THE MICRO-CHARACTERISTICS OF
ADULT-NEONATE SOCIAL INTERACTION

by

Ann Marie Berghout Austin

A thesis submitted in partial fulfillment
of the requirements for the degree

of

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in

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Approved:

________________________
Major Professor

________________________
Committee Member

________________________
Committee Member

________________________
Dean of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

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Ann Marie Berghout-Austin
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Abstract

The Micro-Characteristics of Adult-Neonate Social Interaction

by

Ann Marie Berghout-Austin, Master of Science

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Major Professor: Dr. J. Craig Peery
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In order to dissect social behaviors into their smallest components, five interactions, each involving one neonate and one adult, were video taped and kinescoped into 16mm black and white film exposed at 24 frames per second. The film was analyzed frame by frame and all starts, stops, and changes in direction of movements were scored. Adult movement durations were significantly shorter during vocalization and longer during nonvocalization. Each infant and adult body part had its own characteristic movement rate. Almost two-thirds of the dyadic movements were interactionally synchronous and most of the synchronization occurred during vocalization. It is suggested that this behavior comprises an interactional code, innately biased to encourage mutual attachment between parents and infants. Further, it is suggested that the neonate is continually decoding incoming family socialization messages and encoding and relaying her/his own temperament messages which may or may not be harmonious with the overall family temperament.
Introduction

Nearly all behaviorists believe that the child’s early socialization experiences determine to a great extent her/his adult personality and perspective. This notion delegates a tremendous responsibility to parents, and parents, with varying degrees of trepidation, have usually been quick to accept the challenge. Then comes the equivocalness, for if the challenge has been explicit the means of meeting it have not. Infant personality and socialization theories have been particularly polemical. A theoretical foundation concerning the best infant socialization technique does not exist; rather, a new zeitgeist emerges every so often, is enthusiastically espoused, then discarded or discounted as the trend changes. Hence, the common theme, a behavioral given, remains, namely that early infant experiences can be etiological of later personality. However, the best method of socializing toward this personality is continually being questioned and reformulated.

This study suggests that theories are inconclusive and easily discarded because of two fallacious research practices. First, behaviorists generally measure only those things which can be seen or heard in vivo. Second, the instrumentation tends to be crude. The assumption is that if questionnaires and rating scales are well enough worded and specific enough and if the subjects are properly or randomly chosen absolute behaviors will be accurately measured.
Contrarily, the present study suggests that meaningful behavior also exists on a level not measurable through *in vivo* observation. This behavior takes the form of a nonverbal code which is mutually understood and contributed to by infant and adult. Further, this code must be approached with finite, sensitive measuring devices; therefore, data gathering and analyzing techniques especially suited to precision analyses will be used and discussed. It is assumed that by dissecting behavior into its atomic components, a more exact understanding of the processes of adult-infant socialization will ensue.

**The Pliant Child as a Lilliputian**

Traditionally, infant theories have been concerned consciously or unconsciously with dependent and independent variables. Because the infant was considered a bland and malleable organism (Bridges, 1932) she/he was cast almost exclusively as the dependent variable, being manipulated and conditioned by caretakers and environment. She/he was molded after an adult model and for centuries was treated as a lilliputian. She/he was dressed as a miniature adult and socialized directly into an adult society with its characteristic manners and *mores*. A generalized notion of childhood did not exist (Aires, 1962).

To a very modified extent this notion permeated the child rearing philosophies of the early 20th century. The youngster now had a childhood, but Watson, a vocal authority of the day, believed that if properly reared the child would still fit agreeably into an adult world. Watson advised parents
that the infant was best trained through "rigid scheduling and careful dosing of manifest affection" (Escalona, 1949, p. 160), and furthermore issued a vendetta against maternal affection, feeling that it did not effectively socialize the child into her parents' world (Watson, 1928). He urged rigid circumspection concerning overt signs of maternal affection and cautioned, "mother love is a dangerous instrument. An instrument which may wreck your adult son or daughter's vocational future and their chances for marital happiness" (p. 3).

Implicit in these theories was the notion of infant lability. To Watson, proper infant care and training could even override genetic factors; hence his belief (Watson, 1924) that he could mold any "healthy" child to fit any role regardless of the child's hereditary components.

The Pliant Child and Environment

In the 1930's and 1940's philosophies of infant development embraced Freudianism (Stone & Church, 1968). The infant was still labile, but the techniques of molding had changed. The new era brought a concern for environmental factors. The child was no longer ushered immediately after birth into an adult society, and developmental specialists were particularly concerned that the infant was not inhibited or frustrated by early experiences. Ways in which adults exercised environmental manipulation were studied with particular emphasis on feeding and training regimes.
Early feeding experiences. It was thought that the infant's early feeding experiences were crucial determinants of adult personality characteristics. Improper or inept feeding patterns in the early months of life were tantamount to emotional difficulties later on (Fenichel, 1945; Sewell & Mussen, 1952).

Rogerson and Rogerson (1939) reported that as bottle fed children grew they exhibited more fearfulness, nervousness, and feeding difficulties than did breast fed children, while Hoefner and Hardy (1929) noted that bottle fed children were slower in learning to talk.

Weaning schedules were considered vitally important, with researchers attempting to denote critical periods when weaning could be successfully accomplished. Results seemed idiosyncratic for each study. Childers and Hamil (1932) compared feeding regimen with certain "undesirable behavior manifestations," among them "hyperactivity, disobedience, enuresis, cruelty, sex delinquency, masturbation, and thumbsucking" (p. 140), and from their data established an order of abnormal behavior. Those children most likely to show deviant behavior were weaned between the first and sixth months. Next were the children who had never been breast fed, followed by those for whom breast feeding had continued into the "normal" period for weaning. Those children least likely to show undesirable characteristics were those for whom breast feeding had been prolonged past 11 months.

Pearson (1931) felt that children breast fed less than 6 months or longer than 10 months were more apt to be "placid, antagonistic toward
siblings, disobedient, sulky, nervous, spiteful, and to show an indulgence in sex play" (p. 289).

Confusion over weaning time was further perpetuated by Maslow and Szilagyi-Kessler (1946) who reported that children who were never breast fed or those breast fed longer than a year seemed more secure than those breast fed for an intermediary period.

Sphincter training. Sphincter training was considered another way in which parents crucially manipulated a child's environment. It was believed that the infant "derived a great deal of erogenous pleasure from its bowel movements" (Orlansky, 1949, p. 17), and when this pleasure was frustrated or inhibited through improper training techniques the child became parsimonious and compulsive (Murphy, 1947).

Huschka (1942) believed that if a child were coercively trained she/he might psychosomatically retort with constipation and rage, while Hamilton (1929) cautioned that inept training could be ontogenetic of adult sadism and masochism.

In summary, environmental manipulation to reduce the infant's frustrations was the prime directive of the 1930's and 1940's. Particularly important were the manipulation procedures of feeding and training. Theories were intricate and contradictory, and, as Orlansky (1949), Sewell and Mussen (1952), McCandless (1961), and Kagan and Moss (1962) observed, inconclusive. The emphasis shifted again, this time to the effects of parental attitudes, and
particularly those of the omnipotent mommie, on the developing infant (Escalona, 1949).

The Pliant Child and the Omnipotent Mommie

Although the emphasis shifted from the environment to the parent, the infant was still a pliant organism. Orlansky (1949) remarked dryly that "one gets the general impression that every infant hovers on the border of death and that the balance in the direction of life must be tipped by adequate mothering" (p. 12).

Meeting the infant's emotional needs became paramount in developmental theories, with these needs establishing priority even over physical ones (Escalona, 1949). The mother was omnipotent, conveying to her child verbally and nonverbally a wide configuration of hopes, fears, attitudes, and intentions. Escalona (1949) observed:

It seems as though contentment and even normal development for the child can be attained only at the cost of great self-denial on the part of the parents. The mother must subordinate her need for sleep, for recreation, for getting the housework done or for pursuing non-domestic interests at all times. (p. 160)

Causality was traced to patterns of mothering with the mother always, and undeniably, guilty (Chess, Thomas, & Birch, 1975).

One area considered particularly sensitive to mothering techniques was that of social responsiveness. Rheingold (1956) and Ainsworth (1973) postulated that the child's attitude toward others is a response learned from her/his mother or caretaker. Kagen (1971) noted that the institutionalized
child who must share one caretaker with other infants is subnormal in social behavior and language development.

The pliant infant, then, was an anthropomorphic lump, to be molded and fashioned or unwittingly crippled by the omnipotent mommie. The child was wholly dependent on Mom in a symbiotic manner. This mother-infant dependence has come to be seen as a primary relationship and has been transformed into attachment theory.

**Attachment Theory**

The term "attachment" was first used by Bowlby (1958) to describe the child's affectional tie to the mother, and attachment theories developed thereafter in an effort to measure these important bonds. Attachment presumably develops from the quantity, quality, and timing of mother-infant interaction (Ainsworth & Bell, 1969) and is measured by the amount of contact and proximity seeking behaviors the infant displays when separated from her/his mother (Ainsworth, 1973; Kagan, 1971; Schaeffer & Emerson, 1964).

According to Ainsworth (1973) an infant becomes securely attached to her/his mother only if certain conditions are met. The child needs to be involved in a sufficient amount of interaction with the mother or attachment figure. This interaction must occur within the critical period when attachment can be formed, or the interval from the beginning of the child's second month to the 18th or 24th month. The interaction should be of a certain nature; that is, "the amount of mother-infant interaction determines whether the infant
becomes attached, but the kind of interaction shapes the quality of the attachment" (Ainsworth, 1973, p. 55).

Ainsworth (1973) further contends that the baby is not a passive member of the mother-infant dyad but rather a contributor to the attachment process too. Through changes of state and behavior the child responds to her/his mother and the quality of this response determines the kind and amount of future stimulation she/he will receive from Mom.

Bowlby (1969), Jones and Leach (1974), and Rosenthal (1973), have explicated certain problems in the attachment theory. Bowlby (1969) suggests that crying and clinging, behaviors sometimes used to measure attachment, are actually inversely related to amounts of mothering. Jones and Leach (1974) argue that some securely attached children might readily move away from their mothers because they are independent rather than unattached.

Rosenthal (1973) questions the entire approach to attachment, suggesting instead that attachment be studied as an interactional pattern rather than an outcome from an interaction. Accordingly, researchers should investigate which interactions are attachment ones rather than trying to identify which parent-child dyads are attached.

Certainly attachment, and indeed the ontogeny of all social relationships, are important concerns in child development today. As a new theory, however, the attachment concept has many problems and unanswered questions which need to be investigated in order to understand human relationships.
The "Other" Parent

While infant studies have traditionally been concerned with the mother-infant dyad, more recent investigations have discovered the "other" parent, the "shadow" father. Typically such studies have mirrored the mother-infant format, since they studied a dyad, but this time with a father variable. Particularly have fathers and infants been observed in attachment investigations with variegated results. Spelke, Zelazo, Kagan, and Kotelchuck (1973) correlated the degree of daily father-infant interaction with the amount the infant protested when separated from her father. Children who experienced low father involvement cried more at his departure than did infants experiencing either medium or high father involvement. Girls showed more proximity-seeking and vocalization behavior to their mothers than to their fathers. Boys more often vocalized to and sought proximity with, their fathers. Ban and Lewis (1974) reported somewhat different results. They found that both boys and girls spent more time in proximity seeking behavior to their mothers than to their fathers. Cohen and Campos (1974) found that mothers elicited more attachment behaviors from infants, while Lamb (1975a), studying the infants in their homes, reported that fathers were preferred over mothers. However, in a later laboratory situation, Lamb (1975b) indicated that the father preference disappeared. Adding to the disparity were the findings of Keller, Montgomery, Moss, Sharp, and Wheeler (1975). They reported more distress behaviors directed toward mothers and more proximity responses shown to fathers.
Obviously, attempts to measure the attachment bond of parents and infants have yielded equivocation. Certainly the concern of parent-infant relationships is a pertinent one, but perhaps it needs to be approached with different questions and more finite measuring devices. It is possible that we are using a yardstick when we should be concerned with an angstrom.

Yarrow (1963) has observed that behavioral research always proceeds from the unidimensional to the complex "wherein simple methods on limited problems uncover complexities which demand new and more sensitive methods" (Stolz, 1965). Hence, as research becomes increasingly more complex investigators extend, modify, and even contradict the efforts of previous behaviorists. As an example, researchers now are warily examining unidirectional causality theories. It is a simple equation that certain kinds of parenting techniques yield certain kinds of children. Now behaviorists see the need to extend the paradigm, and many of them are doing this as they turn to the child. Does she/he contribute anything to the interaction, and if so, what is it and how must it be measured.

The Infant as an Independent Variable

Dissatisfaction with unidirectional theories of infant development has led investigators to agree that there occurs a reciprocity of signals, with the infant and her/his parents both providing stimulus and both having an effect upon each other (Bowlby, 1969). Chess, Thomas, and Birch (1975) have agreed that the infant, far from being a bland organism, brings a constellation
of factors into any interaction. These include the infant's activity level, regularity, approach or withdrawal responses in a novel situation, adaptability to change, level of sensory threshold, positive or negative mood, intensity of response, distractractibility, and persistence and attention span (pp. 28-32).

Bell (1974) has suggested that the infant is genetically biased to elicit parental behavior. That is "the thrashing and uncoordinated limb movements create an appearance of helplessness" (p. 2). Furthermore, the child's typically small face and large cheeks stimulate her/his parents' interactions (Tinbergen, 1951).

In many nonverbal ways the infant effectively elicits and reinforces her/his parents' vocal and nonvocal attention. Very soon after birth she/he is able to turn her/his head in response to sound (Wertheimer, 1966; Wolff, 1959). During her/his second week she/he smiles responsively to a high-pitched human voice (Wolff, 1959). Not only does this smile initiate great excitement for her/his parents, but it also acts as a signaling device stimulating increased parental involvement with the child (Bowlby, 1958). The infant has an effect on her/his parents through gazing as it too becomes an elicitor of parental interaction (Ainsworth, 1973; Robson, 1967).

Through changes of state the infant manipulates play and caregiver activities. Thus, Bell (1974) observed that an infant tends to babble much more when she/he is by herself/himself. These vocalizations are irresistible
to her/his caregiver who usually drops her own activities to interact with the child.

This new focus of infant manipulation has encouraged studies of parent-infant interactional systems (Pedersen, 1975; Yarrow, 1974), and from these investigations a pertinent observation:

In my own thinking I have reached the conclusion that we should temporarily suspend outcome-oriented studies and concentrate our research on understanding the process of family interaction with young infants. Only when we know about the networks of reciprocal interactions can we approach the problem of antecedent-consequent relations with enough understanding to do justice to the task. (Pedersen, 1975, p. 9)

A new study focus of interactive processes is suggested then, the suggestion having been precipitated by the inconclusiveness of the past research. Investigators now are encouraged to study the mutuality of parent-infant interactions with the assumption that neither parent nor infant solely manipulates the other and both are co-contributors to the relationship.

Certainly researchers, as Pedersen (1975) suggests, must ask the right questions in their research. A second requirement is that they measure their findings in the most appropriate way. One very rigorous and exacting method is to subject human interactions to a micro-analysis. In this way a behavior can be dissected into its most atomical components, and causes and effects can be measured without contamination.
A Micro-Analysis of Interaction

A micro approach to interaction brings two new assumptions to human research. First it is assumed that social interaction is more than the audible and gross gestural components which are easily discernible in vivo. Rather it also includes many subtle "adjustments to the presence and activities of other human beings" (Birdwhistell, 1970, p. 48). These behavioral adaptations comprise a communication system of which we are hardly aware, but which is of great importance in human interaction. Infants must internalize the kinesics of their social system in order to adapt to society. Unsuccessful assimilation implies a deficient or deviant child (Birdwhistell, 1970).

Second it is assumed that certain data gathering tools, among them the sound camera, slow motion analyzer, and tape recorder are better adapted to this analysis of human interactional kinesics than conventional methods of questionnaires and in vivo observations.

Several researchers have used the micro approach with fascinating results. For example, using film to study social interaction between a primiparous mother and her male twins, Stern (1971) discovered the beginning of successful and unsuccessful internalization of social rules. It was found that one twin at 3 months usually responded to his mother by turning his head and closing his eyes. When he was able to walk he still continued the head turning and coupled this with running away. Observations when the child was 2 years old indicated he had maintained his avoidance behavior. Contrarily, at 3 months the other twin displayed more positive interaction with his mother,
and at 14 months he was not as inclined to run away from her. Stern also observed that the behavior of the "avoiding" twin seemed to have extended to situations which did not involve his mother; that is, he had become a frightened child who was unable to maintain prolonged eye contact with others. He responded to all social situations with extreme head turning.

Condon and Ogston (1966) related interactional kinesics with speech inflections. Using a sound movie film they were able to demonstrate with two "normal" adults "harmonious or synchronous organization of change between body motion and speech in both intra-individual and interactional behavior" (p. 338). Furthermore, Condon and Ogston reported "self-dyssynchrony" (p. 344) in the movements of a schizophrenic patient interacting with his therapist. Later, Condon and Sander (1974) exposed normal neonates to adult speech and discovered, from a frame-by-frame film analysis, that the infants moved synchronously with the speech stress points.

Jaffe, Stern, and Peery (1973) considered another facet of interaction in their analysis of the gazing behaviors between mothers and their infants. They discovered certain mathematical regularities to the gaze patterns which, they suggest, may indicate that gazing comprises a prelinguistic communicative system for the dyad. The authors speculate that this system develops within its own dimension, being a precursor not of the linguistic communicative system, but rather of later gazing patterns.

Peery and Stern (1976) analyzed mother-infant gazing in yet another way. They established frequency distributions for gaze durations and found
that the distributions were identical in every case and furthermore approximated power functions. Their results suggest that perhaps there is a predictable pattern for all "normal human gazing" (p. 10).

The micro-analysis of interaction is a necessary approach toward an understanding of social dynamics because it effectively breaks behavior into its smallest components. Through this approach research results are not compromised by treating a macro behavior as an absolute or finite one. As an example, the results of parent-infant attachment studies have been particularly disparate; however, perhaps the disparity could have been erased if investigators had approached the study from a macro level. Instead of computing the gross number of proximity-seeking behaviors the child directed toward a particular parent, investigators could have micro-examined the number and quality of subtle proximity-seeking behaviors the child's head, hands, and feet were making in response to nonverbal messages being sent by the parent. It is possible that children who would be very securely attached according to micro-measures would be poorly attached according to macro-measures simply because the dyad had developed such a subtle nonverbal code to relay proximity-seeking behaviors. Perhaps in this way, micro methods can supply the needed direction and precision to lay a solid footing of causalities in infant theory.
Summary

A study of infant development theories reveals a topic particularly fraught with polemics. Repeatedly hypotheses have been initiated with great zeal and then discarded just as zealously, often to accept their antithesis. Thus we find a Watsonian stance which saw the child treated and molded as a miniature adult in historical juxtaposition with the concern of the 1930's and 1940's that the child should not be frustrated and inhibited by her environment (Stone & Church, 1968). A common thread exists, however, and is expressed by Kagan and Moss (1962), McCandless (1961), Orlansky (1949), Thomas, Chess, Birch, Hertzig, and Korn (1971), and Yarrow (1963) that definitive causality concerning a child's emotional, social, and intellectual development can not be assigned.

Although relatively unsubstantiated by empirical investigations, the notion has persisted that early infant experiences mold an individual’s personality. Scientists have attempted to test this postulation using macroscopic measurements of gross variables. Their results have not been conclusive (Kagan & Moss, 1962; McCandless, 1961; Orlansky, 1949; Thomas et al., 1971; Yarrow, 1963). Perhaps this is because investigators have used methods which are imprecise to approach variables far too global.

Sound film, the slow motion analyzer, and the tape recorder have recently been used to allow a more finite scrutiny of infant behavior. Thus, certain interactional kinesics have been isolated and investigated. These techniques finitely dissect behavior in such a way that variables indiscernible
in vivo may be discovered and measured from film and tape analyses. From these methods behaviorists are beginning to explore the microscopic rules of social interaction with the expectation that they will crack the interactional "code;" that is, they will learn certain rules of social response which explain the etiology of "normal" and "deviant" behaviors as well as how those behaviors are transferred and assimilated. It is possible that such studies can create a foundation of infant theory which is both exacting and exact.
Objective

The neonate represents human life in one of its earliest forms; hence, if causality is assigned between infant socialization and later adult personality, investigators must examine this primal stage. Behaviorists have done this with a traditional concern of the unidirectional effects of caretaker on child. Their results have generally been inconclusive. They have been unable to establish a firm causal link between early experiences and later personality, thus necessitating a further search for a more definitive approach. Recently it has been postulated that the child is affected by an interactional system, both verbal and nonverbal, in which, even as a neonate, she/he is a very real and contributing member. Within this system it is assumed that there occurs a reciprocity of signals between infant and caretaker which effectively elicit, modulate and terminate the behavior of each.

The purpose of this study was to examine the nonverbal characteristics of such an adult-neonate interactional system. It was postulated that this system constitutes a nonverbal code with its own special grammar and syntax. Through a frame-by-frame film analysis such a code was measured as an adult experimenter spoke to a neonate and moved as she/he was speaking. Variables such as head turning, movements of different body parts, and interactional synchrony were considered in one individual as they related to the

Method
subtle kinesics of the other person. Interactional synchrony, a phenomenon first observed by Condon and Ogston (1966), was defined as any start, stop, or change in the movements of one individual which occurred simultaneously or within one frame of any start, stop, or change in the movements of the other person.

Subjects

Five normal, full-term neonates, three males and two females, were used. These infants were white, middle-class babies, free from complications of pregnancy and delivery, who had Apgar scores ranging from 8 to 10. Each infant had a birth weight above 2500 grams. During delivery their mothers received little or no anesthesia. At the time of the investigation the infants ranged from 30 to 56 hours old.

Two white, middle-class, female college students served as investigators or experimenters.

Data Collection

Awake infants were taken from the Logan hospital nursery to an adjoining room. They were placed in a reclining infant chair and the experimenter interacted with them, speaking and moving as freely as she would in any other situation where she was admiring a new baby; however, she was instructed not to touch the infants so that the interactive process could be restricted as completely as possible to auditory and visual input.
Two video cameras, one for the experimenter and one for the neonate, were used to record the interaction. Thus a split screen image was seen when analyzing the data.

**Data Analysis**

The video tape was kinescopied into 16mm black and white film at 24 frames per second. It was examined frame by frame with a hand-operated Projectola 16mm Professional Viewer, model LB 1600. Frames were counted with an Einzelbilder frame counter.

Data were recorded on a tally sheet with the columns representing body parts and the rows representing time as measured in frames (see Appendix). Using arrows drawn through frame squares, all starts, stops and changes in movement of individual body parts were recorded.

Table 1 summarizes the data analyzed for each dyad according to the total number of seconds, frames viewed, and movements catalogued.

The data were analyzed on two levels. First the movements of the individual were studied. Second, the activities of the adult and infant as a dyad were investigated.

The adult was analyzed by scoring all movements of her head, right hand, and torso, while the child was analyzed by scoring the movements of head, right hand, left hand, right foot, and left foot. These movements were then examined four ways. First, movement durations by third second intervals were summarized through frequency distributions to determine if certain
Table 1
Summary of Data Analyzed

<table>
<thead>
<tr>
<th>Subject</th>
<th>No. of Data Analyzed</th>
<th>No. of Frames Analyzed</th>
<th>No. of Movements Analyzed</th>
<th>Adult</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>POF*</td>
<td>20</td>
<td>480</td>
<td>54</td>
<td>54</td>
<td>46</td>
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<tr>
<td>KM</td>
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</tr>
<tr>
<td>BF</td>
<td>13</td>
<td>312</td>
<td>28</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>DM</td>
<td>20</td>
<td>480</td>
<td>62</td>
<td>62</td>
<td>31</td>
</tr>
<tr>
<td>JM</td>
<td>26</td>
<td>624</td>
<td>55</td>
<td>55</td>
<td>50</td>
</tr>
<tr>
<td>Totals</td>
<td>100</td>
<td>2,400</td>
<td>251**</td>
<td>251**</td>
<td>221**</td>
</tr>
</tbody>
</table>

Total Adult Movement Rate = 2.5 movements/second.
Total Infant Movement Rate = 2.2 movements/second.

*The infants were identified by acronyms composed of the first letter or letters of the child's last name and either F or M to denote the child's sex.

**This is total movements, not body beats. Body beats divided the movements into smaller segments according to directionality and rate. Hence, one movement could easily have been divided into 20 smaller segments because the limb changed speed or direction that many times while moving.

durations occurred more often. Second, the durations were investigated according to vocalizing-nonvocalizing states to discover whether certain durations were characteristic of vocalization with other movement durations more typical during nonvocalization. Third, mean durations of the individual's body parts were compared with each other during vocalization and nonvocalization determining through the analyses whether one body part typically moved for
longer durations in both states while another part consistently had shorter durations. Fourth, the percentage of time each body part and, summing all body parts for the individual, each person totally was active was computed for each individual and summed across individuals.

Dyad activity was measured in two ways. First, movement durations for each individual were classified according to short and long movements and then analyzed to determine if certain adult movement lengths typically occurred with specific infant lengths. Second, interactional synchrony was considered as it occurred over total session time. It was also scored as it happened during states of vocalization and nonvocalization.

**Intra-Rater Reliability**

Approximately 5 seconds of film were randomly selected, rescored, and then compared with the original scoring. Percentage of agreement was 96 for movement duration and occurrence of body beats.
Results

Analyses of the Individual

Length of movement durations. Figure 1 shows the frequency distribution of actual movement durations in third second intervals for all five infants. Figure 2 plots the movement durations for the adults in all five interactions. In both cases frequencies are highest at the shorter durations indicating that both for adult and infant movement durations were short. Seventy-two percent of the total infant movements and 71% of total adult movements were less than or equal to 1 second in duration. These findings have important implications for observational research since they occurred too quickly to have been scored in vivo.

Movement durations during vocalization and nonvocalization. "Vocalization" was used to mean the times when the adult's speech sounds were audible and "nonvocalization" included the silent periods between sounds and words as well as between sentences. Vocalization periods were not called "speech periods" because the term "speech" seemed to imply a complete thought such as a phrase or a sentence while vocalization meant the more finite units between audible words and sounds. To determine whether vocalizing had a function in calibrating movements, movement durations for adult and infant were separated according to those occurring during vocalization and those during nonvocalization. Figures 3 and 4 compare adult movement
Figure 1. Frequency distribution of movement duration--child.
Figure 2. Frequency distribution of movement duration—adult.
Figure 3. Movement duration during vocalization—adult.
Figure 4. Movement duration during nonvocalization—adult.
durations through frequency distributions for vocalization and nonvocalization while Figures 5 and 6 similarly compare the child's durations. Distributions of adult and child movements shows shorter durations during vocalizing periods and longer durations during times of nonvocalizing. Figure 7 compares mean durations during both states for infant and adult and Figure 8 similarly compares median durations for infant and child. All durations using both mean and median comparisons were shorter during vocalization and longer during nonvocalization for the adult. All mean durations for the child were also shorter during vocalization and longer during nonvocalization as were median durations for the head and left foot. A Wilcoxon test was applied to adult and infant median durations. Total adult median durations (summing movement durations for all five interactions) were significantly shorter during vocalization and longer during nonvocalization (p ≤ .008). Total child’s movements were not significantly shorter or longer during vocalization or nonvocalization at the usually accepted levels of confidence. This indicates that vocalization had an effect at least on the movements of the adult.

Movement durations of body parts during vocalization and nonvocalization. Mean durations during vocalization and nonvocalization for each separate body part for every individual were correlated against each other to determine whether certain body parts consistently had longer movements regardless of vocalization state while others consistently had shorter movements. Summing across dyads for adult and child, each body part did seem to have its own characteristic, independent rate which was consistent in
Figure 5. Movement duration during vocalization--child.
Figure 6. Movement duration during nonvocalization—child.
Figure 7. Mean movement durations during vocalization and nonvocalization.
Figure 8. Median movement durations during vocalization and nonvocalization.
vocalization and nonvocalization. Pearson Product Moment Correlation found \( r = .99 \) (\( p \leq .005 \)) for adult body parts and \( r = .95 \) (\( p \leq .01 \)) for infant body parts. On an overall basis this strongly indicates that the body parts did have characteristic rates regardless of vocalization and nonvocalization states.

Summing across dyads, Figure 9 shows the movement rates per second for each body part. The adult head seemed to be moving the fastest with a movement starting or stopping, on the average, every 10th of a second. Her slowest part was the torso, with movements starting or stopping every six-to seven-tenths of a second. The infant's left foot was his or her fastest body part with movements starting or stopping every three- to four-tenths of a second. His or her slowest body part was the right hand, followed closely by the head, with movements, in both cases, starting or stopping every five-and-a-half to six-tenths of a second.

**Overall movement rate.** Both adult and infant were moving rapidly. The number of adult movements in every interaction were summed and divided by the total seconds of data analyzed. Overall infant movement rate was computed in the same way. The adult had, on the average, 2.5 movements per second while the infant had 2.2 movements per second (Table 1).

**Activity.** Figure 10 presents the mean percentage of time body parts were in motion for adult and child, across all subjects. An interesting relationship was found in that the adult's head and right hand were the most active of her parts while the child's head and hands were the least active. The feet expressed most of the activity for the child, and the left side of the child's
Figure 9. Mean overall rates per second for each body part.
Figure 10. Mean percentage of time body parts are in motion, summing all dyads.
body seemed more active than the right side. Overall activity rate was high with the adult moving 98% of the time and child 90% (Figure 11).

Analyses of the Dyad

Coordination of movement durations. As the first step in coordinating movement durations one representative body parts (RBP) was chosen for each individual. The RBP was the one which most closely approached the total mean activity rate and mean percentage of time active for the individual's summed body parts. The second step involved classifying movement durations into short and long lengths. This was done by dividing the total time the RBP was in motion by 2. For example, if individual X's RBP were in motion for a total time of 4.6 seconds, the quotient would be 2.3. Then, going to the frequency distribution describing the RBP's movements, movement durations were added until the sum equaled 2.3. As an example, if the distribution began at .16 with five movements plotted at .16 and three at .50, the sum would be 2.3. This would indicate that all movement durations less than or equal to .50 of a second would be classified as short; all movements greater than .50 would be long. Having secured the classifications for both members of the dyad, adult short or long movements were recorded on a 2 x 2 contingency table as they occurred with infant short or long movements. Using chi-square, movement lengths did not coordinate significantly, either within individual dyads or on an overall basis.
Figure 11. Mean percentage of total time active, summing all dyads.
Interactional synchrony. Table 2 presents the synchrony found in each dyadic interaction. Movements were classified in three ways, as interactationally synchronous, self-synchronous, and isolated. Interactionally synchronous movements were those where a start, stop, or change in direction in the movements of one individual occurred simultaneously with a start, stop, or change in direction in the movements of the other individual. Self-synchronous movements were those which were not coordinated with a specific movement from the other member of the dyad but involved simultaneous starts, stops, or changes in direction of two or more body parts within the individual. It is important to realize that self-synchronous movements are not necessarily interactionally asynchronous. Rather, it is possible that they are only smaller units of the same rhythm to which both individuals are interactionally synchronizing. Isolated movements involved a single body movement not coordinated visibly with any other body movement. Table 3 sums this activity. Summing across dyads 61% of all movements were interactionally synchronous. Twenty-one percent were self-synchronous, and 18% were isolated.

Interactionally synchronous movements were then scored according to their occurrence during vocalization and nonvocalization (Table 3). Seventy percent of the synchronous movements occurred during vocalization and 30% occurred during nonvocalization.

In summary analyses were bi-level involving both the individual and the dyad. On the individual level, frequency distributions for adult and child were similarly skewed to the left. Most movements were less than 1 second
### Table 2
Percentages of Interactionally Synchronous, Self Synchronous, and Isolated Movements within Dyads

<table>
<thead>
<tr>
<th>Dyad</th>
<th>Percent Interactional Synchrony</th>
<th>Percent Self Synchrony</th>
<th>Percent Isolated Movements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adult</td>
<td>Infant</td>
<td>Adult</td>
</tr>
<tr>
<td>POF</td>
<td>54</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>DM</td>
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</tr>
<tr>
<td>KM</td>
<td>67</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>BF</td>
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<td>15</td>
</tr>
<tr>
<td>JM</td>
<td>65</td>
<td>11</td>
<td>4</td>
</tr>
</tbody>
</table>

### Table 3
Overall Mean Percentages of Interactionally Synchronous, Self Synchronous, and Isolated Movements

<table>
<thead>
<tr>
<th>State</th>
<th>Mean Percentage of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactional Synchrony</td>
<td>61</td>
</tr>
<tr>
<td>Interactional Synchrony</td>
<td></td>
</tr>
<tr>
<td>during vocalization</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Self Synchrony</td>
<td>12</td>
</tr>
<tr>
<td>Adult</td>
<td>9</td>
</tr>
<tr>
<td>Infant</td>
<td></td>
</tr>
<tr>
<td>Isolated Movements</td>
<td>10</td>
</tr>
<tr>
<td>Adult</td>
<td>8</td>
</tr>
<tr>
<td>Infant</td>
<td></td>
</tr>
</tbody>
</table>
long. Both adult and child movements seemed speech sensitive, being shorter during vocalization and longer during nonvocalization; however, only adult durations were significantly so. Using Pearson Product Moment Correlations it was determined that each body part had its own characteristic movement rate with each limb being on a different "trip."

The experimenter's head was the most active, the child's the least so. Both individuals were moving over 90% of the total session time. Analyses of the dyad indicated that child-adult movement durations were not significantly coordinated. Almost two-thirds of the movements were interactionally synchronous, and most of the synchronizations occurred during vocalizations.
Discussion

Despite recent findings to the contrary, the textbook neonate has remained the non-thinking organism reacting with only primitive awareness to his or her environment (White, 1975). Our data refute this, suggesting instead that the child even as a young neonate, is a highly complex individual, capable of interacting with an adult according to a specific nonverbal code. As part of this code the child will express herself/himself in short movement durations, much the same as the durations of the adult. The starts, stops, and changes in these movements will synchronize with adult movements and the synchronizations will occur significantly more often during adult vocalization.

This research showed that beneath the gross in vivo interactions to which we think we are attending ticks another socialization system of minute timing and precision, comprising what this study calls the nonverbal code. Although this code is impossible to discern in vivo, through a frame by frame film analysis it can be studied with interesting results. Probably most astonishing about the code was the discovery that its rules of synchronization are already well established just a few hours after birth. Further, the code specifies selective synchronization, or, more synchronizations during the vocalization state. This is an important finding because it indicates the finite discrimination of the code. As an example, vocalization is used in this study
to mean the times when speech sounds are being uttered while nonvocalization refers to those times between sounds, words, and syllables when speech sounds were not uttered; hence, the code specifies that even speech is dissected from sentences and thoughts into words, sounds, and silences with more synchronizations timed with the uttered sounds. It probably would not be particularly unusual that synchronization occurred more often during full spoken sentences and thoughts, but it is remarkable that synchronizations are so minutely timed to selectively occur with words and syllables.

The following discussion will approach this nonverbal code cryptographically.

During the discussion it will be assumed that both infant and adult are contributing to the interaction, a notion supported by many authors (Bell, 1974). The findings will be discussed first as they apply to the individual and then to the dyad.

The Code of the Individual

Both adult and infant movement durations clustered at the shorter frequencies. Ingoldsby (1976), studying adult interaction, noted the same phenomena. This suggests a physiological propensity for shorter movements, a preference which operates for the adult as well as for the neonate, and one which certainly is innate, given the age of the infant. The adult’s movement durations furthermore were sensitive to vocalization, being significantly shorter during this state. The infant’s seemed to be shorter during
vocalization too, but not to as great an extent as the adult's, suggesting two interpretations. First, perhaps vocalization calibrates the movement durations of the speaker only, or second, perhaps responsivity to vocalization with short movement durations is a process of socialization, a code the infant will assimilate as part of the gestalt of language. The second explanation is favored because it seems to be supported by two data clues. One is found with Figures 5 and 6 which describe shorter infant movement durations during vocalization. A second clue rests with the synchrony findings, summed on Table 5, which show that 70% of the synchronizations occurred during speech. These data indicate that speech did make a difference of some sort. A social learning model can be suggested, that as the infant is continually involved in socialization experiences she/he will learn a rule of nonverbal rhythm that listeners who are actively listening shorten their movements when someone else is speaking.

According to Figure 10 which shows the percentage of time each body part was in motion, the adult's head was the most active. Perhaps this is the usual occurrence regardless of the kind of interaction ongoing. Comparative data do not exist to allow an answer. One can speculate that a great amount of head activity is part of the adult-infant socialization code because the head, especially the face, may be the most effective transmitter of affect. Possibly this code operates for the adult during adult-infant interactions because the transmittance of affect, particularly through facial cues, is necessary to establish parent-infant attachment interactions. Furthermore, perhaps
Attachment is a two-way bond so that the adult exaggerates head movements to communicate affect to the child, establishing a child-to-adult bond, and also to elicit infant response, establishing the adult-to-child bond. Brazelton (1974) reports that mothers typically respond to infants in an exaggerated manner with raised brows, wide eyes, and a look of mock astonishment. Both adults in the present study reacted with brows and eyes as Brazelton described. Their head activity might only be another component of the facial overstatement Brazelton observed and may function as an innate catalyst for two-way attachment.

The infant's head moved the least, something of a surprise when the adult's head activity is considered. However, this finding neither negates nor furthers the previous contention that the adult is innately biased to react to the infant with exaggerated head activity. Rather it can be speculated that the disproportionate size and weight of the neonate head probably precludes much activity of any kind. Further it suggests that the nonverbal codes are different and specific for each person with the adult-to-infant code specifying a great amount of head movement while the infant-to-adult code specifies "thrashing and uncoordinated limb movements (which) create an appearance of helplessness" (Bell, 1974, p. 2); responsivity to sound, especially to a high pitched human voice (Wertheimer, 1966; Wolff, 1959, 1966); smiling (Bowlby, 1958); differential gazing (Ainsworth, 1973; Robson, 1967); and manipulative state changes (Bell, 1974); all which are coded to elicit parental interaction and accentuate the infant's innately appealing features (Tinbergen, 1951). It
is suggested then that the codes are innate and different and that they function to elicit interaction and transmit affect, messages necessary to encourage two-way attachment.

In this way the parent responds to and stimulates the infant through exaggerated head and facial activity. If the infant had previously been unresponsive these motions may encourage him or her to notice the parent and make appropriate responses. If the parent were the unresponsive one the neonate attracts parental attention and stimulates involvement through flailing limbs, state changes, and gazing. In both cases an interaction ensues during which attachment messages (defined as messages which transmit affect and information concerning the sender's temperament and interactive style), are transmitted and the parent-infant bond strengthened. Hence, parent and infant are innately biased to secure the other's attention in order to mutually engage in an interaction which simultaneously expresses one's own attachment to the other person all the while eliciting from him or her the same messages of support, interest, and affection.

The analyses found that the infant's legs and feet were the most active which might have been because the infant could move them the most easily on the angle at which she or he was lying. It is possible too that legs initially are the most active body part but that adult preoccupation with rattles and hand toys and the baby's easier visibility of her/his hands quickly reverses this to establish cephalocaudal.
Thus we find the neonate doing several things that previous literature said babies did not do. For one thing the notion has persisted that babies are primitive organisms, yet the neonate already has calibrated her/his movement durations into approximately the same length as those of the adult. Further, this study suggests that the infant's feet are initially the most active, a result quite surprising since cephalocaudal has long been a behavioral given.

In summary, the code of the individual seems to specify short movement durations which become even shorter during vocalization. It was postulated that the infant may learn a nonverbal sensitivity to vocalization too as she/he is socialized into this code.

Each body part seemed to have its own pace with the adult's head the most active of all her/his parts while the infant's head was the least active. It was suggested that adult and infant are biased to interact with each other according to specific nonverbal codes which are innately and distinctly spelled in order to encourage attachment interactions. The infant's feet moved the most, a response which could have been random or artificially induced, or speculatively, a typical phenomena which occurs before the code of cephalocaudal is transmitted.

**The Code of the Dyad**

Interactional synchrony was the dominant dyad reaction. This finding furthers the previous attachment discussion, suggesting that attachment is established through a code of exaggerated head activity and also through an
innate code of interactionally synchronous movements. Hence, because adult and infant are innately biased to synchronize with one another, they are compelled to coordinate movements. Perhaps through this coordination they encode and decode affect and other survival information basic to attachment making the interaction, according to Rosenthal (1973), an attachment interaction. In this way synchrony becomes the medium through which affect and other messages are sent. Because synchrony seems to be an innate reaction it is probable that people are genetically programmed to establish attachment bonds; therefore, innate codes exist to synchronize movements, thereby encouraging this most important relationship.

Seventy percent of the synchronization occurred during vocalization, a phenomena which indicates the rhythmic effects of vocalization, and also suggests that vocalizing encourages attachment interactions since it elicits greater dyad response. Thus it may be speculated that parents who vocalize a great deal to their infants may be facilitating a firm attachment bond with them because they are offering so many opportunities for attachment interactions.

A Note to Parents

The results of this study should at once challenge, soothe, and exonerate parents. Challenges are implicit since our findings describe the neonate's immediate and explicit participation in an adult-infant interaction. The neonate, instead of being bland, primitive, and nonthinking, actually
synchronizes with adult movements and, furthermore, synchronizes more often during vocalization. Since this interactional code is well established at birth, and possibly even before, concern naturally is directed to the nonverbal climate in which the child develops. If the infant at birth can so elaborately interact with others then perhaps she/he, even at birth, can just as elaborately learn other nonverbal messages such as movement rates, personality styles, and self images which are taught as a part of socialization. In this way possibly the neonate learns that Mom is the one who moves rapidly, is usually happy, likes herself, and enjoys the baby. If this is the case, that social learning proceeds, at least from birth, then thoughtful attention must be directed to postpartum practices, to the quality of the postnatal environment, and to the personality and emotional health of the parents or caretakers.

This study further implies the importance of parent-infant interaction and parent-to-infant vocalizations. Apparently these exchanges, particularly during speech, facilitate interactional synchronizations which express attachment messages.

Should this challenge seem too awesome parents and caretakers can be soothed by White (1975) who believes that the first 6 to 8 months of a child's life are the easiest and most successful ones for parents. He contends that if parents follow natural caretaking instincts, growth and development should proceed optimally. Perhaps the ease and success of this period is because the learning tasks are nonverbal. The child is discovering what her/his family is all about, how it interacts within itself, and how it feels toward this new
baby. At the same time the infant is sending important messages to the family, acquainting it with her/his unique temperamental qualities. Perhaps this information is relayed through interactional synchronizations as part of an attachment interaction. Possibly the interaction functions to acquaint each participant with the other, hence the infant and the family exchange messages concerning such things as temperamental qualities and affect. The family's characteristic activity rate (Ingoldsby, 1976) is probably also relayed through these interactions so that the infant learns, for example, that in order to synchronize with family members she/he must constantly move at breakneck pace.

Since all these messages are conveyed through interactional synchronizations or the nonverbal code, it seems that if parents and caretakers interact in a spontaneous and healthy way, doing those things with and for the child which come instinctively, the child will develop well as parent and child exchange attachment information.

Weiner and Elkind (1972) further this faith in low-key, do-what-comes-naturally parenting with their contention that although caretaking styles differ, "normally" adjusted adults usually parent wisely and well by following their own intuitions concerning child care. Stated another way, nonverbal learning tasks in the first few months of life are best taught by parents who "have it all together" and thus transmit healthy messages in a free and positive manner to their infants.
The data imply that while neonates are receiving adult messages, they are also sending some of their own, educating parents through synchronizations with their own unique interactive styles and temperament. Thus parents learn that the infant is either passive or irritable, happy or sober, and eager or reticent. They discover that their child will either signal wants lustily or meekly and will be either easily distracted or nonplussed by environmental noise. This implication should allow parents some exoneration concerning their effect on infant personality, for if infants are sending these temperament messages, it is implicit that the temperament is, in some ways, already established. Concurrent with Chess, Thomas, and Birch (1975), our data imply that parents do not function entirely as omnipotent potters. Certainly parental influence is felt, is important, and may be positive as well as negative, but the data also suggest that the parent-infant socialization process is not one-sided.

Implications for Parent-Infant Theories and Research

Implicit in this study is the notion that the neonate is continually doing two things, decoding and encoding nonverbal messages through interactive synchronization. The neonate decodes as she/he receives, deciphers, and assimilates nonverbal messages from the environment. In this process the child learns the folkways of the family, its characteristic activity rate, its critical attitudes toward the neonate, toward each family member and toward life, and the temperamental qualities of each family member.
Ingoldsby (1976) suggests that the dominant family activity rate is modeled by family members; therefore, as part of the decoding process the child would learn about the family climate, that it was placid, extremely active, depressed, and so on. The next step would be the assimilation of this information so that the child could relay nonverbal messages to the other family members at their characteristic or expected rate.

Attachment information is also probably received from the family environment through interactional synchronizations so that the child learns from nonverbal cues that "the world is a secure place where my needs are met and I am liked," or "the world is a little erratic. I never know if I'll get what I need, and I don't really know if I am liked." Attachment information means all messages which relay affect, transmit interactive styles, disclose temperament qualities, and model activity rates so that the neonate understands what her/his affective place in the family is and how she/he should interact with other family members. Any interaction which conveys attachment information would be called an attachment interaction since it is functioning to forge neonate ties with the family and strengthen mutual understanding.

This notion of the socialization of the child by the environment is one long supported by researchers. However, as previously indicated, studies to investigate or substantiate this have been inconclusive. Perhaps this is because initial critical socialization takes place primarily on a nonverbal level, an area largely ignored by most researchers.
The second task the neonate performs is the encoding and relaying of messages to the surrounding environment. Although the neonate seems to be continually and actively decoding and assimilating important information, she/he seems also to be sending messages of her/his own. This would be attachment information also for its purpose would be to establish family-to-neonate ties and increase the family's understanding of the child. Through this encoding the neonate discloses her/his own special temperamental qualities, relaying to the family that they have, for example, an irascible baby who likes constant activity and a steady stream of novel distractions. This can have a reinforcing or confounding effect on the environment. If a very placid infant sends calm unhurried messages into an active environment the family may find themselves wishing the child had just a little more enthusiasm. On the other hand, a very energetic, vocal baby could trigger emotional havoc in a calm subdued family. Not only would these babies affect family climate, they could also have an unsettling effect on mutual attachment messages, for the family would respond and feel differently toward babies who complimented family homeostasis rather than detracted from it. It is furthermore possible that children with particular temperamental qualities do not respond well to their families because family messages are nonverbally coded in a way upsetting, confusing, or irritating to the baby. Perhaps the method in which the family has learned to encode messages is devastating or distracting to one kind of baby but not to another. For this reason, research needs to direct itself to family processes, to the patterns of family interaction, and to
the mutual effects certain personalities and certain types of families have on each other.

A Word on Methodology

This study demonstrates the subtle nuances of human interaction which can be discovered and examined under a "behavioral microscope." The data are extensive, finite, and intricate. Furthermore, although the n was small, tests were generally significant, suggesting that absolute atomical behaviors instead of macro conglomerates were discovered. Because of the dissective quality of the analyses, the rapidity with which human interaction proceeds, and the nature of the behaviors investigated, these data could not have been collected or analyzed in vivo. The intricacy and exactness of this data should encourage future researchers to thoughtfully consider incorporating micro-methods into their own studies.

Conclusions

Adult-neonate socialization seems to occur on a micro level in a most significant and explicit way. This subtle social interchange comprises the nonverbal code and expresses messages of affect and self-disclosure which establish or impede attachment bonds. There seems to be an innate compulsion to engage in nonverbal socialization experiences, hence the nonverbal code is present and intricately operating at least from birth. If parents and infants are thus biased to mutual interaction then researchers must consider what
alters certain nonverbal styles so that attachment interactions between particular parent-infant dyads become scarce, nonexistent, or pathological.

Limitations

In a study as enjoyable and also obsessive as this one has been it is easy to become myopic to its limitations. Nevertheless, the following points should be considered:

1. The sample size, five neonates and two adult experimenters, is small. However, it is more difficult to obtain high significance levels with a small n, but nonetheless, few tests applied to these data were insignificant. Further, although the n was small, each dyad contributed about 480 observations (frames) to the data. From these observations, approximately 50 movements for each person were scored and analyzed.

2. This study explores a relatively unchartered realm. It is difficult to know how to approach data or explain relationships when prior understanding is limited.

3. Approximately 20 seconds of film were analyzed for each child. Analysis of additional frames would have perhaps provided a more complete picture.

Suggestions for Future Studies

1. It would be very helpful to study how nonverbal parenting styles differ and are alike, across personality types, marital situations, family
density, and sibling order. Do they differ with sex of the infant or sex of the parent.

2. Do children ever significantly shorten their movements during vocalization. If they do, is this a process of their language acquisition.

3. Is an adult-adult interaction characterized by the same exaggerated head activity which seems to be typical in adult-infant interactions.

4. What goes on nonverbally at the family clearing house and data processing center, namely the family dinner table.
References


Rheingold, H. L. *The modification of social responsiveness in institutional babies.* *Monographs of the Society for Research in Child Development, 1956, 21(2, Whole No. 63).*


Appendix
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<th>Frame No.</th>
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<td></td>
<td></td>
</tr>
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</tr>
<tr>
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<tr>
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</tr>
<tr>
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</tbody>
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**Figure 12. Sample data sheet.**
Vita

Ann Marie Berghout-Austin

Candidate for the Degree of

Master of Science


Major Field: Family and Human Development

Biographic Information:


Professional Experience: classroom teacher, fourth, fifth, and sixth grades, Providence Elementary, Providence, Utah, 1971-1973; private music instructor, all grades, Vernal, Utah, 1973-1975; research assistantship, USU, spring quarter, 1976; instructor, Conference and Institute Division, USU, fall quarter 1976-


Honorary Organizations: Phi Kappa Phi, Alpha Lambda Delta