. Psychol., 1959, 52: 68-73.

RICCIUTI, H.N. Fear and the Development of Social Attachments in the First Year of Life. In M. Lewis and L.A. Rosenblum (eds.), The Origins of Fear. Wiley: New York, 1974.

RICHARDS, M.P.M. Social interaction in the first weeks of human life. Psychiat. Neurol. Neurochir., 1971a, 74: 35-42.

RICHARDS, M.P.M. A comment on the social context of mother-infant interaction. In H.R. Schaffer (ed.), The Origins of Human Social Relations. Academic: London, 1971b.

RICHARDS, M.P.M. and Bernal, J.F. Social interaction in the first days of life. In H.R. Schaffer (ed.), The Origins of Human Social Relations. Academic: London, 1971.

RICHARDS, M.P.M. and Bernal, J.F. An observational study of mother-infant interaction. In N. Blurton-Jones (ed.), Ethological Studies of Child Behaviour. Cambridge University Press: Cambridge, 1972.

ROBSON, K.S. The role of eye-to-eye contact in mother infant attachment. J. Child. Psychol. Psychiat., 1967, 8: 13-25.

ROSEN, B.C. Family structure and achievement motivation. Amer. Sociol. Rev., 1961, 26: 574-585.

ROSENTHAL, M.K. Attachment and mother-infant interaction: some research impasse and a suggested change in orientation. J. Child Psychol. Psychiat., 1973 14: 201-207.

ROSS, G., Kagan, J., Zelazo, P., and Kotelchuck, M. Separation protest in infants in home and laboratory. Dev. Psychol., 1975, 11: 256-257.

ROTTER, J.B. Social Learning and Clinical Psychology. Prentice-Hall: Englewood Cliffs, N.J., 1954.

ROTTER, J.B., Generalised expectancies for internal vs external control of reinforcement. Psychol., Monogr., 1966, 80: (1, whole No. 609).

ROUTH, D.K. Conditioning of vocal response differentiations in infants. Dev. Psychol., 1969, 1: 219-226.

RUFF, H.A., and Birch, H.G. Infant visual fixation: the effect of concentricity, curvilinearity and number of directions. J. Exp. Child Psychol., 1974, 17: 460-473.

SALAPATEK, P., and Kessen, W. Visual scanning of triangles by the human newborn. J. Exp. Child Psychol., 1966, 3: 155-167.

SAMEROFF, A.J. The components of sucking in the human newborn. J. Exp. Child Psychol., 1968, 6: 607-623.

SAMPSON, E.E. Birth order, need achievement and conformity. J. Ab. Soc. Psychol., 1962, 64: 155-159.

SCANLON, J.W., Brown, W.U., Weiss, J.B. and Alper, M.H. Neurobehavioural responses of newborn infants after maternal epidural anaesthesia. Anesthesiology, 1974, 40: 121-128.

SCARR, S., and Salapatek, P. Patterns for development during infancy. Merrill-Palmer Quart., 1970, 16: 53-90.

SCHACHTER, S. The interaction of cognitive and physiological determinants of emotional state. Adv. Exp. Soc. Psychol., 1964, 1: 49-80.

SCHACHTER, S., and Singer, J.E. Cognitive, social and physiological determinants of emotional state. Psychol. Rev., 1962, 69: 379-399.

SCHAFFER, H.R. Some issues for research in the study of attachment behaviour. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 2. Methuen: London, 1963.

SCHAFFER, H.R. The onset of fear of strangers and the incongruity hypothesis. J. Child Psychol. Psychiat., 1966 , 7: 95-106.

SCHAFFER, H.R. and Emerson, P.E. The development of social attachments in infancy. Monogr. Soc. Res. Child Dev., 1964a, 29: Serial No. 94.

SCHAFFER, H.R., and Emerson, P.E. Patterns of response to physical contact in early human development. J. Child Psychol. Psychiat., 1964b 5: 1-13.

SCHWARTZ, A., Rosenberg, D. and Brackbill, Y. An analysis of the components of social reinforcement of infant vocalizations. Psychon. Sci., 1970, 20: 323-325.

SEARS, R.R. The learning theory of Robert R. Sears. In H.W. Maier, Three Theories of Child Development. Harper and Row: New York, 1965.

SEARS, R.R., Maccoby, E.E., and Levin, H. Patterns of Child Rearing. Row, Peterson: Evanston, Illinois, 1957.

SEASHORE, M.J., Leifer, A.D., Barnett, C.R. and Leiderman, P.H. The effects of denial of early mother-infant interaction on maternal self-confidence. J. Pers. Soc. Psychol., 1973, 26: 369-378.

SHAW, C. A comparison of the patterns of mother-baby interaction for a group of crying, irritable babies and a group of more amenable babies. Child: Care, Health and Development, 1977, 3: 1-12.

SHIPLEY, W.U. The demonstration in the domestic guinea pig of a process ressembling classical imprinting. Animal Behav., 1963, 11: 470-474.

SHNIDER, S.M., and Moya, F. Effect on infant of morphine administration in labour. Am. J. Obst. Gynec., 1964, 89: 1009-1015.

SIQUELAND, E.R., and Lipsitt, L.P. Conditioned headturning in human newborns. J. Exp. Child Psychol., 1966, 3: 356-376.

SKARIN, K. Cognitive and contextual determinants of stranger fear in six-and eleven-month-old infants. Child Dev., 1977, 48: 537-544.

SKINNER, B.F. Science and Human Behaviour. Macmillan: New York, 1953.

SPELKE, E. Infants' intermodal perception of events. Cognitive Psychol., 1976, 8: 553-560.

SPELKE, E., Zelazo, P., Kagan, J., and Kotelchuck, M. Father interaction and separation protest. Dev. Psychol., 1973, 9: 83-90.

SPITZ, R.A. and Wolf, K.M. The smiling response: A contribution to the ontogenesis of social relations. Genet. Psychol. Monogr., 1946, 34: 57-125.

SROUFE, L.A., and Waters, E. Attachment as an Organisational Construct. Child Dev., 1977, 48: 1184-1199.

STAYTON, D.J. and Ainsworth, M.D.S. Individual differences in infant responses to brief, everyday separations as related to other infant and maternal behaviours. Dev. Psychol., 1973, 9: 226-235.

STAYTON, D.J., Ainsworth, M.D.S. and Main, M.B. Development of separation behaviour in the first year of life: protest, following, and greeting. Dev. Psychol., 1973, 9: 213-225.

STAYTON, D.J.., Hogan, R. and Ainsworth, M.D.S. Infant obedience and maternal behaviour: the origins of socialization reconsidered. Child Dev., 1971, 42: 1057-1069.

STECHLER, G. Newborn attention as affec ted by medication during labour. Science, 1964, 144: 315-316.

STERN, D.N. A micro-analysis of mother-infant interaction: Behaviour regulating contact between a mother and her 3½ month-old twins. Amer. Acad. Child Psychiat., 1971, 10: 501-517.

STERN, D.N. Mother and infant at play: The dyadic interaction involving facial, vocal and gaze behaviour. In M. Lewis, and L.A. Rosenblum (eds.), The Origins of Behaviour. Vol. 1: The Effect of the Infant On Its Caregiver. Wiley: New York, 1974.

STERN, D.N. Beebe, B. Jaffe, J., and Bennett, S.L. The infant's stimulus world during social interaction: a study of caretaker behaviours with particular reference to repetition and timing. In H.R. Schaffer (ed.), Studies in Mother-Infant Interaction. Academic: London, 1977.

STEWART, R.A.C., and Gorringe, E.I. Socio-economic status in New Zealand: An updated empirical index and its relationship to other N.Z. empirical and statistical indices. N.Z. Psychologist, 1977, 6: 25-30.

SUTTON-SMITH, B., Roberts, I.M., and Rosenberg, B.G. Sibling associations and role involvement. Merrill-Palmer Quart., 1964, 10: 25-38.

TAUTERMANNOVA, M. Smiling in infants. Child Dev., 1973, 44: 701-704.

TENNES, K.H. and Lampl, E.E. Stranger and separation anxiety in infancy. J. Nerv. Ment. Dis., 1964, 139: 247-254.

THOMAN, E.B. Sleep and Wake Behaviours in neonates: consistencies and consequences. Merrill-Palmer Quart., 1975a, 21: 296-314.

THOMAN, E.B. Development of synchrony in mother-infant interaction in feeding and other situations. Proc. Fed. Am. Soc. Exp. Biol., 1975b, 34: 1587-1592.

THOMAN, E.B. How a rejecting baby affects mother-infant synchrony. In R. Porter and M. O'Connor. Ciba Foundation Symposium: Parent-Infant Interaction. Elsevier: Amsterdam, 1975c.

THOMAN, E.B., Barnett, C.R. and Leiderman, P.H. Feeding behaviour of newborn infants as a function of parity of the mother. Child Dev., 1971, 42: 1471-1483.

THOMAN, E.B., Korner, A.F., and Beason-Williams, L. Modification of responsiveness to maternal vocalization in the neonate. Child Dev., 1977, 48: 563-569.

THOMAN, E.B., Leiderman, P.H., and Olson, T.P. Neonate-mother interaction during breast feeding. Dev. Psychol., 1972, 6: 110-118.

THOMAN, E.B., Turner, A.M., Leiderman, P.H., and Barnett, C.R. Neonate-mother interaction: effects of parity on feeding behaviour. Child Dev., 1970, 41: 1103-1111.

THOMAS, H. Visual-fixation responses of infants to stimuli of varying complexity. Child Dev., 1965, 36: 629-638.

THOMAS, H. Unfolding the baby's mind: The infant's selection of visual stimuli. Psych. Rev., 1973, 80: 468-488.

TODD, G.A., and Palmer, B. Social reinforcement of infant babbling. Child Dev., 1968, 39: 590-596.

TOLMAN, E.C. There is more than one kind of learning. Psychol. Rev., 1949, 56: 144-155.

TRACY, R.L., Lamb, M.E., and Ainsworth, M.D.S. Infant approach behaviour as related to attachment. Child Dev., 1976, 47: 571-578.

TREHUB, S.E., and Chang, H. Speech as reinforcing stimulation for infants. Dev. Psychol., 1977, 13: 170-171.

TREHUB, S.E. and Rabinovitch, M.S. Auditory-linguistic sensitivity in early infancy. Dev. Psychol., 1972, 6: 74-77.

TRONICK, E.D., Als, H., and Brazelton, T.B. Mutuality in mother-infant interaction. J. Commun., 1977, 27: 74-79.

TULKIN, S.R. Social class differences in attachment behaviour of ten-month-old infants. Child Dev., 1973, 44: 171-174.

TULKIN, S.R. AND Kagan, J. Mother-child interaction in the first year of life. Child Dev., 1972, 43: 31-41.

UCKO, L.E. A comparative study of asphyxiated and non-asphyxiated boys from birth to five years. Dev. Med. Child Neurol., 1965, 7: 643-657.

WALTERS, J., Connor, R., and Zunich, M. Interactions of mothers and children from lower class families. Child Dev., 1964, 35: 433-440.

WALTERS, R.H. and Parke, R.D. The role of distance receptors in the development of social responsiveness. Adv. Child Dev. Behav., 1965, 2: 59-96.

WATERS, E. The reliability and stability of individual differences in mother-infant attachment. Child Dev., 1978, 49: 483-494.

WATERS, E., Matas, L. and Sroufe, L.A. Infants reactions to an approaching stranger: Description, validation, and functional significance of wariness. Child Dev., 1975, 46: 348-356.

WATSON, J.S. Memory and "contingency analysis" in infant learning. Merrill-Palmer Quart., 1967, 13: 55-76.

WATSON, J.S. Operant conditioning of visual fixation in infants under visual and auditory control. Dev. Psychol., 1969, 1: 508-516.

WATSON, J.S. and Ramey, C.T. Reactions to response-contingent stimulation in early infancy. Merrill-Palmer Quart., 1972, 18: 219-228.

WEIR, C. Auditory frequency sensitivity in the neonate: A signal detection analysis. J. Exp. Child Psychol., 1976, 21: 219-225.

WEISBERG, P. Social and nonsocial conditioning of infant vocalizations. In Y. Brackbill and G.G. Thompson (eds.), In Behaviour in Infancy and Early Childhood. The Free Press: New York, 1967.

WELLER, G., and Bell, R. Basal skin conductance and neonatal state. Child Dev., 1965, 36: 647-657.

WERTHEIMER, M. Psychomotor coordination of auditory - visual space at birth. Science, 1961, 134: 1692.

WHITE, B.L., and Castle, P.W. Visual exploratory behaviour following postnatal handling of human infants. Percept. Mot. Skills, 1964, 18: 497-502.

2

WILCOX, B.M. Visual preferences of human infants for representations of the human face. J. Exp. Child Psychol., 1969, 7: 10-20.

WILCOX, B.M., and Clayton, F.L. Infant visual fixation on motion pictures of the human face. J. Exp. Child Psychol., 1968, 6: 22-32.

WILLEMSON, E., Flaherty, D., Heaton, C., and Ritchey, G. Attachment behaviour of one-year-olds as a function of mother vs father, sex of child, session, and toys. Genet. Psychol., Monogr., 1974, 90: 305-324.

WOLFF, P.H. Observations on the early development of smiling. In B.M. Foss (ed.), Determinants of Infant Behaviour, Vol. 2. Methuen: London, 1963.

WOLFF, P.H. The natural history of crying and other vocalizations in early infancy. In B.M. Foss (ed.). Determinants of Infant Behaviour, Vol. 4. Methuen: London, 1969.

ZUNICH, M. A study of relationships between child rearing attitudes and maternal behaviour. J. Exp. Ed., 1961, 30: 231-241.