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Individual differences in infant response to an interpersonal stress at 6 months.

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INDIVIDUAL DIFFERENCES IN INFANT RESPONSE TO AN INTERPERSONAL STRESS AT 6 MONTHS

A Dissertation Presented

By

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DEDICATION

To my parents
whose unqualified love, support, and encouragement
has helped carry me through the years.

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CHAPTER I

INTRODUCTION

Little research has been done on the normal infant's capacity to *cope* with *interpersonal* stress (Gianino, 1982). None of the data which is available indicates when individual differences in coping with interpersonal stress emerge and thus what connection this form of coping might have to other developmental changes (Campos, Barrett, Lamb, Goldsmith, & Sternberg, 1983; Hodapp & Mueller, 1982; Parke & Asher, 1983). The early researchers who did examine the nature of individual differences in infant coping capacities tended to view the infant as asocial, as neither predisposed nor preadapted to relate to people (Escalona, 1968; Murphy, et al., 1976). They tended to follow Freud in his belief that human beings are driven to seek pleasure and have no specific need for interpersonal relations. Accordingly, they anchored their account of coping and defense in infancy to what they described as the infant's need to protect his vulnerable psyche against the continuous bombardment of internal and external 'stimuli' (Beebe, 1975; Gianino, 1982). On this view it does not matter whether the source of the stimuli is inner or outer, animate or inanimate, or self or other, since it assumes that the infant is incapable of making these differentiations. What the infant therefore needs is a 'protective shield' which can regulate the _quantity_ of impinging stimui, whatever its source.

Following in the tradition of Winnicott (1965) and other object relation theorists (Guntrip, 1971), Escalona (1968) and Murphy et al. (1976) slightly modified this classical psychoanalytic view by emphasizing the role of the mother as an 'auxillary ego'. They noted how the mother's efforts to comfort her distressed infant--by rocking, feeding, patting, or talking him, to mention a few of the typical maternal devices--function as an auxillary source of coping input. When the infant is distressed, the mother helps alleviate that distress.

Although both Escalona and Murphy et al. assigned an important role to the mother by recognizing her ability to help the infant cope with his distress, they were still wedded to the psychoanalytic paradigm. Thus neither viewed the mother and infant as _interacting_, as engaging in 'social conversations' or 'dialogues'. Three conclusions follow from the view that the infant is not inherently motivated to form interpersonal relationships, however rudimentary, and that he is without the social skills required to participate in a social exchange. The first conclusion is that the infant does not contribute to the _regulation_ of his interpersonal relations with the mother; that is, none of his behaviors function to regulate the inevitable cycles of engagement and disengagement which attend any social encounter, even in infancy (Brazelton, 1974). Indeed, in a real sense the infant is not relating at all, but merely registering or not registering the 'stimuli' which cross the threshold of his stimulus barrier. Second, given this view there is no reason to think that the infant has a specific need to _cope_ with interpersonal stress as such, although he does need to cope with the discomfort generated by overloads of stimuli, e.g., that caused by his 'vegatative functioning', such as with hunger, indigestion, or illness. There is no suggestion that something in the infant-caregiver _relationship_ itself might be the source of significant distress. The third conclusion is that there is no connection between the ontogeny of the infant's overall coping and defensive strategies and the history of his efforts to regulate cycles of engagement-disengagement in his relationship with the caregiver.

Drawing upon a different paradigm, many current researchers begin with the assumption that the human organism is inherently social. In the words of Ainsworth et al. (1974),

> Infants are genetically biased towards interactions with other people from the beginning. Their sensory equipment is responsive to stimuli most likely to stem from people, and many of their behavior systems are most readily activated (or terminated) by such stimuli.

On this view, the infant is both goal-directed in pursuing interpersonal relationships and capable of contributing to the regulation of his interactions. These researchers further hypothesize that since the infant is inevitably stressed by the his interpersonal relationship with his caregiver and therefore compelled to adopt coping behaviors, the ontogeny of coping capacities is necessarily linked to the development of normal social skills (Tronick, 1980; Brazelton, Koslowski, & Main, 1974; Gianino, 1982). While these researchers agree with Escalona and Murphy that the infant may use the caregiver to help him cope with his distress, they also contend that the infant sometimes must cope with distress engendered by the caregiver's own interactive behavior.

A significant implication of this perspective is that deviations in personality development arise out of, or are formed in, stressful infant-adult interactions, e.g., failure to thrive (Greenspan, 1983) or the socially withdrawn infant (Brazelton et al., 1974; Stern, 1971, 1977; Massie, 1978; Bakeman & Brown, 1977; Field, 1977). However, given the poverty of experimental research in this area, this work has just begun to advance our understanding of the developmental process underlying such deviations.

It is the hope of this project that an experimentally controlled research design which examines the infant's coping capacities and affective tendencies, and the establishment of individual differences in these, will further our understanding of the normal developmental processes engendered by interpersonal stress. It is also hoped that such knowledge will enhance our clinical ability to recognize and interpret exceptional, if not distorted, patterns of coping response.

Infant Response to Interpersonal Stress

Models of mother-infant interaction propose that the partners jointly regulate the interaction with interpersonal behaviors, primarily affective displays, which convey each partner's appraisal of the current state of interaction (Brazelton, et al., 1974; Tronick, 1982; Fogel, 1977; Bakeman & Brown, 1977; Beebe, Jaffe, Feldstein, Mays, & Alson, 1985; Campos et al., 1983). Embedded in this view is the assumption that the infant has a goal regarding social exchange; in taking this position these models exhibit their sympathies with the object relations perspective within psychoanalysis (Winnicott, 1965; Guntrip, 1971). The infant's interpersonal goal has been characterized by Brazelton (1974) as 'reciprocity', by Stern (1977) as 'mutual delight', by Beebe (1977) as 'affective attunement' and by Tronick (1982) as 'shared directional tendencies'. While these researchers differ in their characterizations, their models all assume that the infant's behavior is _directed_ towards social interaction once the behavioral system subserving the goal has been triggered by social stimuli. They also assume that the infant's behavior is modified by the feedback he receives from his interactive partner; Bowlby (1969) employs the term 'goal-corrected' to describe this type of complexly motivated behavior. These models predict that when the interaction is well-coordinated the infant's affective state is positive and well-modulated, with affective displays utilized to initiate, modify, and maintain the social exchange. Since normal interactions are never perfectly regulated, these models propose that when a "normal" disruption occurs (a "mismatch" according to Stern, 1977; Tronick, Als, & Brazelton, 1980; and Fafouti-Milenkovic, & Uzgiris, 1979) the infant attempts to adjust to the disruption or to modify it. The infant accomplishes this, too, by employing his interpersonal behavioral skills, since they also allow him to avoid, redirect, and terminate an exchange.

Research supporting this model includes studies on: the infant's differential reactions to mothers, fathers and strangers (Dixon, Yogman, Tronick, Adamson, Als, & Brazelton, 1981; Parke, Oleary, & West, 1972; Parke, 1974); modification of the distribution of infant-mother joint behaviors from the expected distribution based on their independent distributions of behavior (Bullowa, 1975; Tronick, et al., 1980); modification and specificity in the response of infants to distortions in their partner's behaviors (Tronick, 1981; Trevarthan, 1977; Cohn & Tronick, 1983; Fogel, Diamond, Langhurst, & Demos, 1983; Beebe et al., 1985); contingencies between infant smiles and vocalizations and specific maternal turn-yielding signals (Mayer & Tronick, 1985; Anderson, Vietze & Dokechi, 1977); and contingencies between infant averting and maternal behaviors (Stern, 1977; Bloom, 1977; Brazelton et al., 1974; Massie, 1978; Field, 1977).

However, both Schaffer (Schaffer, Collis, & Parson, 1977) and Kaye (Kaye & Fogel, 1980) have questioned the model of mutual regulation and instead have argued that the structure of the interaction is largely a product of the mother's skill. Gottman (1979), in reanalyzing interactive data analyzed by Tronick et al.(1980), concluded that there was no mutual influence in two of three interactions. These authors would probably argue that it is unlikely that the infant would evidence a highly specific response to an interpersonal stress. Since they contend that the infant lacks sufficient social skills to assist in regulating an interpersonal exchange, they would also deny that the infant has the coping skills attributed him by the regulatory perspective. Following McCall & McGhee (1977), they might hypothesize that the infant would display distress, surprise, or disinterest depending on the perceived discrepency of the display to the infant's schema. Certainly they might present other possible alternatives, but they would not argue for the specificity in coping strategies or emotional responses being suggested here. For this reason research on the infant's response to an interpersonal stress bears on a number of issues.

According to the model adopted in this project, which has been referred to as the mutual regulation model (Brazelton, 1976), prolonged distortions of an interaction, as contrasted to normally occurring mismatches, stress the infant's capacity for sustaining interpersonal engagement while maintaining self-regulation (Tronick, 1978; Stern, 1974; Brazelton, 1974; Massie, 1978). It is hypothesized that insofar as the infant seeks reciprocity, but is unable to readjust the interaction in line with this goal, negative affect is generated. When a normal disruption, or 'mismatch' occurs, the infant communicates his emotional evaluation of the distortion, which enables him to effectively regulate the social exchange to achieve reciprocity. Moreover, at the same time that the infant's behavior functions to regulate the mismatched interaction, it also serves to regulate his internal state (Spitz, 1965;

Stern, 1974; McCall and McGhee, 1977; Field, 1977). This self-regulatory outcome is achieved because in altering the partner's behavior the infant simultaneously alters an interpersonal situation which would eventually generate negative affect if allowed to continue. In this sense, the infant's interpersonal repetoire facilitates his self-regulation in an interpersonal context. Prolonged distortions, however, stress not only the infant's resources for regulating interpersonal relations, but also his capacity for coping with the accompanying negative affect. It is hypothesized that to cope with a prolonged distortion the infant utilizes not only his affective, interpersonal skills, but other coping behaviors as well.

Brazelton et al. (1974) have discussed infant coping strategies for any form of stress, either animate or inanimate. According to Brazelton, even 1 month old infants have four strategies available for coping with a stress. In addition to being able to signal with communicative displays, e.g., by expressing negative affect (anger or crying) or positive affect (smiles and positive vocalizations), infants can withdraw from the source of the stress, e.g., by arching, turning, or "shrinking" away; they can reject the source of the stress, e.g., by pushing it away with hands or feet; or they can decrease their perceptual receptivity to the source of the distress, e.g., by falling asleep or as manifested in 'looking dull'. A significant difference between signalling and the other three strategies is that by signalling the infant preserves his goal of maintaining engagement with the partner. When the infant adopts any of the other three coping strategies, he opts for self-regulation over continued engagement with the mother; that is, the infant forgoes engagement in order to reduce his distress. However, this difference between signalling behaviors and the other three strategies is not absolute, since even in withdrawing the infant's behavior has communicative value which can be interpreted and responded to by a sensitive interactive partner.

In one of the few studies of infant coping with interpersonal stress, Gianino (1982) compared the response of 3, 6, and 9 month old infants to a maternally generated interpersonal stress, viz., the mother acting still-faced as opposed to engaging in normal interaction. In several studies (Tronick et al., 1978; Fogel et al., 1983; Field, 1977) this distortion of the interaction has been found to distress the infant. Tronick et al. (1978; Fogel et al., 1983) has argued that the still-face is stressful because gaze contact functions as a crucial context marker which affects the regulative meaning of the accompanying emotional displays (Bloom, 1977). In the still-face, the mother's *en face* position and eye contact with her infant present him with a signal that social interaction is forthcoming, while her expressionless and unresponsive face communicates the opposite. In that sense, it is a contradictory message, since the mother simultaneously invites and denies interaction. Insofar as the infant is primed for interaction by the mother's *en face* position and eye contact, as well as by his own interpersonal goals, the mother's denial of interaction often results in infant bids to initiate social interaction. Since the mother remains still-faced, however, the infant's attempts are frustrated. Unless the infant is able to adopt some other measure to cope with his predicament, he will likely become increasingly stressed by the mother's repeated deflection of his attempts to reinstate a reciprocal interaction.

In addition to the four strategies described by Brazelton, Gianino found two other self-regulatory strategies: 1) infants attempted to self-comfort by sucking, rocking, or self-clasping; and 2) they attempted to redirect their attention away from the still-faced mother to the surround. He also found that with development infants acquired greater skill and capacity in a number of areas. For example, infant attempts to distance themselves from the interaction, e.g., by extreme arching or turning away, decreased from 3 to 9 months (see Table 1); older infants needed less recourse to this type of pervasive

TABLE I

FREQUENCY OF COPING BEHAVIORS

Distancing

	3	6	9
mean	1.5	.2	0
s.d.	3.24	.65	0

F=3.11, p¼.09

Distress Indicators

	3	6	9
mean	8.0	3.6	2.5
s.d.	4.22	3.95	2.32

F=11.99, p¼.002

Alternate Focus on Objects

	3	6	9
mean	5.0	8.1	9.6
s.d.	4.40	4.75	3.24

F=5.90, p¼.025

disengagement. Indications of distress, e.g., heavy breathing and hand clenching, decreased with development. And although infants at all three ages tended to respond to the still-face by directing their attention to objects in the surround, the older the infant the more frequently the infant employed this strategy.

In lag analyses of the data Gianino found that, regardless of age, infants first attempted to terminate and avoid the stressful interaction by averting their gaze from the mother and that after averting they were more likely to switch their attention from the interaction to the surround. But among the significant main effects, Gianino found that whereas 3 month olds were more likely than expected to protest after exploring the surround, 6 month olds were more likely than expected to reorient to the mother, and 9 month olds to avert again (see Table 2). After protesting, 9 month olds were the only group who were more likely than expected to explore the surround, suggesting better self-regulatory capacity than 3 or 6 month olds.

More generally, the developmental differences were marked by a significant increase in variablity, complexity, and organization; there were increases in the number of behaviors from 3 to 9 months (225, 320, and 348, respectively) and in the frequency of transitions from one behavior to another. Furthermore, there was a reduction in

TABLE 2

LAG 1 TRANSITIONS

p (Social Attend to Avert)

	Po*	Pe*	SD(Pe)*	Z	p½
3 mo	.85	.53	.06	4.86	.01
6 mo	.71	.42	.07	4.12	.01
9 mo	.52	.37	.06	2.57	.01

p (Avert to Object Attend)

	Po	Pe	SD(Pe)	Z	p½
3 mo	.36	.27	.05	2.00	.01
6 mo	.56	.32	.05	5.27	.01
9 mo	.40	.27	.04	2.85	.01

p (Object Attend to Protest)

	Po	Pe	SD(Pe)	Z	p½
3 mo	.18	.09	.05	1.98	.05

p (Protest to Object Attend)

	Po	Pe	SD(Pe)	Z	p½
9 mo	.37	.21	.07	2.15	.05

* Po = observed probability; Pe = expected probability; SD(Pe) = standard deviation of expected probability.

the randomness of the transitions, i.e., an increase in predictibility, in that the number of transitions which had a conditional probability significantly different from expected went from 6 at 3 months, to 8 at 6 months, to 13 at 9 months. In general, it was found that the older the infant, the greater the behavioral options and the greater the capacity to employ these behavioral options to sustain self-regulation in the face of this interpersonally stressful situation.

Langhorst (1984) used the still-face in a longitudinal study in which she compared the infant's response to the still-face at 3 months of age to his response to the strange situation at 12 months. But while she found some evidence for stability, she accomplished this by presenting a global distress/coping index rather than a detailed description of infant coping behaviors and affective displays. Consequently, her study did not provide data on the _specificity_ of behavioral and affective continuity.

Frosch (1983), working with Gianino, found that infants tended to deploy the same behaviors they used to cope with the still-face interaction in a subsequent normal interaction. Frosch interpreted this carry-over from the still-face to the normal interaction as indicating an expectation of further distressing maternal behavior and an attempt to cope with it. Such a carry-over effect would also indicate the beginning of stability in the infant's reaction.

In a related study done in our laboratory, Cohn (Cohn & Tronick, 1983) stressed the infant by having mothers simulate depression during the interaction. In lag analyses of these data, Cohn demonstrated that infants cycle through a wary-withdrawn-protest cycle with only occassional and very brief expressions of positive affect. Moreover, he found, as did Frosch, that this cycle carried over into the following normal interaction. A more recent study of mother-infant interaction using dyads in which the mothers were clinically depressed found similiar, though even stronger, cycles (Cohn, Connell, & Lyons-Ruth, 1984).

These data support the view that the interaction is mutually regulated and the hypothesis, to be examined here, that infants possess specific coping strategies for dealing with this stress.

Individual Differences in Infant Reactivity

Research on the stability of individual differences in temperament and competence is extensive (Kagen and Moss, 1962; Escalona, 1968; Thomas, Chess, and Birch, 1968; Bell, 1968; Brazelton, 1973; Yang & Halverson, 1976; Murphy, 1976; Ainsworth et al, 1978; Sroufe, 1979). Much of the recent research has been from within an attachment theory perspective (Sroufe, 1979; Kagen, 1980). This research has attempted to identify the antecedents of the infant's attachment classification at 12 months by looking primarily at maternal sensitivity (Ainsworth, 1973; 1979; Blehar et al., 1977; Crockenberg, 1981; Egeland & Farber, 1984; Belsky et al., 1984; Pettit & Bates, 1984) and, to a much lesser extent, at infant temperament (Waters, Vaughn, & Egeland, 1980; Pettit & Bates, 1984; Belsky et al., 1984). While Ainsworth and Sroufe might disagree, it appears that Campos et al. are correct in their assessment that most of the findings are weak.

Research on the stability of interactive styles is much less extensive, though weak as well. Beebe et al. (1985) found consistent individual differences in the interactive behavior of 3 1/2 month olds and their mothers. Consistency was especially apparent when interactions were characterized as "good" or "bad": the good interactions tended to stay good and the bad tended to stay bad. Mayer and Tronick (1985) found consistency in maternal behavior but not in infant behavior between 2 and 5 months. And Fogel (1977) found consistency in dyadic synchrony in young infants.

One possible reason why there have not been strong findings of stability of social performance during the first half year of life is the failure to use an appropriate assessment technique. Most studies on the stability of social interaction have studied 'normal' mother-infant interaction, e.g., instances of mother-infant play at home or in the laboratory (Blehar et al., 1977; Crockenberg, 1981; Egeland & Farber, 1984). But normal social interaction may not be an appropriate assessment tool because it may not be a sufficient challenge to the infant's social resources. It is argued by Sroufe & Waters (1981; Ricks, 1981; Sander, 1962) that an appropriate assessment of individual differences in infant competence must challenge, or stress, the infant's current developmental capacities. An assessment that fails to stress the infant either because it is an inappropriate task or is insufficiently stressful will fail to highlight underlying individual differences among the infants. "All" infants, if you will, appear typical when confronting an easy task. However, with an appropriate stress, individual capacities to deal with that stress are revealed.

Since the establishment of reciprocal interactions is argued to be the developmental task of the 3 to 6 month old infant (Sander, 1962; Brazelton, 1974; Sroufe, 1979), what is needed is a procedure which highlights these capacities in the same way that the strange situation highlights the 12 month old's social competency. Since the regulation of social exchange is the task of the young infant, it would seem that a form of face-to-face interaction which sufficiently challenges the infant would be an appropriate type of procedure. Again, a normal interaction, however, provides too little stress on the infant, and most infants can "succeed" at the task; consequently, a normal interaction is unlikely to reveal the breadth of individual differences in interpersonal competance among normal infants, although it may be quite revealing in abnormal situations (Field, 1977; Massie, 1978; Stern, 1971). Moreover, another difficulty with normal face-to-face interaction is that it is difficult to sort out the mother's contribution from the infant's, rendering it difficult to know who's behavioral organization and social competency is being assessed (see Tronick, 1980 vs. Kaye, 1982).

Among the various face-to-face designs, the still-face procedure poses an appropriate challenge to the infant's interpersonal resources, since it stresses the infant's current developmental capacities. The still-face is said to provide a contradictory message in that the mother's _en face_ position, coupled with her expressionless and unresponsive behavior, invites and denies interaction at the same time. The manner in which an infant responds to this situation reflects his interactive tendencies and capacities. Specifically, it assesses the infant's ability to signal his mother either to interact with him or to help him alleviate his distress, and it assesses his capacity to self-regulate his affective state. In this sense, it taps the infant's capacity to sustain interpersonal engagement while maintaining self-regulation. Since by 6 months of age the infant's interest in the surround begins to compete with his interpersonal goals, administering the still-face at this age also provides some evidence on the presence of individual differences in the infant's exploration/attachment balance under conditions of interpersonal stress (Tronick et al., 1982; Gianino, 1982).

Only a few studies have looked at the consistency of infant behavior in response to an interactive stress (Ricks, 1981; Tronick et al., 1982; Cohn & Tronick, 1983; Langhorst, 1984; Escalona, 1968; Murphy, 1976). Cohn (Cohn & Tronick, 1983) found carry-over effects from the infant's reaction to maternal simulated depression to the next normal interaction. Frosch and Gianino (1983) found similar carry-over effects in the infant's reaction to the still-face. In both of these studies, the effect on the infant's behavior during the normal interaction was short- lived and the separation between the distorted and normal interaction was only 15 seconds.

CHAPTER II

EXPERIMENT AND RATIONALE

The two aims of this project were, first to further examine the nature of the infant's specific coping responses, and, secondly, to test the hypothesis that infants display stable, short term, individual differences in their reactions to an interpersonal stress. It is believed that examination of the infant's coping capacities and, in particular, the establishment of individual differences in these, should inform our understanding of both the normal developmental process and that responsible for developmental deviations.

To carry out this project, 6 month old infants experienced an experimentally induced stressful interaction with their mothers on two occasions, one week apart. To create a stressful interaction, the mothers acted still-faced and unresponsive with their infants. Both sessions were videotaped. The infants reactions were scored from the tapes for coping behaviors and affective displays.

Rationale for Studying 6 Month Olds

There were several reasons for choosing 6 month olds. First, it has been demonstrated that 6 month olds can perceive the meaning of affective messages (Campos et al., 1983) as well as communicate affectively (Brazelton et al., 1974; Stern, 1977; Tronick, 1980). Secondly, by 6 months, the infant's interest in objects begins to grow significantly, which affords the infant another coping strategy since he can turn away from the mother and involve himself in the surrounding object world. (Piaget, 1968; Gianino, 1982). Lastly, there is evidence that stable individual differences in interactive patterns of normal social exchange are present by this age (Beebe, et al., 1985).

Stability from Week to Week

The dilemma in assessing stability of infant coping behaviors and affective displays at 6 months is to balance carry-over effects that might be expected with only a brief separation (assessed in this study within a session; Cohn & Tronick, 1983; Frosch & Gianino, 1983) against longer term developmental and maturational changes in the infant's behavior (as would be assessed in a follow-up study at 1 year with the Ainsworth strange situation; Ainsworth et al., 1978; Escalona, 1968; Murphy, 1976; Gianino, 1982). The choice of a week's separation was an attempt at achieving an appropriate balance. It was in part based on pilot work during which no apparent change in the infant's reaction to the laboratory from one week to the next was observed and on other research indicating that there are changes in normal interactive behavior at longer, i.e., monthly, intervals (Tronick, 1982; Gianino, 1982; Fogel, 1977; Kaye, 1982). However, to evaluate the effectiveness of this decision success rates from session one to session two were tracked and infant mood and the mother's report on her infant's reactions were recorded.

Rationale for Still-Face

The rationale for using the face-to-face design is that it highlights the infant's interpersonal capacities (Brazelton, 1974; Stern, 1977; Tronick et al., 1978; see introduction). Experimentally the advantage of the still-face is that it allows for control of the independent variable, i.e., the mother's stressful interactive behavior. Certainly mothers do not remain absolutely still-during this display, e.g., they occasionally dart their eyes or flicker a smile, but essentially the presenting stimulus is the same for each infant, viz., his mother, en face and unresponsive and expressionless. Thus this manipulation allows control of the stimulus when studying a number of dyads, and it helps ensure control when the mothers must repeat their performance at another time.

Data Analysis

To carry out the two aims of the project, first, the infant's response within each session was analyzed, and, secondly, a comparison of the infant's response to the two sessions was made. The first produced a detailed characterized of the infant's response to the interpersonal stress, and the second tested the hypothesis that 6 month old infants exhibit stability in their coping behavior.

Three within session analyses were performed: analyses of variance, intercorrelations, and lag analyses. As a first step, an analysis of variance on the frequency, total duration, and bout length of each coping behavior was completed to identify any significant differences due to session effects. The intercorrelations were done on the frequency, total duration, and average duration (or bout length) of each coping behavior for each infant. They indicated which behaviors were related to each other and the direction of the association. The sequential organization of behavior within each session was assessed following Sackett's (1977) procedure for testing lag-1 sequences for contigency. The analysis was accomplished by comparing the observed, or conditional probability of single transitions between coping behaviors with their expected, or unconditional, probability. If the difference was significant for a contigency, i.e., for any transition between one behavior and another, then knowing that the infant exhibited the first behavior reduced the uncertainty about which behavior would follow. Two types of contingency could occur: a) 'excitatory'--when the observed probability of a transition was significantly greater than its expected probablity; and b) 'inhibitory' when the observed probability of a transition was significantly less than its expected probability.

To assess the strength of the relationships of the coping behaviors of the first and second sessions, correlations were done on frequency, total duration, bout length, and the observed lag probabilities. Since these examined the relationships of either single behaviors or one-step sequences of behavior, two other analyses were performed which examined the overall organization of behavior for each infant. The first, a cluster analysis, resulted in a categorical classification of each infant on each session, enabling a comparision of infant classifications across the two sessions. The cluster analysis partitioned the infants of each session into N number of clusters, with clusters selected based on the Euclidean distance between each infant. The distance was determined using each infant's score on each behavior. Those infants closest to each other formed a cluster. The second analysis, a categorical system developed from within the self-regulatory perspective, examined the extent of self-regulatory stability by comparing the infant's response on a selected set of self-regulatory behaviors which had been transformed into dichotomous categories based on theoretical considerations and empirical findings. The infant's classification on each category was then used to generate a ratio of stability to instability.

CHAPTER III

METHOD

Subjects

Thirty male and twenty two female infants and their mothers were subjects. The infants ranged in age from 5 months 5 days to 6 months 11 days on their first visit (mean age of 5 months 21 days) and from 5 months 10 days to 6 months 18 days on their second visit (mean age of 5 months 28 days). The time between sessions ranged from 5 days to 11 days, with a mean of 7.15 days. The dyads were drawn from the published birth announcements in community newspapers. Only dyads which experienced no pregnancy or delivery complications or subsequent health problems were included. Four subjects could not be used for the following reasons: three mothers were unable to maintain the still-face and one infant was too distressed to continue with the first normal interaction.

Setting and Materials

The face-to-face laboratory was equipped with an infant seat mounted on a table facing an adjustable stool for the mother, two video cameras, and a microphone. One camera was focused on the mother and one on the infant. Both pictures were transmitted through a digital timer and split-screen generator into a video recorder (Tronick et al., 1982; Cohn & Tronick, 1983; Gianino, 1982).

Procedure

Each dyad was videotaped at 6 months and again one week later. On both visits the dyad was experience the same conditions: a face-to-face play interaction, followed by a still-face interaction, followed by another face-to-face play interaction.. Each interaction was two minutes long, with the first and second conditions followed by a fifteen second pause in which the mother turned her back towards her infant (see Tronick et al., 1978, and Gianino, 1982, for more details). Note that the design did not include a group of infants who received three normal interactions in sequence. Such a design would have allowed for a comparison of a group experiencing the still-face in the "2nd" position to a group of infants experiencing the normal interaction in the "2nd" position. Such a design would also have controlled for fatigue and order effects and eliminated dependency problems in the data. However, in several studies where such a design has been employed (Tronick et al., 1978; Cohn and Tronick, 1983; Ricks et al., 1977) such effects were not found, suggesting that its added cost in terms of time and effort were unnecessary.

Scoring of Data

The coding of infant coping behaviors during the still-face was based on the Self-Regulatory Behavior Scoring System developed by Gianino (1982). The major categories of the Self-Regulatory Scoring System are presented in Table 3; for a more detailed presentation see Appendix 1, Table 15. In the Self-Regulatory System, the categories Monitor, Signalling, and Averting are mutually exclusive. The categories Self-Comfort, Escape, and Withdrawal are also mutually exclusive. However, Self-Comforting and Escape can occur at the same time as Monitor, Signalling, and Averting. For instance, while sucking on his thumb the infant can either be looking at his mother, crying, or looking away. Specific codes are introduced to account for these conjunctions of behavior so that the coding can be of mutually exclusive categories.

The system combines a) observations by Brazelton et al. (1974) on how the infant can respond to stress, b) Gianino's findings on the infant's use of self-comforting behaviors and on the infant's exploration of the surround, and c)

TABLE 3

SELF-REGULATORY SCORING SYSTEM

1.0 MONITOR: The infant looks at the partner's face without doing any of the other behaviors being scored; if the infant does something else at the same time, the appropriate code should be used.

2.0 SIGNAL: While looking at the partner, the infant acts in a way which functions to elicit or modify the partner's behavior.

3.0 AVERT: The infant looks at something other than the mother; if the infant does something else at the same time. the appropriate code should be used.

4.0 SELF-COMFORT: The infant uses his body to provide self-comforting stimulation.

5.0 ESCAPE: The infant attempts to increase his physical distance from his mother by turning, twisting, or arching away from her.

6.0 WITHDRAWAL: The infant uses his motor, attentional, and perceptual processes to minimize his engagement with the surround.

ENDTABLE 3

elements of Tronick's et al., Modified Monadic Phase Scoring System (1980). Brazelton's observations were made on infants one month or younger and as such describe the infant's initial adaptive repetoire. Gianino's study of 3, 6, and 9 month olds found that signalling (positive and negative) is a frequently used strategy for coping with an interpersonal stress over these months and that infants of this age continue to turn away (escape) from someone who's stressing them. However, he found that Brazelton's other category.

decreasing perceptual receptivity by falling asleep or "glazing over", is seldom used by infants older than 2 months. Additionally, Gianino found that because of the absence of maternal contact during the still-face, infants had no occassion to attempt to push away the mothers. He also found that infants sometimes signalled their mothers with neutral affect, e.g., they reached out to their mother to be picked up with affect that was neither positive nor negative. Importantly, the most frequent strategy was for the infant to switch his attention away from the mother. He found that infants attempted to comfort themselves by sucking, rocking, or self-clasping. Gianino differentiated the infant's attention to the surround into distal and proximal focus, and he further differentiated proximal focus into whether the infant focused on his own body or on an inanimate object and if on an object whether or not the infant manipulated it.

In developing this scoring system, Gianino first combined Brazelton's observations with his own findings. He then added infant behaviors from Tronick's Monadic System to form a more inclusive and comprehensive system. By adding Monitor and Avert (which became the subcategory Scan in Gianino's system), he was able to capture the infant's ongoing behavior for second-by-second scoring.

Coding with the Self-Regulatory System was done from videotapes on a slow motion videodeck. Two coders were trained intensively with practice tapes to above 85% interobservor reliability for all behaviors. To control for the effects of coder bias on session one to session two stability, the two visits were divided between the two scorers.

Infant Mood

Infant mood was assessed at the beginning of each visit through questions to the mother and through observation of the baby. In addition, the mother was askedif there have been any significant events or changes in the infant's life or in the life of any other family member in the weeks preceding the first visit or during the week between visits. The literature on individual differences has repeatedly demonstrated that stability is not an absolute quality, observable regardless of the circumstances. It is dependent on context, i.e., on other variables being maintained within a particular range (Sroufe, 1979). Infant mood is one such variable which can affect both the infant's 'appreciation' of a stressful event and (directly and indirectly) his response. For instance, an infant who is calm and alert on one visit but irritable and drowsy on the next is likely to experience stress differently and to have different coping resources available on the two visits. For this reason infant mood, how the baby slept in the last 24 hours, and when and how well the baby last ate was assessed.

CHAPTER IV

RESULTS

Data Management

A problem in analysis was to collapse the 68 self-regulatory sub-categories into a set which both captured the complexity of the infants' response and was manageable in size. Eight categories were adopted: Monitor, Positive Signal, Neutral Signal, Negative Signal, Transition, Scan, Alternate Focus, and Self-Comfort. The data reduction included the following steps: a) Cry-No-Look was collapsed into Negative Signal; b) Scan was subdivided into Scan and Transition; c) the five sub-categoreis of Alternate Focus were combined into one category; d) the 4 Self-Comfort categories were collapsed into one category; and e) Escape was combined with the sub-categories of Monitor, Signal, Scan, and Alternate Focus, depending on what the infant was doing while Escaping. There were no instances of Withdrawal. The category Transition was introduced because a review of the tapes revealed that Scans of 2 seconds or less had a different quality and, by inference, a different function than those of longer duration. The shorter Scans appeared to function as transitions between behaviors, while the the longer ones appeared to indicate an absence of focus. For that reason, all bouts of Scan 2 seconds or less were designated Transitions. For the interested reader, a more complete description of the process of data reduction and its rationale can be found in Appendix 2.

Analysis of Within Session Response

This section attempts to characterize the typical infant's response in the two sessions. It reports on three analyses performed on the 8 self-regulatory behaviors: a) the means of their frequency, total duration, and bout length; b) the intercorrelations of the eight behaviors computed separately for their frequency, total duration, and bout length; and c) an analysis of lag-one transitions between the 8 behaviors. For each analysis a summary of the findings common to the two sessions will be presented. It was decided to summarize the data in this way rather than for each session separately because an analysis of variance on the differences produced by session effects on the frequency, total duration, and bout length of each behavior uncovered only one significant result.* There were significantly more negative signals in the first session than in the second. This was true of mean frequency (2.00

* Table 19 in Appendix 1 presents a summary of all significant Anova results for session, sex, and interaction effects. Appendix 3 contains findings on all sex differences. These differences will not be discussed in this project.

vs. .67, F = 3.54, p ¼ .05), mean total duration** (13.58 vs.3.54, F = 7.00, p ¼ .01), and mean bout length** (2.43 vs. .71, F = 6.47, p ¼ .05). The first session generated more Negative Signalling. Clearly it was more stressful. However, none of the measures of any of the other coping categories was significantly different between sessions, suggesting that as a group, at least, the infants acted similarly in the two sessions.

Means of Self-Regulatory Behaviors

Looking at Table 4, which presents the means of the combined two sessions, two patterns emerge: a pattern of fewer and shorter socially engaged behaviors and a pattern of more frequent and more sustained disengaged behaviors. This pattern will first be described for frequency, then for bout length and total duration.

During each session the infants typically Monitored the mother about 5 1/2 times and Signalled her a little more than 6 times. The Signalling was divided up into 2.5 Positive attempts, 2.3 Neutral attempts, and 1.3 Negative attempts. Combining these different forms of social engagement, the infants attended to the mother almost 12 separate times. They Averted from the mother 22 times. Of these 22 times, they Transited between behaviors 9.9 times,

** Total duration and bout length were measured in seconds.

TABLE 4

MEANS OF SELF-REGULATORY BEHAVIORS

BOTH SESSIONS*

BEHAVIOR	TOTAL FREQUENCY	TOTAL DURATION**	BOUT LENGTH**
Monitor	5.56	10.27	1.73
Positive Signal	2.47	7.05	1.58
Neutral Signal	2.34	6.01	1.53
Negative Signal	1.34	8.56	1.58
Transition	9.90	12.61	1.31
Scan	3.32	16.62	4.09
Alternate Focus	8.48	45.78	6.56
Self-Comfort	2.55	12.83	3.46

* For a summary of the means of each session separately, see Table 18 in Appendix 1.

** Total duration and bout length measured in seconds.

Scanned 3.3 times, and adopted an Alternate Focus 8.5 times. The ratio of Alternate Focus to Scan, which was better than 2 to 1, indicates the infants greater tendency to fix their focus rather than allow it to wonder. The number of Transitions indicates the number of times the infants stopped one behavior without immediately deploying another. A Self-Comfort was employed about 2 1/2 times per session, making only the 3 sub-categories of Signalling lower frequency behaviors.

The bout length data indicate an important difference between the engaged and disengaged behaviors. Regardless of the type of Signal attempted, the infant sustained it for only 1.5 seconds (1.58 for Positive and Negative Signal and 1.53 for Neutral Signal). Averaging in the average bout length of Monitoring, which was 1.77 seconds with the average bout length of Signalling, demonstrates that the infants were unable to sustain any form of engagement with the mother for over 1.75 seconds, which is remarkably short. The bout length of 6.56 seconds for Alternate Focus and 3.46 for Self-Comfort suggest the relative difficulty of engaging the mother during the still-face as compared to either attending to the surround or attempting to self-comfort.

The behavior with the longest duration was Alternate Focus. The infants spent nearly 46 of the 120 seconds of the still-face episode focusing on objects in the surround with each occurrance Adding in the seconds the infants spent Scanning, almost 17 seconds, to the time in Transition and Alternate Focus demonstrates that the infants Averted, i.e., looked away from the mother for about 74 seconds. Of the remaining 46 seconds, the infants attended to the mother for almost 32 seconds and Self-Comforted for 13 seconds. While attending to the mother, the infants Monitored her behavior for 10 seconds. Positively Signalled for 7 seconds, Neutrally Signalled for 6 seconds, and Negatively Signalled for 8 1/2 seconds. The total for all Signalling behaviors came to about 21 1/2 seconds.

Within Session Intercorrelations

Twenty-eight intercorrelations for each session were generated by the the 8 x 8 matrix. Since these correlations were made on 3 measures (frequency, total duration, and bout length), 84 correlations were computed for each session.

Forty intercorrelations were significant in the first session and 29 in the second. A comparison of significant intercorrelations of the two within session matrices suggested 10 relationships common to both. Only these 10 will be reported here, but Tables 5, 6, and 7 present the full within session matrices. The 10 relationships uncovered with the intercorrelation matrices can be organzied into 3 patterns. In the first, the more the

TABLE 5

INTERCORRELATION OF FREQUENCY OF SELF-REGULATORY SYSTEM

SESSION ONE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.40**	---						
NEU	.26*	.27*	---					
NEG	.08	-.24*	.15	---				
TRN	.31*	.20	.14	-.32*	---			
SCN	.06	-.06	-.08	-.29*	.20	---		
DIS	-.08	.12	-.18	-.53**	.60**	.35**	---	
SFC	-.09	-.22	-.30*	.14	-.22	-.17	-.30*	---

SESSION TWO

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.28*	---						
NEU	.31*	.04	---					
NEG	-.12	-.11	.11	---				
TRN	.48**	.33**	.29*	-.08	---			
SCN	.03	.03	-.02	.05	-.23	---		
DIS	.08	-.11	-.05	-.33**	.46**	.08	---	
SFC	-.07	-.37	-.22	-.07	-.15	-.18	.12	---

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; SCN-Scan; ALT-Alternate Focus; SFC-Self-comfort; TRN-Transition.

* ¼.05
** ¼.01

TABLE 6

INTERCORRELATIONOFDURATIONSOF SELF-REGULATORY SYSTEM

SESSION ONE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.07	---						
NEU	.30*	.18	---					
NEG	-.01	-.17	.11	---				
TRN	.09	.09	.02	-.35**	---			
SCN	-.06	-.15	-.20	-.36**	.04	---		
DIS	-.29*	-.18	-.38**	-.57**	.21	.27*	---	
SFC	-.11	-.22	-.22	-.09	-.25*	-.24*	-.39**	---

SESSION TWO

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.03	---						
NEU	.30*	-.12	---					
NEG	-.20	-.13	.03	---				
TRN	.43**	.06	.18	-.13	---			
SCN	-.13	-.21	-.03	-.10	-.40**	---		
DIS	-.21	-.15	-.25*	-.37**	.03	-.34**	---	
SFC	-.28*	-.21	-.25*	.12	-.22	-.25*	-.26*	---

Key: MON- Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; SCN-Scan; ALT-Alternate Focus; SFC-Self-comfort; TRN-Transition.

* ¼.05
** ¼.01

TABLE 7

INTERCORRELATION OF BOUT LENGTH OF SELF-REGULATORY SYSTEM

SESSION ONE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.20	---						
NEU	.34**	.27*	---					
NEG	.07	-.27*	.19	---				
TRN	-.08	-.21	.00	.38**	---			
SCN	-.08	-.11	-.28*	-.31*	-.04	---		
DIS	.04	.10	-.07	-.30*	.02	.25*	---	
SFC	-.07	-.35**	-.21	-.11	.15	.07	-.04	---

SESSION TWO

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.33**	---						
NEU	.26*	.43**	---					
NEG	.07	-.04	.05	---				
TRN	.04	-.11	-.08	.01	---			
SCN	-.09	-.09	-.08	-.06	.02	---		
DIS	.07	.20	.26*	-.23	.07	-.13	---	
SFC	-.32**	-.38**	-.18	.08	.13	-.03	-.32*	---

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; SCN-Scan; ALT-Alternate Focus; SFC-Self-comfort; TRN-Transition.

* ¼.05
** ¼.01

infant either Monitored, Positively Signalled, or Negatively Signalled, the more he did the other two. In the second, the more Self-Comfort he exhibited, the less he Signalled and Averted. And, lastly, the more the infant adopted an Alternate Focus, the less he Negatively Signalled.

The relationship among Monitor and Signalling was demonstrated by the positive correlations of Monitor with: Positive Signal (frequency), Neutral Signal (frequency, duration, bout length), and Transition (frequency). The more the infant Monitored the mother, the more he attempted to Signal her either Positively, say with a smile, or Neutrally, as with a gesture of arms and hands to be picked up. The correlation between Monitor and Transition suggests that increases in the amount of Monitoring was accompanined by more Transitions between behaviors. The bout lengths of Positive Signal and Negative Signal (1.58 vs. 1.53) were also positively correlated, suggesting that the more the infant was able to sustain one of these types of Signals the more he was able to do the other.

In the second pattern, Self-Comfort was inversely correlated with 4 behaviors: Positive Signal (frequency, total duration, bout length), Neutral Signal (frequency and total duration), Alternate Focus (total duration), and Scan (total duration). Increases in Self-Comfort, therefore, tended to be associated with decreases in Positive and

Neutral Signal as well as with Alternate Focus and Scan. However, this finding is partly, though not entirely, an artifact of the way the subcategories of Self-Comfort were combined. By effectively ignoring whether the infant was either Monitoring, Signalling, or Averting while Self-Comforting, this data reduction strategy made each of the three behaviors mutually exclusive with Self-Comfort, which they need not be. Nonetheless, what it does indicate is that those infants who did adopt a Self-Comforting strategy, tended to do less unaccompanied Positive Signal, Neutral Signal, and Avert.

In the third pattern of relationships, involving the subcategories of Avert, Alternate Focus was positively correlated with Transition (frequency) and inversely correlated with Negative Signal (frequency, total duration, and bout length). While increases in the frequency of Alternate Focus accompanied increases in the frequency of Transition, increases in all measures of Alternate Focus accompanied decreases in Negative Signal.

The overall picture suggested by these intercorrelations is that three of the forms of engagement, i.e., Monitor, Positive Signal, and Negative Signal, are positively related. The more the infant used any one of the three, the more he used the others. In contrast, increases in Self-Comfort were associated with decreases in both

Positive and Neutral Signal and decreases in Alternate Focus and Scan. The relationship between Alternate Focus and Negative Signal suggests that the more the infant disengaged and attended to the surround, the less negative affect he displayed.

Within Session Lag Analysis

When analyzing lag-one transitions, Sacket (1977) recommends that testing be limited to those transitions in which the number of occurances of the criterion event, i.e., the leading behavior, is at least 25 and the expected probability is at lease .05. Since the lowest frequency for either session was for Negative Signal, which occurred 31 times on the second visit, the first criterion was met without exception. However, the expected probability of all transitions to Negative Signal was below .05 for the second session. Consequently, these transitions could only be tested for the first session. The mean observed probabilities for each session are presented in Tables 8 and 9.

The data will be summarized in terms of those findings common to the two sessions. That is, the two sessions will be summarized for those transitions which were independently significant in the two sessions. As noted earlier, a significant transition is one those whose observed

TABLE 8

LAG ONE CONDITIONAL PROBABILITIES AND SUMMARY STATISTICS

SESSION ONE

CRITERION: MONITOR

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	---	.22	.13	.06	.12	.11	.05	.31
Pe	---	.08	.07	.06	.11	.28	.09	.32
SD	---	.02	.02	.02	.02	.03	.02	.03
Z	---	8.55**	3.69**	-.26	.83	-5.81**	-2.22*	-.38

CRITERION: POSITIVE SIGNAL

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.15	---	.02	.02	.11	.14	.05	.51
Pe	.16	---	.06	.06	.10	.25	.08	.29
SD	.0[illegible]	---	.02	.02	.03	.04	.03	.04
Z	-.24	---	-2.05*	-1.87+	.65	-2.78**	-1.04	5.13**

CRITERION: NEUTRAL SIGNAL

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.17	.18	---	.12	.06	.10	.02	.36
Pe	.16	.07	---	.06	.10	.25	.08	.29
SD	.04	.03	---	.02	.03	.04	.03	.04
Z	.48	4.48**	---	2.55**	-1.35	-3.65**	-2.24*	1.51

CRITERION: NEGATIVE SIGNAL

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.14	.02	.07	---	.12	.13	.23	.29
Pe	.16	.07	.06	---	.10	.25	.08	.29
SD	.04	.03	.0[illegible]	---	.03	.05	.03	.05
Z	-.46	-1.84+	.44	---	.73	-2.75**	5.71**	.02

CRITERION: SCAN

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.26	.04	.07	.09	---	.44	.08	.01
Pe	.16	.07	.07	.06	---	.26	.08	.30
SD	.03	.02	.02	.02	---	.04	.02	.04
Z	3.43**	-1.35	.20	1.59	---	5.18**	.14	-7.97**

TABLE 8 (continued)

CRITERION: ALTERNATE FOCUS

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.08	.01	.02	.04	.19	---	.10	.57
Pe	.19	.09	.08	.07	.12	---	.10	.36
SD	.02	.01	.01	.01	.02	---	.02	.02
Z	-6.00**	-5.33**	-4.22**	-2.75**	4.57**	---	-.07	8.91**

CRITERION: SELF-COMFORT

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.11	.01	.02	.17	.14	.19	---	.36
Pe	.16	.07	.07	.06	.10	.26	---	.29
SD	.03	.02	.02	.02	.03	.04	---	.04
Z	-1.48	-2.81**	-2.29*	5.54**	1.68	-1.73	---	1.74

CRITERION: TRANSITION

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.20	.05	.09	.05	---	.54	.07	---
Pe	.20	.09	.08	.07	.12	.32	.10	---
SDe)	.02	.01	.01	.01	.02	.02	.01	---
Z	-.11	-3.10**	.55	-2.07*	-8.14**	9.80**	-1.94+	---

Po: The observed probability
Pe: The expected probability
SD: The standard deviation of the expected probability
Z: The Z score: Po-Pe/SD (Pe)

\+ ¼ .07
* ¼ .05
** ¼ .01

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; SCN-Scan; ALT-Alternate Focus; SFC-Self-comfort; TRN-Transition.

TABLE 9

LAG ONE CONDITIONAL PROBABILITIES AND SUMMARY STATISTICS

SESSION TWO

CRITERION: MONITOR

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	---	.19	.15	.01	.14	.09	.03	.39
Pe	---	.09	.08	.02	.11	.28	.08	.34
SD	---	.02	.02	.01	.02	.03	.02	.03
Z	---	6.25**	4.49**	-1.30	1.74	-7.61**	-3.44**	2.10*

CRITERION: POSITIVE SIGNAL

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.12	---	.06	---	.17	.09	.01	.54
Pe	.18	---	.08	.02	.10	.25	.07	.30
SD	.03	---	.02	.01	.03	.04	.02	.04
Z	-1.64	---	-.80	-1.55	2.53**	-4.28**	-2.66**	6.14**

CRITERION: NEUTRAL SIGNAL

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.15	.15	---	.05	.14	.08	.07	.37
Pe	.18	.08	---	.02	.10	.25	.07	.30
SDe)	.03	.02	---	.01	.03	.04	.02	.04
Z	-.79	3.16**	---	2.50*	1.57	-4.68**	-.27	1.66

CRITERION: NEGATIVE SIGNAL

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.10	---	.26	---	.10	.06	.13	.35
Pe	.17	.07	.07	---	.10	.24	.07	.29
SDe)	.07	.05	.05	---	.05	.08	.05	.08
Z	-1.05	-1.56	4.10**	---	.02	-2.27*	1.32	.84

CRITERION: SCAN

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.32	.03	.09	.03	---	.46	.07	.01
Pe	.18	.08	.08	.02	---	.26	.08	.31
SDe)	.03	.02	.02	.01	---	.03	.02	.03
Z	4.96**	-2.59**	.61	1.04	---	6.04**	-.15	-8.85**

TABLE 9 (continued)

CRITERION: ALTERNATE FOCUS

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.11	.02	.03	.01	.17	---	.12	.54
Pe	.21	.09	.09	.02	.12	---	.09	.37
SD	.02	.01	.01	.01	.02	---	.01	.02
Z	-5.47**	-5.22**	-4.36**	-1.92+	3.03**	---	2.39**	7.55**

CRITERION: SELF-COMFORT

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.12	.02	.05	.01	.14	.33	---	.32
Pe	.18	.08	.07	.02	.10	.25	---	.30
SD	.03	.02	.02	.01	.03	.04	---	.04
Z	-1.56	-2.31*	-.92	-.88	1.40	2.08*	---	.52

CRITERION: TRANSITION

	MON	POS	NEU	NEG	SCN	ALT	SFC	TRN
Po	.24	.07	.06	.03	.00	.52	.07	---
Pe	.23	.10	.10	.02	.13	.33	.09	---
SDe)	.02	.01	.01	.01	.02	.02	.01	---
Z	.83	-2.01*	-2.76**	1.11	-8.80**	9.46**	-1.91+	---

Po: The observed probability
Pe: The expected probability
SD: The standard deviation of the expected probability
Z: The Z score: Po - Pe/SD (Pe)

+ ¼ .07
* ¼ .05
** ¼ .01

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; SCN-Scan; ALT-Alternate Focus; SFC-Self-comfort; TRN-Transition.

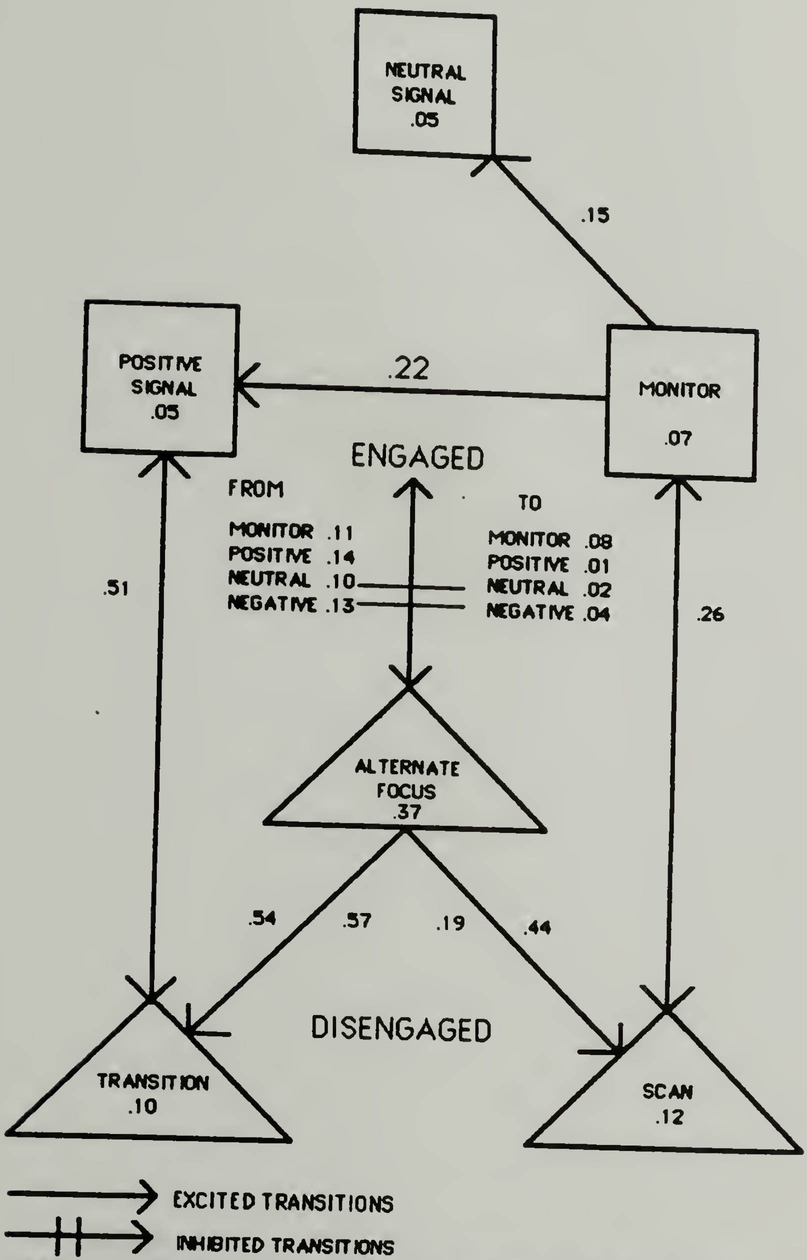
probability was significantly different from the expected probability in session one *and* in session two. The data can be summarized in thiw way because an analysis of variance on the effect of sessions on the observed probability of all lags indicated only two significant differences. Both differences involved Negative Signal: Scan to Negative Signal (F = 4.59, p. ¼ .05) and for Alternate Focus to Negative (F = 4.18, p. ¼ . 05. Although these two differences indicate some changes in the organization of behavior in the two sessions--affected by the significantly greater proportion of Negative Signal in the first session--the overall picture is fundamentally the same for both.

Comparing Tables 8 and 9 for each session, there were 9 'excitatory' transitions, i.e., transitions which occurred with a higher probability than expected and 13 'inhibitory' transitions, i.e., transitions which occurred with a lower probability than expected. See Figures 1 and 2 for a schematic representation of the important relationships for each session.

The excitatory transitions can be grouped into 3 patterns. The first, a pattern of engagement with the mother, involved Monitor, Positive Signal, and Neutral Signal. In this pattern, Monitor excited Positive Signal and Neutral Signal, and Neutral Signal excited Positive Signal. Once the infant entered Monitor, he was more likely

FIGURE 1

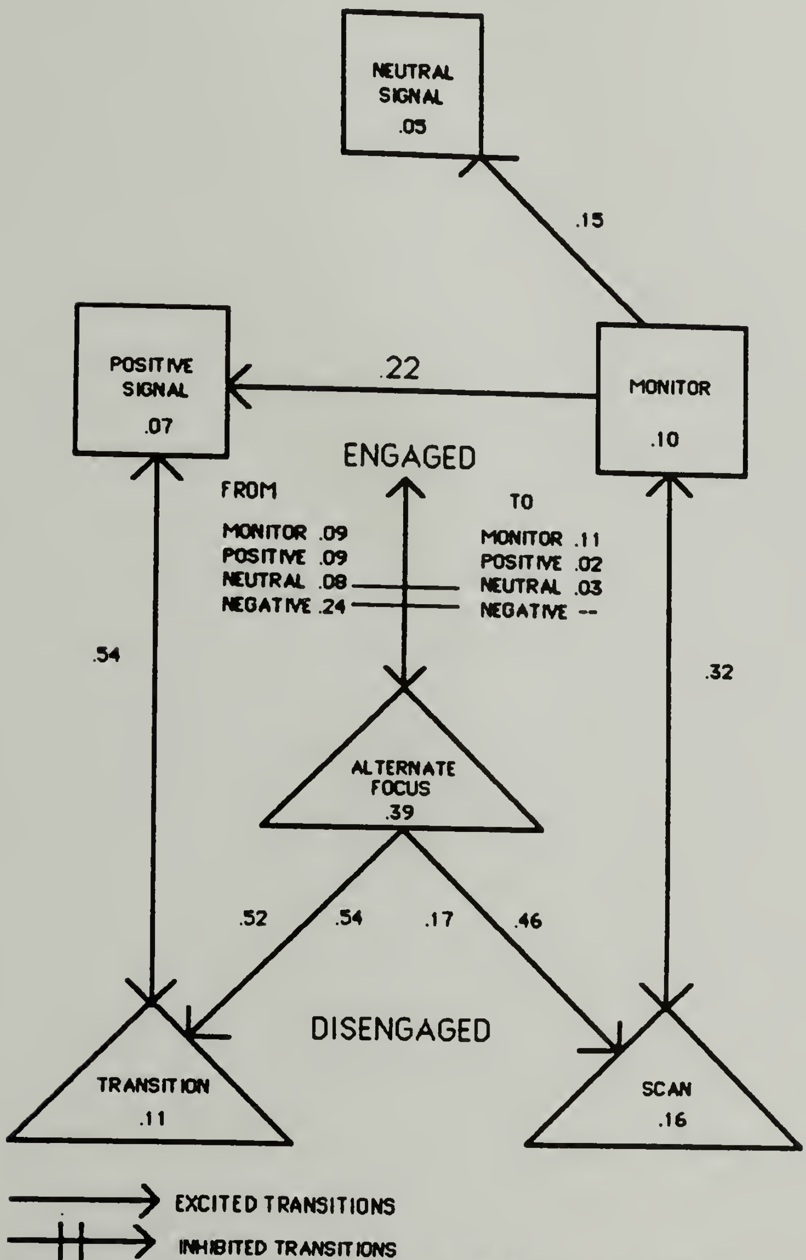
SESSION ONE ENGAGED-DISENGAGED-INTERFACE CONFIGURATION



Numbers within figures refer to proportion of time infants were in that behavior
Numbers accompanying arrows between figures refer to lag 1 cond. probabilities

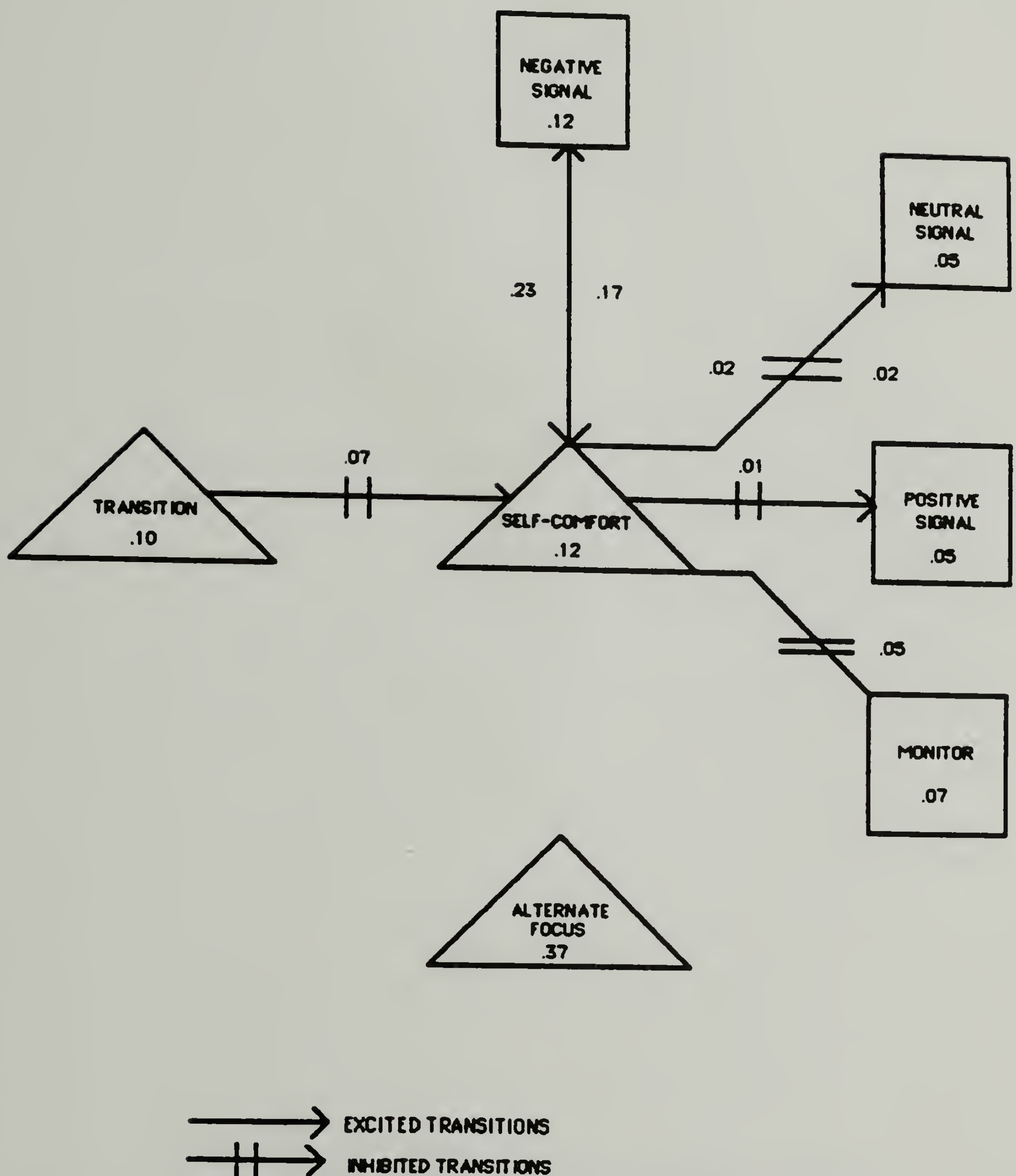
FIGURE 2

SESSION TWO ENGAGED-DISENGAGED-INTERFACE CONFIGURATION



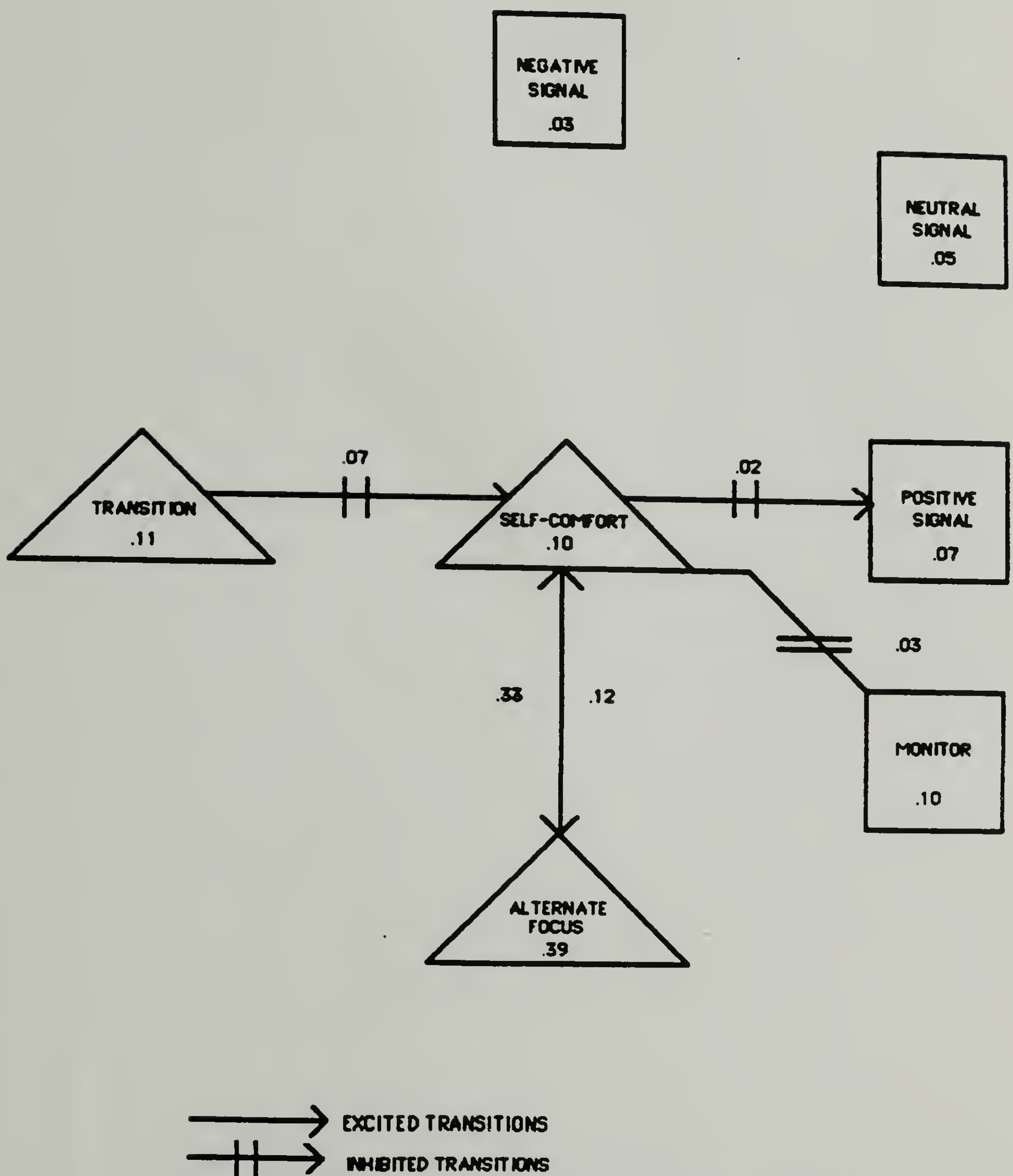
Numbers within figures refer to proportion of time infants were in that behavior
Numbers accompanying arrows between figures refer to lag 1 cond. probabilities

FIGURE 3
SESSION ONE SELF-COMFORT CONFIGURATION



Numbers within figures refer to proportion of time infants were in that behavior
Numbers accompanying arrows between figures refer to lag 1 cond. probabilities

FIGURE 4
SESSIONTWO SELF-COMFORT CONFIGURATION



Numbers within figures refer to proportion of time infants were in that behavior
Numbers accompanying arrows between figures refer to lag 1 cond. probabilities

to Signal Positively or Neutrally, and once he Signalled Neutrally, he was then more likely to Signal Positively.

The second pattern, a disengaged configuration, involved Alternate Focus, Transition, and Scan. There was a reciprocal excitatory relationship between Alternate Focus and Transition and between Alternate Focus and Scan. After entering either a Transition or a Scan, there was an increase in the likelihood the infant would exhibit an Alternate Focus. Reciprocally, when in Alternate Focus there was a greater likelihood the infant would Scan as well as a greater likelihood that he would use a Transition. Thus with the exception of the transition between Scan and Transition, all three behaviors used by the infant when disengaged from the mother (Transition, Scan, and Alternate Focus) excited each other; regarding the exception, transitions between Scan and Transition could never occur because a Transition is a Scan of less than 2 seconds duration, and no behavior could follow itself.

The third pattern of lags involved transitions between the engaged and disengaged set of behaviors. Significantly, in each direction there was only one transition with a likelihood greater than expected between the engaged and disengaged behaviors. When ceasing to Positive Signal, the infant went to Transition with a higher probability than expected, and when leaving Scan the infant went to Monitor with a higher probability than expected.

Looking at the inhibitory transitions common to the two sessions, there were 4 patterns among the 13 separate transitions. In the first, 3 behaviors were involved in a reciprocal relationship with Alternate Focus: Monitor, Positive Signal, and Neutral Signal. In the second, employing a Self-Comfort reduced the likelihood a Monitor or Positive Signal would follow. In the third, Transition inhibited Self-Comfort and Negative Signal. The last, involving a reciprocal relationship between Scan and Transition, was an artifact of the scoring system.

In the first configuration, the infant was less likely than expected to move directly from an engagement with the mother to an engagement with the surround. That is, in both sessions the infant was less likely than expected to go to an Alternate Focus after either adopting a Monitor, a Positive Signal, or a Neutral Signal and also less likely than expected to enter one of these forms of engagement after exhibiting an Alternate Focus. More simply, when switching between an engagement with the surround and an engagement with the mother, direct transitions between the two were inhibited. This pattern was further in evidence with respect to Negative Signal, which is the one remaining form of engagement. In both sessions Negative Signal to

Alternate Focus was inhibited. Furthermore, in the first session, where the probabilities of all transitions to Negative Signal were large enough to be evaluated, it was found that transitions in either direction between Alternate Focus and Negative Signal were inhibited, completing a picture of reciprocal inhibition between all 4 engaged categories and Alternate Focus.

In the second configuration, Self-Comfort inhibited both Monitor and Positive Signal. Having turned to himself for comfort, the infant was less likely to reengage the mother by Monitoring her or by Positively Signalling.

The behavioral sequences Transition to Self-Comfort and Transition to Negative Signal were inhibited. The infant was less likely to go to a Self-Comfort and less likely to go to a Negative Signal after he employed a Transition.

The last two inhibitory transitions exhibited by both sessions involved a reciprocal relationship between Scan and Transition. As already noted, transitions between Scan and Transition were precluded by the definition of Transition as a type of Scan and the fact that no behavior could follow itself.

A definite organization of the infant's coping behavior emerges when the significant excitatory and inhibitory behaviors for both sessions are examined together. Monitor, Positive Signal, and Neutral Signal form a set of engaged-with-mother behaviors, while Scan, Alternate Focus, and Transition form a set of disengaged-from-mother behaviors. Within the engaged behaviors, entering either Monitor or Neutral Signal significantly increased the probability of a Positive Signal following, and entering Monitor also increased the probability of a Neutral Signal following. The linkage, then, was, first, between Monitor, which was the least affectively positive behavior of the three, and Neutral and Positive Signal, and, secondly, between Neutral Signal and the most affectively positive behavior, Positive Signal. On the disengaged side, Alternate Focus was reciprocally excited with both Scan and Transition, indicating that once the infant employed one of these disengaged behaviors, the chances of him adopting another were more likely.

Transitions between the engaged and disengaged configurations were more likely than expected for Transition and Scan, but less likely for Alternate Focus. More specifically, while turning away from the mother the one transition which was more likely than expected was from Positive Signal to Transition. When turning back to the mother, it was from Scan to Monitor. That there was no tendency for infants to attempt transitions between engaged and disengaged behaviors via Alternate Focus suggests that once the infant began to fully attend to the surround, he became less likely to immediately become engaged with the mother and that once engaged with the mother he became less likely to turn away and become absorbed by the surrounding object world.

Lastly, the excitatory role of Self-Comfort changed depending on how much Negative Signalling was employed. When the interaction was more Negative, as in session one, a reciprocal excitation appeared between Self-Comforting and Negative Signal. When the pattern was less negative, as in session two, a reciprocal excitation developed between Self-Comfort and Alternate Focus. Whether negative or not, the infant was less likely than expected to go from Self-Comfort to Positive Signal, from Monitoring the mother to Self-Comfort, or from Transition to Self-Comfort. From another point of view, in neither case did Self-Comfort increase the probability of Monitor, Positive Signal, or Neutral Signal, nor did employing any of these three increase the probability of a Self-Comfort following. Thus, sequences involving Self-Comfort and any of the 3 neutral-positive forms of engagement with mother were less frequent than expected.

Summary of Within Session Response

For most of each still-face session (74 seconds) the infants typically turned away from the mother, cycling between Transition, Alternate Focus, and Scan, with better than 60% of this time invested in objects. Although this Averting from the mother's unresponsive and expressionless respose filled more than one-half of each session, the infants' attention and behavior was neither completely absorbed by the object world nor unorganized when they attempted to reengage the mother. The more the infants attended to the mother with any one of the three non-negative forms of engagement, i.e., Monitor, Positive Signal, or Neutral Signal, the more they engaged her with the other two as well. Once the infants Monitored, the chances increased that they then Neutrally Signalled, and once they either Monitored or Neutrally Signalled, the chances increased that they Positively Signalled. Thus, even though these behaviors occurred infrequently (approximately 3 times each per session) and briefly approximately 1 1/2 seconds on each occurrance), collectively they exhibited several significant interrelationships. The most notable finding about the interface of the engagement and disengagement behaviors was that infants were less likely than expected to transit in either direction between an Alternate Focus and an engagement with the mother without first Scanning or using a Transition. When abandoning one form of engagement, i.e., with either the mother or the surround, the infants did not readily and immediately take up the other. Another finding of interest was that the longer the total duration of Self-Comfort, which on the average occurred approximately 2 1/2 times each session for a total of almost 13 seconds, the shorter the duration of Positive Signal, Neutral Signal, Scan, and Alternate Focus. Just as the more Self-Comfort used the less Positive and Neutral Signal attempted, the more Alternate Focus used the less Negative Signal attempted.

Analysis of the Stability of Response Across Sessions

Correlations of Coping Behaviors Across Sessions

Correlations on the 8 behaviors from session one to session two produced 10 significant results (see Table 10). Positive Signal (frequency, total duration, and bout), Neutral Signal (total duration and bout), Negative Signal (total duration), Alternate Focus (frequency), and Self-Comfort (frequency, total duration, and bout) were all positively correlated across the two sessions. Thus only Monitor, Transition, and Scan exhibited no stability across the two sessions.

It is notable that the total durations of all 3 categories of Signal were significantly correlated,

TABLE 10

CORRELATIONS OF SELF-REGULATORY BEHAVIORS

SESSION ONE WITH SESSION TWO

BEHAVIOR	TOTAL FREQUENCY	TOTAL DURATION 1	BOUT LENGHT 1
Monitor	.114	.080	-.066
Positive Signal	.362**	.497**	.203
Neutral Signal	-.030	.288*	.310*
Negative Signal	.220	.351**	.204
Transition	-.049	-.033	-.047
Scan	.144	.182	.081
Alternate Focus	.351**	.173	-.032
Self-Comfort	.455**	.353**	.333**

1. Total duration and bout length measured in seconds.

* ¼ .05

** ¼ .01

indicating that infants displayed some stable tendencies in their use of Signalling when presented with the still-face mother. In a separate analysis, it was found that collapsing all 3 sub-categories of Signalling produced significant correlations as well for frequency (R = .43, p. ¼ .01), total duration (R = .41, p. ¼ .01), and bout length (R = . 32, p. ¼ .05).

Additionally, the consistent findings on the 3 measures of Self-Comfort indicate that infants exhibited similiar tendencies in the two sessions in their use of Self-Comfort. The stability in Self-Comfort was evidenced in how often they used it, how long they sustained each attempt, and the total time they employed it. The correlations of the 17 behavior set, presented in Table 17 of Appendix 1, show that not only was Self-Comfort in general stable across the two sessions, but that the different types were as well; three out of the 4 subcategories (Oral-Self, Oral-Other, and Rocking) were significantly correlated for all three measures.

The one self-regulatory measure which was expected to be correlated across the two sessions but which was not was the duration of Alternate Focus; however, the frequency of Alternate focus was significant, suggesting that although infants varied their bout length from session one to session two, which altered the total time they employed the behavior, they were more consistent in how frequently they adopted it in the two sessions.

These results demonstrate that Signalling, Self-Comforting, and Alternate Focus all exhibit some stability across the two sessions. Furthermore, the 3 sub-categories of Signal and 3 out of 4 sub-categories of Self-Comfort were signicant, which indicates that infants exhibited stable tendencies in the use of specific forms of Signalling and Self-Comfort.

Correlations of Lag-One Conditional Probabilities

The observed probabilities of the 56 transitions exhibited in each session were correlated. A high correlation indicated that the *infants qua individuals* tended to use the transitions with a similiar probability in the two sessions. Thirteen of the 56 correlations were significant; see Table 11. Eleven of these 13 involved transitions among the engaged behaviors (4 transitions) or between the engaged and disengaged behaviors (7 transitions). The other 2 involved Self-Comfort. There was no evidence of stability in the transitions among the disengaged behaviors, i.e., among Transition, Scan, and Alternate Focus.

Considering the significant results among the engaged behaviors, in transiting in either direction between Neutral

TABLE 11

SIGNIFICANT CORRELATIONS OF THE OBSERVED PROBABILITIES OF SESSION 1 & 2 LAGS

Monitor to Positive Signal	.40**
Monitor to Scan	.29*
Monitor to Alternative Focus	.25*
Positive Signal to Neutral Signal	.31*
Positive Signal to Scan	.27*
Neutral Signal to Positive Signal	.278
Negative Signal to Neutral Signal	.30*
Scan to Positive Signal	.35*
Self-Comfort to Monitor	.48**
Transition to Positive Signal	.54**
Transition to Neutral Signal	.24*
Transition to Negative Signal	.28*
Transition to Self-Comfort	.41**

* ¼.05
** ¼.01

Signal and Positive Signal infants tended to do so with the same probability in the two sessions. Negative Signal to Neutral was also positively correlated from session one to session two. These 3 correlations between transitions involving Positive Signal, Neutral Signal, and Negative Signal indicate some stability in the infant's tendencies to cycle between different forms of Signalling. Adding in the positive correlation of Monitor to Positive Signal suggests some further stability among the transitions between the engaged behaviors. Altogether, 33% of the transitions among the engaged behaviors were positively correlated.

Out of the 24 transitions (12 in each direction) which could occur between the engaged and disengaged behaviors, about 28% were significant. The conditional probabilities of 3 transitions from the engaged to disengaged behaviors and of 4 transitions from the disengaged to the engaged behaviors were stable across the two sessions. Monitor to Alternate Focus, Monitor to Scan, and Positive Signal to Scan were all signficantly correlated transitions involving engaged to disengaged behaviors. Transition to Positive Signal, Transition to Neutral Signal, Transition to Negative Signal, and Scan to Positive Signal were all significantly correlated transitions involving disengaged to engaged behaviors. The last set of correlated transitions involve transitions to and from Self-Comfort. Of the 14 transitions, only two are significant, that of Transition to Self-Comfort and Self-Comfort to Monitor.

In evaluating the results, the first observation is that less than 25% of the 56 correlations were statistically signficant. The evidence of stability was strongest for transitions between engaged behaviors and weakest--infact nonexistent--between disengaged behaviors. Furthermore, out of the 29 transitions whose observed probability was found to be significantly different from the expected within both sessions, only 5 were also found to be significantly correlated across the two sessions. The implication is that the correlations on the observed probability data does not evidence as much behavioral organization across sessions as it does within sessions. The reason would seem to be that many of the infants were organized somewhat differently in the two sessions.

Cluster Analysis of Coping Behavior

In order to evaluate the stability of each infant's overall behavioral organization, a cluster analysis was perfomed. The analysis produced a set of categorical classifications for the infants in each session, enabling a comparison of each infant's classification across the 2 sessions. The behaviors used for the analysis were the four behaviors identified by the self-regulatory perspective as most central to coping: Signalling, Alternate Focus, Scan, and Self-Comfort. The analysis was run three times to partition the infants into 2, 3, and 4 clusters. For each analysis the total duration of each of the four behaviors, standarized to unit variance, was used, since the correlational analysis had identified greater stability for total duration than for frequency. Since the cluster analysis partitioned the infants of each session into clusters based on their scores on the four behaviors, the four behavioral means constituting the clusters were compared after each analysis. Each cluster was described as being high, medium, or low on the mean total durations of each behavior. Thus a cluster might be defined as high Signal, medium Alternate Focus, medium Scan, and low Self-Comfort. After clusters were defined. a comparison of each session's clusters was made in order to identifying similiarly defined clusters. An assessment of stability was then obtained by counting the number of infants who fell into the 'same', i.e., similiarly defined, clusters on the two sessions. For a discussion of the issues which bear on the usew of a cluster analysis on this data set see Appendix 4.

The first analysis, which produced two clusters, identified a pair of similiarly defined clusters for the two sessions (see Table 12). In the first session, one group

TABLE 12

CLUSTER MEANS

CLUSTER N = 2

SESSION 1*

	SCAN	ALT. FOC.	SELF-COM.	SIG.
1.	17.93	17.50	5.36	60.36
2.	36.13	59.03	15.08	8.27

SESSION 2

	SCAN	ALT. FOC.	SELF-COM.	SIG.
1	28.53	32.8	9.20	39.20
2.	39.11	56.7	12.62	8.84

STABILITY**: High Signal = 7; High Disengaged = 30

CLUSTER N = 3

SESSION 1

	SCAN	ALT. OC.	SELF-COM.	SIG.
1.	17.93	17.50	5.36	60.36
2.	33.57	44.29	55.29	7.14
3.	36.71	62.35	6.00	8.52

SESSION 2

	SCAN	ALT. FOC.	SELF-COM.	SIG.
1.	27.50	34.57	6.57	40.29
2.	40.00	42.00	55.20	8.20
3.	39.09	57.48	7.18	9.39

STABILITY: High Signal = 6; High Scan/Self-Comfort = 2; High Scan/Alternate Focus = 22

TABLE 12 (continued)

CLUSTER N = 4

SESSION 1

	SCAN	ALT. FOC.	SELF-COM.	SIG.
1.	17.93	17.50	5.36	60.36
2.	33.57	44.29	55.29	7.14
3.	53.75	48.63	12.63	4.13
4.	30.78	67.13	3.70	10.04

SESSION 2

	SCAN	ALT. FOC.	SELF-COM.	SIG.
1.	29.44	35.94	5.67	35.94
2.	37.57	44.29	48.14	7.57
3.	65.50	37.50	6.70	5.90
4.	25.11	74.06	5.82	9.18

STABILITY: High Signal = 8; High Scan/Self-Comfort = 2; High Scan = 2; High Alternate Focus = 11

* All means are on the total durations measured in seconds.

** Stability refers to the number of infants who were stable across the 2 sessions.

was characterized by high Signalling, medium Scan, low Alternate Focus, and low Self-Comfort. The corrosponding group in the second session differed in that Alternate Focus and Self-Comfort were medium. The second group in both sessions was defined by high Scan and high Alternate Focus. Session one differed from session two on this group by the use of more Self-Comfort. In short, one group was highly engaged with the mother, the other was highly involved with the surround. Looking at Table 12, it can be seen that on both visits 7 infants were chararcterized by high engagment with the mother while 30 infants were characterized by high engagement with the surround; of 15 who exhibited different tendencies on the two sessions 8, focused more on the surround on the first session and more on the mother in the second, and 7 did the opposite. Thirty-seven infants, therefore, were stable according to this analysis, while 15 were not.

In forming three clusters (see Table 12), the two Signal groups remained almost exactly the same in behavioral means and membership, with the one difference being the addition of one infant to the second session Signal cluster. The high disengaged cluster was subdivided into a high Scan/high Self-Comfort group and a high Scan/high Alternate Focus group. The only difference between the two sessions in the definition of these groups was that the Scan/

Alternate Focus group was accompanied by low Self-Comfort on session one and medium Self-Comfort on session two. This analysis classified 30 infants into the same group in the two sessions. Six were found to be in the Signal group, 2 in the Scan/ Self-Comfort group, and 22 in the Scan/ Alternate Focus group. Of the 7 infants who were identified as exhibiting stability when two clusters were formed but as appearing unstable when three clusters were formed, 1 was in the Signal group and the other 6 were in the disengaged group for the 2 cluster classification; for the 3 cluster classification, 4 of the latter 6 were in the Scan/Self-Comfort group in the first session but on the Scan/Alternate Focus group in the second.

Adding a fourth cluster (see Table 12) caused the Scan/Alternate Focus group to subdivide into a high Scan and a high Alternate Focus group, although the Alternate Focus group in session one also averaged a high amount of Scan whereas the corrosponding second session cluster was characterized by medium Scan. The defining characteristics of the resulting 4 clusters were a) high Signal; b) high Self-Comfort; c) high Scan; and d) high Alternate Focus. In the second session, both the Signal cluster and the Scan/Self-Comfort cluster added 2 infants to its composition, all 4 arriving from the Scan/Alternate Focus group defined when three clusters were formed. With the 4 clusters, 23 infants were classified into the 'same' category for the two sessions, 7 less than when 3 clusters were used, and 14 less than when 2 clusters were formed. Eight infants were classified as Signal, 2 as Scan/Self-Comfort, 2 as Scan, and 11 as Alternate Focus.

The three cluster analyses considered together indicate that 21 infants exhibited behavioral stability in all 3 sets of clusters, i.e., when 2, 3, and 4 clusters were formed, and that 18 more infants were stable on at least one of the analyses. Thirteen infants were never classified in the same way in the two sessions, suggesting little stability in their behavior. The most fundamental classification distinction was between the infant as engaged and as disengaged with the mother. The next division introduced a distinction between those infants who both used Self-Comfort and Scan and those who sustained an Alternate Focus and Scanned. When a fourth division was created, the analyses differentiated those infants who more often sustained an Alternate Focus from those who tended to frequently Scan.

Thus there was good evidence that 40% of the infants were highly stable, 25% were highly unstable, and 35% were modestly stable. Stability was manifested most when an engaged/disengaged distinction was applied and became steadily weaker as finer distinctions were made.

Self-Regulatory Stability

Another approach to assessing stability was tried along with the cluster analyses. In the cluster approach: a) the infant's stability in the four major self-regulatory categories--Signalling, Alternate Focus, Self-Comfort, and Scan--was assessed; b) total durations were used; and c) Self-Comfort was used both on its own and in terms of the other behaviors the infant exhibited at the same time as Self-Comforting. Each of the four categories was made into a dichotomous variable--high or low, and each infant was classified as to high or low on each behavioral category. Then stability was assessed in two ways: first, the number of infants who were stable on each category was computed, and, secondly, the number of categories in which stability was evidenced for each infant was computed.

To create dichotomous variables, a cut-off score was selected for each category based on two factors: first, hypotheses suggested by the self-regulatory perspective about the adaptive and normative use of these behaviors, and, secondly, the actual distribution of these behaviors in the sample. The decision was made to use the upper three quartiles of Signalling and Alternate Focus and the upper most quartile for Scan and Self-Comfort. The use of Signalling (Ricks, 1981; Gianino, 1982) and Alternate Focus

(Gianino, 1982) has been found to be very high among 6 month old infants in response to the still-face. Coupling this fact with the view that some Signalling is important for adaptive functioning but that beyond a certain minimum level of Signalling individual differences in the use of Signalling is probably less suggestive of adaptiveness than of individual style, it was decided that those infants who fell in the bottom quartile of the distribution would be classified differently from those in the upper three quartiles. With both Scan and Self-Comfort, individual differences of significance would most likely appear in those infants who employed the behavior significantly more than the others. On that basis, infants who were in the upper quartile on these behaviors were classified as high. Since the distributions differed for the two sessions, the cut-off score for each distribution was compared and the score between the two which best preserved the quartile split was chosen. See Table 13 for cut-off scores.

The first analysis of the data computed phi, which is a measure of statistical association and best interpreted like a correlational score (Hayes, 1973), was computed on each category to assess session one to session two stability; see Table 14. The values were .22 for Scan, .07 for Alternate Focus, .28 for Self-Comfort and .33 for Signal. When compared to the Pearson correlations presented earlier (see

TABLE 13

CUT-OFF SCORES FOR SELF-REGULATORY CATEGORIZATIONS

CATEGORIZATION	HIGH	LOW
SIGNAL	0 TO 3*	½ 3
ALTERNATE FOCUS	0 TO 29	½ 29
SCAN	0 TO 15	½ 15
SELF-COMFORT	0 TO 30	½ 30

* All scores are total durations measured in seconds.

TABLE 14

CHI SQUARE TABLES AND PHI
FOR SELF-REGULATORY CATEGORIZATIONS

SCAN

	0**	1	
0*	32	10	42
1	5	5	10
	37	15	52

CHI SQUARE = 1.57
PHI = .23

ALTERNATE FOCUS

	0	1	
0	30	8	38
1	12	2	14
	42	10	52

CHI SQUARE = .02
PHI = .08

SELF-COMFORT

	0	1	
0	32	7	39
1	7	6	13
	39	13	52

CHI SQUARE = 2.77
PHI = .28

ALTERNATE SIGNAL

	0	1	
0	5	12	17
1	2	33	35
	7	45	52

CHI SQUARE = 4.82
PHI = .35

* First Session
** Second Session

Table 10), these values are actually smaller, suggesting that the categorical system adopted here, at least when the categories were considered separately, less effectively captured the underlying stability in the original behavioral measures. However, this method allows for another descriptive summary of the data which was not possible with either the original behavioral measures or their correlations.

By assigning each infant a classification (high or low) on each of the self-regulatory measures for each session and then computing the percentage of classificatory aggreements divided by aggreements plus disaggreements, another measure of behavioral stability was produced. The advantages of this measure were twofold: first, by assessing all four categorizations together, it provided evidence of the overall stability of each infant, and secondly it indicated which self-regulatory categories were stable for each infant and which were not. The correlations of session one and session two behavioral scores did not assess the stabiltiy of any single infant; rather they captured the tendencies towards individual stability within the group. Another limitation of the correlations as a test of behavioral stability was their focus on individual behaviors. The cluster analyses, by contrast, made it possible to use a number of behaviors at once and to then classify individual infants. A limitation of the cluster analyses, however, was that each analysis generated a dichotomous classification process. That is, either an infant was in the 'same' cluster on the two sessions or was not. The descriptive statistic presented here allows one to assess each infant's behavioral tendencies on 4 self-regulatory categories and thus to arrive at some sense of overall stability present. Furthermore, by separately indicating for each infant which categories were stable and which were not, it becomes possible to relate other measures which might be contributing to stability and instability in particular areas, e.g., temperament, maternal sensitivity, and maternal self-esteem.

Applying this descriptive statistic to the self-regulatory categories, it was found that 12 infants were stable on all 4 categories, 21 infants were stable on 3 categories, 14 infants were stable on two categories, and 5 infants were stable on 1 category. Thirty-three infants, then, were stable on at least 3 of the 4 categores and 47 of the the 52 infants were stable on at least 1/2 of the measures. Comparing this breakdown with that provided by the cluster analysis, which used the same behavioral categories, 11 of the 12 infants who were stable on all 4 self-regulatory categories were also stable in all 3 sets of clusters analyses. Stability in all 4 self-regulatory categories proved to be a sufficient but unnecessary condition for stability on the cluster analyses, since there were 10 other infants who were stable in all 3 sets of cluster analyses but who were stable on 3 or less self-regulatory categories; of these 10, 7 were stable in 3 categories, and 3 were stable in 2 categories.

Summary of Results on Stability Across Sessions

The session one by session two correlations on each self-regulatory behavior uncovered some measure of stability in all 3 types of Signalling, 3 out of 4 Self-Comforting behaviors, and Alternate Focus. The correlations on lag-one conditional probabilities, however, provided less evidence of stability, which might suggest that while infants tended to exhibit the same behaviors on the two sessions, they organized those behaviors somewhat differently in each. A cluster analysis indicated that almost 60% of the infants exhibited a stable tendency to turn away from the mother to engage the surround, while almost 14% were consistent over the two sessions in how much they attempted to evoke a response from their mother. As more specific categorizations were made of the infant's behavior, less stability was evidenced. The last analysis, a second categorical assessment, revealed that almost 25% of the infants were very stable, being classified the same on both

both stability and instability, with over 40% of the 52 infants evidencing stability in 3 out of 4 categories. Adding the last group with the most stable, 65% of the infants were stable on at least 3 of the 4 categories.

CHAPTER V

DISCUSSION

The first goal of this project was to provide a more detailed picture of how 6 month old infants respond to an experimentally induced interpersonal stress. The second aim was to investigate whether 6 month old infants exhibit stability in these responses. To produce an interpersonal stress, the mother remained expressionless and unresponsive with her infant, a design known as the still-face. The project was guided by the regulatory perspective, which ties the acquisition of infant coping capacities to the development of normal interpersonal skills. According to this perspective, the 6 month old infant exhibits a capacity for both joint regulation of the interaction and self-regulation of his own affective state. These capacities are said to complement each other since in attempting to regulate an interaction which has become distressing or which is no longer reciprocal, the infant can employ his or her affective displays--most strongly by communicating an appraisal of distress--to signal the partner to change her behavior. Since such a change in the partner's behavior will typically help alleviate the infant's distress, the infant will have both altered the partner's behavior and self-regulated his own affective state. When these methods fail, the infant is compelled to use other tactics to reduce his distress. Self-Comforting and Averting from the mother are two major strategies. In disengaging from the mother the infant opts for self-regulation over continued social engagement.

The 6 Month Infant's Response to the Still-Face Mother

From the point of view of generating a broad data base to further characterize the infant's responses to the still-face, the project provided two relatively large, though dependent, samples, i.e., the two experimental sessions which were separated by a week. It was found that while the greater amount of negative affect displayed in the first session gave rise to some important differences between the two sessions, the overall picture was the same for both; an important implication of the difference in negative affect between the two sessions will be considered when stability is discussed. Previous studies of experimentally induced interpersonal stress, such as the still-face and the simulated depressed mother, have demonstrated a pattern of reduced engagement with the partner, increased attention to the surround, greater distress, and more protesting compared to a normal interaction. Although this study did not attempt a direct comparision to the normal interactions which preceded and followed the still-face, there is little doubt that the same patterns emerged here (see Tronick, 1982; Cohn, 1983; Brazelton, 1974; Stern, 1977; Gianino, 1982).

In both sessions, the infants spent most of their time Averting from their mother. The moments of engagement with their mother were almost fleeting, with most lasting less than 2 seconds. Still, the typical infant made almost 12 separate attempts to engage his mother in the 2 minutes, one almost every 10 seconds, and the more he did of any one of these (Monitor, Positive Signal, or Negative Signal) the more he did of the others. This suggests that even though the still-face mother is interactively unavailable, which the infant experiences every time he attends to her, the face-to-face contact is so compelling that he is unable to simply forgo interpersonal involvement; his goal, and in this sense his 'need', of interpersonal contact is too powerful.

Perhaps this is actually more remarkable than it might appear. Cognitively oriented researchers, beginning with Piaget (1968), have emphasized that the 6 month old is beginning to discover the inanimate object world. At this age sustained exploration is seen as intrinsically motivating and a source of great delight. Researchers from a more social-emotional perspective, such as Tronick (1982), have noted that at times this investment in objects appears to compete with the mother for the infant's interest, sometimes inducing greater compensatory--if not competative--activity by mothers of 6 month olds than of mothers of either younger or older infants. In the still-face design, the mother is ostensibly available, yet objectively unavailable, to the infant. Particularly on the first visit, the laboratory is new to the infant and a potential opportunity for curious exploration. In such a context, one might hypothesize that the infant would quickly turn away from the mother and become captivated by the novelty of the surround. One might even go so far as to predict that the infant would not turn back for the entire period, for the still-face is only 120 seconds long. One might go on to speculate that the infant has probably experienced other relatively brief moments of maternal unavailability and thus would have already learned to quickly switch goals and engage the surround. The evidence suggests, however, that the infant is too socially motivated to be able to avail himself of this option in its extreme form.

Still, no matter how hard the infant tries to elicit the mothers involvement, her still-face behavior continues to rebuff him. One consequence, already noted, is the brevity of communicative attempts. The infant is compelled to seek the mother's response, but the stress engendered by her denial causes the infant to quickly abort his efforts. A second consequence is the repeated efforts to Self-Comfort. Unable to induce the mother to interact, the infant attempts to self-regulate his affective state, i.e., to reduce his distress. Here it might be noted that psychodynamically oriented theorists would suggest that the infant is attempting to obtain some 'self-gratification' as a symbolic substitute for what he is craving; interestingly, almost all of the infant's Self-Comforting is oral (approximately 11 of 13 seconds).

The infant's other major alternative is to turn away from the mother. Brazelton (1974) and Stern (1977) have observed how important an ability this is, since by Averting the infant is better able to terminate and avoid the distressing non-interaction, in short, to disengage from the mother.

However, not all Averts are alike. It was found that while some of the Averts were unfocused, with the infant either Transiting between behaviors or Scanning the surround, most were clearly focused and infused with interest, with the infant exploring one or another of the surrounding objects. Thus, although the data indicate that the infant was not entirely able to disengage from the mother to explore the surround without internal distraction, he was able to do so for a number of brief periods (over 8) of almost 7 seconds each. Brazelton (1974) hypothesizes that during a stressful situation these focused periods have an important adaptive function. By diverting his attention from the mother, the infant is afforded a recovery and processing period. It seems that investing interest in an object allows the infant to functionally switch goals--from interpersonal engagement to object exploration--and thus to effect a positive escape, however brief, from the distressing condition. It is significant in this regard that Alternate Focus was negatively correlated with Negative Signal. Those infants who used Alternate Focus most displayed the least negative affect. It is unclear whether the object focus helped them modulate their negative affect or if it reduced the chances of negative affect arising at all.

Some infants, however, were less able to sustain an object focus. Once they disengaged by Averting, they Scanned about the room, their glance moving from one object to another. Although the self-regulatory scoring system does not provide evidence for this, on film these infants appeared somewhat distracted and distressed. To adultomorphize, they seemed anxiously preoccupied; if one were to spectulate, one might infer that they were not truely disengaged from the mother, but were trying to do so in order to reduce their distress--with only partial success. On the one hand, it could be said that they were somewhat successful, as evidenced by the negative correlation between Scan and Negative Signal in session one, the session which contained the most negative affect. On the other hand, they were less able to use a Negative Signal to communicate their distress and thus were less able to Protess in a way which (ordinarily) would have caused the mother to alter her distressing behavior.

Support for this interpretation of the difference between Scan and Alternate Focus is found in the within session lag-analysis. In both sessions, infants were less likely than expected to move from an Alternate Focus to any of the engaged with mother behaviors, whereas they were more likely than expected to move from Scan to Monitoring the mother. It appears that an Alternate Focus allowed them to disengage more fully than a Scan. And when they did attempt to reengage the mother, they had a tendency to Monitor her behavior before attempting to Signal. In previous work (Cohn, 1981; Gianino, 1982), these Monitors were characterized as evidencing a lot of 'wariness'.

Considering the transitions from the engaged behaviors, it is notable that the infant was less likely than expected to immediately attend to objects. After disengaging from the mother, the infant needed a moment or two (a Transition or Scan) before he could redirect his attention to the object world. From the self-regulatory perspective, he needed to briefly self-regulate his affective state before he could switch goals.

The goal of Self-Comforting as a self-regulatory, or coping, behavior is also evidenced in the sequential organization of behaviors. It was found on the first interaction, which was characterized by more negative affect, that Self-Comfort and Negative Signal excited each other. On the one hand, when the infant was most distressed he was most likely to seek a form of Self-Comfort. On the other hand, a Self-Comfort served only as a temporary respite from distress, since the infant was still more likely than expected to Negatively Signal. However, another way of considering it is that the Self-Comfort afforded the infant enough self-regulatory time to enable him to reengage the mother, even if with negative affect; that the Self-Comfort did not alter the infant's mood, however, is suggested by the inhibition of transitions to Positive and Neutral Signal. During the second interaction, when the infant was less distressed, Self-Comfort was sequentially linked with Alternate Focus. One of the things Alternate Focus and Self-Comfort have in common is an investment in something other than mother. As long as the infant did not become overly distressed and was thus able to self-regulate effectively, he could redirect his capacity for emotional involvement to either the object world or his own body. That is, he could either invest the object world with emotional importance or he could find pleasure, or at least take solace, in his own body. It is not surprising that when confronted with the unavailability of the still-face mother the infant tended to cycle back and forth between the two.

The results of the within session analyses provide strong support for the self-regulatory perspective. If joint regulation of the interaction is denied the infant, resulting in distress, self-regulation assumes greater importance. However, only in rare cases does self-regulation entirely supercede. Not a single 6 month old infant in either session of the study resorted to Perceptual or Motor Withdrawal, whereas Gianino (1982) found that 3 out of 10 three month olds used Motor Withdrawal. In normal 6 month olds, a distressing interaction engenders a dynamic conflict between social and self-regulatory needs, causing the infant to cycle back and forth between behaviors which serve the two goals.

The Stability of the 6 Month Old Infant's Response

The data on the within session behavior indicates that

6 month old infants have characteristic ways of responding to a stressful interaction. As a group they demonstrate organization, structure, and flexibility. The evidence on the stability of individual 6 month old infant's behavior is less clear cut, since some of the data (the between session correlations, the cluster analyses, and the self-regulatory categorizations) provide evidence for stability, while the lag-one conditional probabilities suggest a lack of it.

The between session correlations ranged from .29 to .50, with most below .40. Although this indicates that the relationships were not remarkably strong, the literature on the stability of discrete behaviors in infancy has seldom demonstrated much stronger relationships (Sroufe and Waters, 1977). Correlations of even this size suggest an emergent pattern of stability in coping strategies. The stability in all Signalling behaviors and three out of four Self-Comforting behaviors was particularly interesting. If Signalling is an especially important coping strategy, then it is significant that 6 month olds are already exhibiting some stable individual differences in this regard. If tendencies to Self-Comfort in response to a stress are predictive of certain patterns of personality development and defensive patterns, as hypothesized by generations of psychodynamic theorists, then evidence indicating the presence of some stable individual differences in these at 6 months in response to an interpersonal stress suggests that the infant's early interpersonal relationships--and not just his intrapsychic conflicts a la A. Freud (1966)--play an important role in the development of his defensive tendencies. These two findings provide some support for the view that two of the infant's more important self-regulatory tendencies are at least beginning to stabilize by 6 months. Remarkably, this is at least a month or two before most infants evidence a strong, discriminating attachment to their mother (Bowlby, 1969).

The correlations of lag one conditional probabilities provided the weakest evidence for stability. Less than 25% of the correlations were significant, suggesting that the organization of the infant's behavior changed somewhat between sessions. In other words, those infants whose rank ordering differed in the two sessions followed somewhat different sequential rules in each session. However, there is another interpretation worth considering, which is that while the rank orderings of some of the infants' conditional probabilities significantly differed in the two sessions, the overall sequential organization of most infants' behavior was similiar. In a sense, there is a parallel to be made here with what the attachment people have observed about attempts to define the quality fo attachment in terms of the correlations of discrete behaviors (Sroufe & Waters, 1977). The securely attached infant does not always use the exact same behaviors in the exact same quantity. In fact, there often are significant differences in both the type and quantity of specific behaviors. But from the point of view of how attached the infant is, i.e., from the point of view of the organization of his behavior _vis-a-vis_ the mother, the infant is still classified secure. Analogously, there are various routes to coping adaptively with a stressful exchange, and different routes are not strickly defined by any one or two transition sequences. We can easily imagine an infant who generally followed the same 'rules', i.e., evidenced the same organization, in both sessions yet whose rank ordering on the conditional probabilities of some of the transitions was significantly different in the two sessions. In the first session, he might have transited significantly more from Monitor to Neutral Signal than from Monitor to Positive Signal, and when moving between engaged and disengaged categories he might have tended to exit more via Neutral Signal than via Positive Signal. In the second session, he might have transited significantly more from Monitor to Positive Signal than from Monitor to Neutral Signal, and when moving between engaged categories he might have tended to exit more via Positive Signal than via Neutral Signal. But in both sessions, all the other conditional probabilities remained virtually the same from session one and two, since he followed the course taken by the 'typical' infant in the two sessions. In other words, after Monitoring the mother, the infant might have Signalled more Neutrally in the second than in the first session (with a pick-me-up rather than a smile), but he was not likely to have immediately switched his attention from the mother to the strap on his chair, nor was he likely to have cried immediately after having smiled. Some low correlations notwithstanding, the infant would have adopted the same, fundamental rules in the two sessions, i.e., those that apply to engaged and disengaged behaviors and to transitions between the two. But a mere rank ordering of the individual conditional probabilities would have obscurred this fact, since such correlations are blind to the functional (organizational) relationships among behaviors. Without a functional analysis of the different transitions, comparisons across the two sessions using lag analyses are difficult to interpret.

Since this is also true for the correlations on the individual self-regulatory behaviors, one of the goals of using the two categorical analyses was to evaluate the data in terms of the relative adaptiveness of different strategies. It was hoped that a categorical system might be able to show how apparently different responses to the still-face were actually serving similiar adaptive functions. Neither the cluster analysis nor the categorical system completely achieved this goal. Before considering why, it needs to be emphasized that these analyses did provide some useful evidence on the amount of stability present at 6 months.

A majority of infants showed some significant stability; out of 52 infants, 37 were stable on the 2-cluster analysis and 33 were stable on 3/4 of the self-regulatory classifications, over 20% were very stable on both measures. Adding in the 14 infants who were not found stable on any of the cluster analyses with the 5 who were stable on only one of ths self-regulatory classifications suggests that 10-20% of the infants demonstrated little behavioral stability. It would seem that there was a significant degree of variability in the amount of stability in the group. Some infants were more stable in their self-regulatory tendencies than others, and some infants were hardly stable at all.

The subgroup of infants who were stable seemed to be divided into two groups with somewhat different behavioral tendencies. One group was very oriented to the mother, while the other was more oriented to the surround. Each group persisted in its efforts to cope with the stress. The 50 seconds per session of Signalling which characterized the infants who oriented to the mother marked them as exceptionally determined to alter their mother's behavior. On an active-passive continuum, these infants were not content to bide their time. They actively tried to adjust the the mother's behavior in line with their interactive goal. In a sense they displayed a great deal of confidence in their own ability to communicate and in their mother's ability and willingness to respond sensitively. It might be that it is this confidence, or sense of interpersonal competance, which is the stable element underlying the infant's signalling tendencies. From another point of view, it might be that the difference between the two groups was due to temperamental differences rather than to the history of their respective interpersonal histories.

The group of infants who tended to orient away from the mother was comprised of 3 subgoups. Having adopted a strategy of disengagement, the infants within this group tended either to turn their attention to the surround, to display a lot of unfocused, flitting of attention, or to Self-Comfort. Since some stability was lost as these subgroups were added by the cluster analyses, the strongest stability evidenced was due to the infants' shared preferences for disengagement as a way of coping with a distressing interaction. It is tempting to say that whereas the signal group was more active, the disengaged group was more passive--that whereas the signal group tried to <u>adjust</u>

the interaction, the disengaged group tried to adjust _to_ the interaction. But it must be remembered, first of all, that most of the 'disengaged' group also signalled; secondly, that those infants of this group who actively explored the surround for sustained periods selected a strategy which allowed them to avail themselves of the resources available; and, thirdly, that although the infants in this group had disengagement as a prefered coping strategy, this commonality belied important differences among them. The high Scan, the high Alternate Focus, and the high Self-Comfort subgroups did not choose equivent self-regulatory behaviors. The difficulty in this project was providing evidence for this merely from the behavioral record.

This study defined stability in terms of behavioral measures of self-regulation. Although these measures often referenced the infants affect, the system per se is not affectively based. Neither this project nor any others which have used the still-face have examined infant emotional displays. More specifically, no one who has studied the infant's response to the still-face has drawn upon theories of emotional expression or recent advances in coding facial expressions (Tronick, 1978; Gianino, 1982; Fogel, 1983). Yet, given the view that the infant's interpersonal behaviors are primarily affective, these advances in our understanding of affect are relevant to the question of the infant's specificity of response to interpersonal stress. Campos et al. (1983; see also Izard, 1978; Ekman, 1980; Tomkins, 1982), argue that the young infant has the capacity to experience and express at least seven primary emotions (joy, interest, sadness, anger, fear, surprise, and distress) and that current techniques make it possible to differentiate these emotions on the basis of facial expressions. Furthermore, Campos et al. argue that an emotional response reflects an 'appreciation' by the infant of an event's meaning for him; Bowlby (1969) refers to this as an 'appraisal' of the event. If this is the case, then the infant's emotional response to the still-face should reflect the infant's experience of it. For example, according to Campos et al., anger is generated when a) the infant has a goal (e.g., mutual regulation in an interaction), b) that goal is obstructed (e.g., an unresponsive mother), and c) the infant expects the goal to be obtainable under the circumstances (e.g., when the mother presents herself as ready to interact by facing the infant). Such an angry response to the still-face, for example, would be consistent with models of mutual regulation. For Campos et al., a sad response to an unresponsive mother is to be contrasted to an angry response: a sad response would occur when the infant has the goal of mutual regulation but nonetheless expects the mother not to meet that goal, i.e., a situation in which the goal is appraised as unobtainable. Alternatively, the infant might display interest in response to the display, indicating it is novel or discrepant rather than stressful (McCall & McGhee, 1977; Kagan, 1974).

Campos et al. view emotion as a motivational concept. When the infant feels Y, because he appreciated some situation as X, he is inclined to express Y and to do some Z. But, as Campos points out, the 'behavior' Z can take a number of different forms (Z1, Z2. Z3 . . . ZN), since emotions can be behaviorally enacted in any number of ways. Just as a secure attachment can be evidenced in many different behaviors, all serving the same goal, an emotion such as anger can be expressed in a number of ways, such as in a rageful cry, a flailing of the arms or legs, an angry-faced Avert. or all three together. Not only would it be interesting to know what the infant was feeling whenever he first Averted from the mother, it would also be important to know what he was feeling when he adopted an Alternate Focus: was he interested, anxious, sad, or angry. There might be stronger evidence of stability if the infant's emotions were studied in addition to his behaviors. The two analyses would usefully complement rather than supercede one another. However important it is to know what an infant feels, it is also useful to know his behavioral tendencies when the feeling arises. By studying affect and behavior together, we would learn how the infant appreciates the interpersonal stress as well as how this guides his attempts to regulate both the interaction and his internal state.

These points are particularly relevant for studying individual differences in response to relational stresses. Responses which appear different may all be motivated by the same emotion. Conversely, different emotions may give rise to similiar behaviors. Moreover, an analysis which only focuses on behavior does ot readily allow an assessment of the amount of stress experienced by the infant in response to an interpersonal stress. The design of this study presumed that the still-face was more or less equally stressful to each infant in the two sessions. However, this may not have been the case, as evidenced by the percentage (23%) of infants who cried at the first but not the second session. A fuller discussion of this point will help illustrate the importance of looking at affect as well as behavior when studying individual differences in the infant's response to an interpersonal stress.

Of the 12 infants who cried in the first session but not in the second, none were described by their mother as upset before visiting the laboratory, and none cried during the normal interaction which preceded the first still-face. Although this suggests that the negative affect was therefore in response to the stress generated by the mother's still-face behavior, this does not account for the difference between the two sessions.

Some evidence is provided by the fact that a number of mothers indicated that the first visit to the laboratory was more stressful for them than the second. One could hypothesize that the unfamiliarity of the laboratory alone made the first visit for the infant more stressful, too. If both the mother and infant were stressed independently of each other, the interaction of these conditions would exacerbate the infant's stress and probably the mother's as well. Still, the 12 distressed infants were able to remain at least affectively neutral, and often quite positive, while interacting with the mother during the first normal interaction. Given this consideration it seems safe to hypothesize that when the mother became still-face the additional stress tipped the infant's precarious self-regulatory balance, causing the infant to loose some ability to cope with his distress, which manifested itself in more negative affect. This account can be filled out by noting that if both the mother and infant were more distressed by the first visit to the laboratory, then the infant might have felt a greater need for his mother's responsivity and be more vulnerable to her rebuffs of his elicitations. The view of attachment theorists (Bowlby, 1969; Ainsworth, 1973) that the mother serves as a secure base for the infant when he is stressed suggests that her unavailability under such conditions would be more stressful to him.

As reasonable as this account is, the difference between the first and second sessions might have been due to other factors as well. In addition to the possibility that the mother and infant were more relaxed in the second session than in the first because of their familiarity with the laboratory, it is also possible that the infant was actually less stressed by the still-face itself.

Drawing upon the self-regulatory perspective and the account of emotion advanced by Campos et al. (1983), it can be hypothesized that the infant's experience of the still-face depends on _both_ his internal state and on his appreciation of the mother's behavior. An interpersonal situation such as the still-face--in which the mother is unavailable, as opposed to available but non-contingent--generates stress when the infant is both primed for social interaction, that is has the goal of engaging the mother, and when he appreciates her behavior as indicating that she is interactively unavailble. If either condition is not fulfilled, then this type of interactive situation would not generate stress. The still-face procedure attempts to control for both conditions in three ways: a) by priming the infant with a preceding normal interaction; b) by having the mother maintain eye-contact, which at least in our culture signals an intent to relate interpersonally*; and c) by having the mother remain expressionless and unresponsive. Although almost every infant initially made eye contact with the mother as she turned towards him with a still-face, it is not clear from this fact alone how motivated each infant was to engage her socially. Furthermore, even when an infant's interpersonal behavioral system was activated by the mother's _en face_ position, the infant could have appreciated his still-face mother in a way which engendered little stress. Specifically, one could hypothesize that an infant who previously confronted his mother in a 2 minute still-face pose would appreciate her still-face behavior differently than an infant who had never experienced his mother acting this way before; only one mother said her baby had truely experienced her in such a prolonged still-face before the first session. After the first still-face session in the laboratory. at least some of the infant's could have learned that their mother's distressing behavior would eventually end (after 2 minutes and 15 seconds). However much the still-face had distressed these infants in the first session. they could have learned that their mother

* It is possible that eye-contact does not serve as a context marker for impending social interaction in all cultures, i.e., that this 'rule' (Cohn & Tronick, 1983) is at least partly learned and not 'pre-wired', but this project cannot answer this question.

would soon enough interact normally with them again. To speculate a little further, these infants might even have attributed (associated, if one prefers) their mother's return to normalcy after her still-face behavior as due to (related to) their attempts to alter her behavior with some form of Signalling. Following the lead of Erikson (1950) and Ainsworth et al. (1974) one could speculate that this association resulted in a greater sense of trust in their mother's availability and sensitivity and in a greater confidence (sense of effectance) in their ability to signal the mother effectively in the context of the laboratory (see the section below on Interpersonal History and Infant Reactions).

The one thing that both the first and second account of the difference in negative affect in the two sessions have in common is that to employ either requires an assessment in each session of each infant's appreciation of the mother's still-face and the amount of distress he experienced. Neither assessment is easily made by a behaviorally based methodology, while an affectively based system like Izards assesses both since it implicitly evaluates appreciations (Campos, 1983) and explicitly scores distress as one of the infant's primary emotions. This difference is of much importance for analyzing stability, as was attempted in this study, since if the infant appreciated the two sessions differently and consequently experienced different levels of stress in them, then whatever stable behavioral tendencies were already formed in the infant would be obscured. Considering these complications, it is all the more remarkabe that the study was able to uncover as much stability as it did. Nonetheless, an approach which emphasized the intrinsic connections between affect and behavior would almost certainly provide a more fruitful approach to studying individual differences in infancy.

Recommendations for Further Research:

This study attempted to describe and analyze the 6 month old infant's reactions to an interpersonal stress and the extent of stability he evidenced in his response tendencies. No attempt was made to relate these findings to other measures which might account for them. It would be useful to know whether infants with certain temperaments or whose mothers were more or less sensitive have one type of self-regulatory tendency or another and if the extent of stability they did manifest was effected by these factors. In this concluding section these two hypotheses will be briefly discussed.

Interpersonal History and Infant Reactions

Both Campos et al.'s (1983) views on emotion and the mutual regulation model of interaction imply that the infant's tendencies to react to an interpersonal stress with a particular coping behavior or affect can be traced in part to the infant's prior interpersonal experiences. This means that the appreciation process is biased by the infant's social history. Emde (1983), following Spitz (1965), has suggested that the cumulative effect of the infant's daily interpersonal experiences contributes to the gradual evolution of a stable emotional mood (Tronick et al., 1982). Emde's claim builds on Campos et al.'s view by suggesting that in addition to possessing an affective system which assigns adaptive 'meaning' to interpersonal situations and thus motivates appropriate behavior, infants also develop an 'affective core' or 'pre-representational self' which serves to bias the infant's emotional appraisals and behavioral reactions. This bias is brought to, and more or less imposed on, the different interpersonal situations encountered by the infant, modifying his appraisal and behavior even before he has fully processed the information arising out of the interactions. For example, the infant whose affective core is one of anxiety is biased to appreciate a new interpersonal situation fearfully and to have a tendency to disengage from it before confronting it.

Emde's account of an affective core, therefore, provides a basis for expecting stability in the infant's emotional response at some point in development, at least to particular classes of social interaction.

Since the formation of this affective core is said to occur during the infant's daily social exchanges, the quality of these interactions should relate to the infant's emotional response. Among the factors identified as significantly affecting the quality of interaction is the mother's capacity to relate sensitively and appropriately to her infant (Blehar, Lieberman, & Ainsworth, 1977; Ainsworth, Bell, & Stayton, 1978; Ricks, Noyes, & Tronick, 1981; Tronick et al., 1982; Belsky, Ravine, & Taylor, 1984). For instance. Brazelton et al. (1974) found that mothers who fail to pause or who stay in too close to their infants have infants who Avert their gaze a greater proportion of time than infants whose mothers are more sensitive. Field (1977) found a similiar effect with preterm infants, and Main et al. (1979) found that avoidently attached older infants had mothers who had avoided physical contact with them when they were younger. Demos (1982) demonstrated how maternal interaction patterns modified their older infant's exploratory behaviors.

An infant who has sensitive mothering repeatedly experiences prompt, reliable, and appropriate responses to his distress signals, including instances when the mother herself is the cause of his distress. From these experiences, the infant develops an expectancy that when he is distressed, for whatever reason, his mother will not persist intolerably long before appropriately responding to his signals (Ainsworth et al., 1974). To put it in terms of the infant's interpersonal experiences, an infant who is generally able to coordinate the interaction with his mother sufficiently well to achieve a shared positive emotional state and who experiences success when he attempts to alter a distressing interaction with her, also feels a strong sense of effectance. i.e., a sense of what he can and cannot accomplish (White, 1959, Tronick, 1980; Tronick et al., 1982). By contrast. an infant who experiences less sensitive mothering is likely to develop a sense of ineffectance or helplessness and an affective core that biases him toward withdrawal (Seligman, 1975). Ricks et al. (1981; Tronick, et al., 1982) has found that at 6 months of age infants whose mothers are sensitive during normal interactions are infants who try to elicit the mother during the still-face, whereas infants whose mothers are less sensitive (i.e., either 'overcontrolling' or 'undercontrolling') do not try to elicit their mothers during the still-face. Note that the infant whose mother is less sensitive (whether under- or overcontrolling) is deprived of control over the interaction and of the experience of being effective.

These results support the hypothesis that the quality of the normal interaction affects the infant's response in different interpersonal situations--in particular, that the sensitivity of the mother during normal interactions biases the infant's response during a stressful interaction. Applying this hypothesis to the data presented in this project would provide a useful test of this emphasis on maternal senstivity and would possibly help parcel out some of the individual differences observed.

Temperament and the Infant's Reactions

Research on the effect of infant temperament on mother-infant interaction (Gewirtz, 1961; Korner, 1965; Bell, 1968; Yang & Halverson, 1976; Thomas and Chess, 1977) has shown that the quality of the environment, especially maternal behavior. is insufficient to account for abnormal patterns of infant social development. "Goodness-of-fit" between infant and caregiver has been cited as an important variable affecting how the dyad negotiates social interaction and as having important consequences for later development (Thomas & Chess, 1977). Rothbart and Derryberry (1982) have suggested that temperament involves constitutional differences in reactivity and self-regulation. Campos et al., (1983) suggest that temperament plays a more specific role in that it organizes various aspects of emotionality. Campos et al. claim that individual differences in emotionality (as well as in hedonic tone and arousal) are partly reflected in parameters of emotional expression such as threshold, latency, rise time, intensity, and recovery time. Following Campos et al., if emotions serve as determinants and regulators of intrapsychic and interpersonal interactions, then individual differences in temperament are likely to affect coping strategies. To give an example, consider, a type of stressful mother-infant interaction which tends to engender negative affect in most infants. The response of any individual infant will depend on the infant's tendencies regarding response threshold, intensity, and recovery time for negative affect, since these will affect how capable the infant will be of disengaging from the mother, switching goals, accepting comforting from the mother, etc.

Speculations from within a Psychoanalytic Perspective

Psychoanalytic theorists, especially those subscribing to an object relations perspective, have emphasized the importance of early infancy for later personality development; as noted in the Introduction, however, they have generally failed to grasp the nature and extent of the infant's social motivation and skills. A pivotal concept for these theorists is the notion 'internalization'. Schaffer (1968) has defined internalization as:

> those processes by which the subject transforms real or imagined regulatory interactions with his enviroment and real or imagined characteristics of his environment into inner regulations and characteristics.

The process of internalization is one in which exogenous regulatory structures become endogenous controls. Emde's discussion of the contribution of the cumulative effects of the infant's daily experiences to the evolution of a stable emotional mood and to the formation of a 'pre-representational' self is another perspective on internalization, one which minimizes the role of drives (though not of motivation) and emphasizes the role of affect. When one adds to this account the self-regulatory perspective developed in the Introduction, some possibilities suggest themselves relevant to psychoanalytic accounts of defense and psychopathology.

The data presented in this study speak most directly to the processes governing the normal developmental response to interpersonal stress. The results indicated that when infants are stressed interpersonally, they tend to adopt a set of self-regulatory behaviors, which have a definte organization, to help them cope with their distress. The question one might ask is what, if any, is the connection between these normally deployed self-regulatory behaviors and the ontogeny of defensive behaviors. To explore the issues involved, the behavioral effects of having to cope with chronic interpersonal stress will be discussed first, followed by a discussion of the possible intrapsychic consequences.

The Ontogeny of Relational Defensive Behaviors

Drawing on case studies by Brazelton (1971), Stern (1977), Adamson (1977), and Massie (1982), Gianino (1982) hypothesized that an infant who is forced to cope with repeated and prolonged occasions of interpersonal stress will be compelled to resort to more extreme measures of coping with his negative affect, e.g., with Perceptual Withdrawal. Following Tronick (1982), Gianino speculated that repeated experiences with such failures to influence the partner results in the gradual erosion of the infant's sense of effectance; in fact, a sense of ineffectance or helplessness results. Furthermore, he speculated that a potential consequence of repeatedly adopting the more extreme coping behaviors is their evolution into maladaptive defensive patterns, with their intrapsychic correlates.

As hypothesized, relational defensive behaviors evolve out of the infant's attempts to cope with a history of frequent, prolonged stressful interactions, i.e., stresses which have been a chronic feature of the infant's primary interpersonal relationships. Experience teaches the infant which coping behaviors are most effective. Once he learns this, he will adopt them even if they are so extreme as to constrict his overall ability to maintain engagement with the surround and, more generally, even if they restrict his immediate and longer term options; in short, even if they curtail his autonomy. Such is the primacy of the infant's need to self-regulation his internal state.

By definition, the transition from coping behaviors to defensive behaviors occurs once the infant begins to employ them automatically, inflexibly, and indiscrimantly, and thus even with a partner who does nothing to warrent them. They are 'defensive' because they are adopted to *preclude* the experience of interpersonal stress.

Intrapsychic Correlates of Relational Defensive Behaviors

This behavioral discussion can be integrated with one focusing on the intrapsychic correlates by considering, as Stern (1977) recommends, that coping behaviors which become a fixed feature of the infant's interactive repetoire--that is, which have assumed a defensive status--help to consititute the infant's affective core, his interiorized schemes of affective, interpersonal behaviors. In other words, the interactive experiences which precipitate the infant's defensive style are internalized.

An example will be presented to illustrate this. This study demonstrated that among normal infants an Avert is a common response to an interpersonal stress. It seems reasonable to propose that in a normal population an Avert is adaptive, since it allows the infant to self-regulate and does not preclude him from returning to the mother when she makes herself more available. As long as the mother is not routinely unavailable, the infant will experience many occasions in which he successfully engages her and many occasions in which he first Averts to cope with a minor stress, or mismatch, but then returns to find the mother ready to reengage him.

But consider an infant who is compelled to respond to a mother who very frequently rebuffs his social elicitations. If this infant tends to deploy an Avert on most of these occassions, the developmental implications are quite different than for the infant who does this to cope with a mismatch produced by a mother who is generally available. One can speculate that after many such experiences the infant will automatically disengage from the mother and quickly involve himself in the surround in order to immediately minimize his distress. Furthermore, the automaticity of the response might gradually be accompanied by a tendency to screen out the distressing experience from his mind. Insofar as the infant succeeds in screening out the distress, his behavior would entail elements of denial and emotional insulation; Bowlby (1980) describes this defensive process as one of selective exclusion of painful information. By disengaging immediately, the infant effectively self-regulates the negative affect he would otherwise feel, and by immersing himself in exploration he reduces his ego involvement in his relationship with his mother. However, even if the infant is often able to screen out the distressing experience, he might not be able to screen out his need for social interaction. Furthermore, if Campos et al. (1983) are correct in their view that the infant necessarily 'appreciates' the world emotionally, then one has grounds for speculating that the infant will not always be able to screen out his his appreciation of such chronic interpersonal stressors, which may be a form of primitive rage. At times the negative affect could become intolerable and would have to be inhibited (repressed), especially if the mother ignored or punished him whenever he displayed negative affect (Bowlby, 1969, 1981). One would further speculate that the infant would associate (but not with any understanding) his need for interpersonal contact with his consequent distress and might therefore repress the need as well, perhaps withdrawing. Following Winnicott

(1965) and Guntrip (1971), one might wonder if the infant would not come to feel--in some very primitive, non-conceptual, way--that his own natural need for human relatedness was bad and his self was unloveable, that it drove love away. This might manifest itself in overwhelming sadness and depression. One need only take one further step and hypothesize that the infant has too great a stake in his mother's availability to entirely reject her (Bowlby, 1980); Winnicott (1965) and Fairbairn (1978) would refer to the infant's inability to recognize that the mother who is sometimes available and sensitive (the 'good mother') is the same mother who is often unavailable and insensitive to him. Once one has take this step, one has adopted a framework which allows for the potential of 'splitting'. One can imagine Fairbairn's notion of the different parts of the infant which experience the mother as a) exciting and b) rejecting and which experience the self as a) a sabateur and b) libidinal. Chodorow (1978) provides a godd summary of this perspective:

> Insofar as aspects of the maternal relationship are unsatisfactory, or such that the infant feels rejected or unloved, it is likely to define itself as rejected, or as someone who drives love away. In this situation, part of infantile attention, and then the infantile ego, remains preoccupied with this negatively experienced internal relationship. Because this situaion is unresolvable, and interferes with the ongoing need for love, the infant represses its preoccupation. Part of its definition of self and its affective energy

> thus splits off experientially from its central self, drawing to an internal object energy and commitment which would otherwise be available for ongoing external relationships. The growing child's psychic structure and sense of self thus comes to consist of unconscious, quasi-independent, divided experiences of self in affective (libidinal-attached, aggressive, angry, ambivalent, helpless-dependent) relation with an inner object-world, made up originally of aspects of its relation to its mother.

Since the object of this section is to speculate about the relevancy of the study's findings for psychoanalytic theory, two points need to be emphasized. The first point is that the contemporary view of the infant--as intrinsically socially motivated, as interpersonally competent, as capable of differential emotional experiences which organize intrapsychic and interpersonal behavior, and as functioning to maintain self-regulation--provides an excellent theoretical scaffolding for psychoanalytic notions which have been too readily discarded along with the abandonment of drive theory. Some very important notions, first derived from within psychoanalytic theory, need to be rescued and provided with a more secure theoretical base. Some current thinking within developmental psychology appears the most viable candidate.

This study demonstrates the importance of the mother for the infant and the importance of self-regulation. Although it does not address the infant's affective experience, it does provide evidence on the range of normal coping responses deployed by the infant in response to an interpersonal stress. It suggests that the even the 6 month old infant can have emergent self-regulatory tendencies. The second point is that this type of experimental, behavioral research has an important role to play in expanding our understanding of intrapsychic development. For if the infant's self-regulatory tendencies have intrapsychic correlates, then we need to find a bridge between the infant's behavioral response to interpersonal stress and the accompanying intrapsychic developments, and this bridge would be stronger if anchored in behavioral observation. Although crossing the bridge will necessarily involve speculation, since we will need to infer underlying intrapsychic correlates, it needs to be disciplined by the greater objectivity confered by controlled studies of normal development. The next step is to apply our blossoming understanding of the normal self-regulatory process to clinical populations. It is hoped that this study provides some useful conceptual tools to carry this work out.

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APPENDIX 1

TABLE 15

SELF-REGULATORY SCORING SYSTEM

1.0 MONITOR: The infant looks at the mother's face without doing any of the other behaviors being scored; if the infant does something else at the same time, the appropriate code should be used.

2.0 SIGNAL: While looking at the mother the infant acts in a way which functions to elicit or modify the mother's behavior.

- 2.1 Positive Signal: the infant signals with positive affective tone, e.g., with a smile, coo face, talking, or pick-me-up.
- 2.2 Neutral Signal: the infant signals with neither clear positive nor clear negative affective tone, e.g., by vocalizing, razzing, sneezing, coughing, or making hand or arm gestures toward the partner.
- 2.3 Negative Signal: the infant signals with negative affective tone, e.g., by grimacing, whimpering, fussing, or crying.
- 2.4 Cry-No-Look: Negative Signal without looking at mother.

3.0 AVERT: The infant looks at something other than the mother; if the infant does something else at the same time, the appropriate code should be used.

- 3.1 Scan: the infant looks at something other than the mother without focusing on any one object for 2 seconds or more.
- 3.2 Distal Alternate Focus: the infant fixes its focus for 2 seconds or more on an object in the distance which is unidentifiable because of the angle of the camera; infant affect must indicate interest.
- 3.3 Proximal Alternate Focus: the infant focuses for 2 seconds or more on a clearly identifiable object.
  - 3.31 Prox. Alt. Focus--self: the object is the infant's own body.
  - 3.32 Prox.Alt. Focus--other: the object is something other than the infant's own body.
- 3.4 Proximal Alternate Focus with Manipulation: the infant focuses on and manipulates an object for 2 seconds or more.
  - 3.41 Prox. with Manipulation -- self: the object is the infant's own body.

TABLE 15 (continued)

3.42 Prox. with Manipulation -- other: the object is something other than the infant's own body.

4.0 SELF-COMFORT: The infant uses his body to provide self-comforting stimulation.

4.1 Oral: the infant sucks on his body or on an inanimate object.

4.11 Oral--self: the infant sucks on his own body.

4.12 Oral--other: the infant sucks on an object such as his clothing or the strap on the chair.

4.2 Self-clasp: the infant clasps his hands together.

4.3 Rock: the infant rocks back and forth or side to side.

5.0 ESCAPE: The infant attempts to increase his physical distance from his mother by turning, twisting, or arching away from her.

6.0 WITHDRAWAL: The infant uses his motor, attentional, and perceptual processes to minimize his engagement with the surround.

6.1 Motor: the infant gives up postural control, collapsing in his seat.

6.2 Perceptual: the infant inhibits his perceptual apparatus, as evidenced in looking "dull" or "glassy-eyed".

TABLE 16

MEANS OF SELF-REGULATORY BEHAVIORS
SET OF 17 BEHAVIORS

	SESSION ONE			SESSION TWO		
	FREQ1	DUR2	BOUT3	FREQ1	DUR2	BOUT3
Monitor	4.94	8.85	1.70	6.04	11.46	1.74
Positive Signal	2.17	6.00	1.48	2.73	8.00	1.67
Neutral Signal	2.02	5.90	1.50	2.60	5.90	1.54
Negative Signal	1.98	8.98	1.61	.79	2.35	.34
Cry No Look	1.46	4.15	.65	.33	.92	.16
Transition	9.21	11.87	1.33	10.58	13.12	1.27
Scan	3.04	14.52	4.13	3.60	18.71	4.05
Distal Focus	.90	4.00	1.76	1.46	5.21	1.91
Proximal Focus Self	1.98	8.00	2.97	1.73	5.64	2.34
Proximal Focus Other	1.85	7.67	2.42	1.89	7.08	2.25
Proximal Focus Manipulate Self	1.17	5.25	1.97	.94	4.42	2.29
Proximal Focus Manipulate Other	3.52	19.77	4.39	4.37	24.3	6.96
Oral Self	1.15	4.77	1.37	.96	4.15	2.11
Oral Other	1.23	5.73	1.98	1.58	6.54	1.38

TABLE 16 (continued)

	SESSION ONE			SESSION TWO		
	FREQ1	DUR2	BOUT3	FREQ1	DUR2	BOUT3
Self-Clasp	.33	1.96	.94	.23	.94	.50
Rock	.12	1.37	.23	.08	.19	.08
Escape	.58	.96	.28	.31	.71	.33

1. Total frequency
2. Total duration, measured in seconds
3. Bout length, measured in seconds.

TABLE 17

MEANS OF SELF-REGULATORY SCORING BEHAVIORS
SET OF 17 BEHAVIORS

BOTH SESSIONS

BEHAVIOR	TOTAL FREQUENCY	TOTAL DURATION*	BOUT LENGTH*
Monitor	5.49	10.15	1.72
Positive Signal	2.45	7.00	1.57
Neutral Signal	2.31	5.90	1.52
Negative Signal	1.39	5.66	.97
Cry No Look	.89	2.54	.41
Transition	9.89	12.49	1.30
Scan	3.32	16.62	4.09
Distal Focus	1.18	4.61	1.83
Proximal Focus Self	1.86	6.82	2.65
Proximal Focus Other	1.87	7.38	2.33
Proximal Manipulate Self	1.06	4.84	2.13
Proximal Manipulate Other	3.94	22.05	5.67
Oral Self	1.06	4.47	1.74
Oral Other	1.40	6.14	1.68
Self-Clasp	.28	1.45	.72
Rock	.10	.78	.15
Escape	.44	.84	.30

* Total duration and bout length measured in seconds.

TABLE 18

MEANS OF SELF-REGULATORY BEHAVIORS
SET OF 8 BEHAVIORS

	SESSION ONE			SESSION TWO		
	FREQ1	DUR2	BOUT3	FREQ1	DUR2	BOUT3
Monitor	4.98	8.92	1.70	6.14	11.62	1.78
Positive Signal	2.23	6.10	1.49	2.71	8.00	1.68
Neutral Signal	2.06	6.08	1.52	2.62	5.94	1.53
Negative Signal	2.00	13.58	2.43	.67	3.54	.71
Transition	9.25	12.02	1.34	10.56	13.19	1.28
Scan	3.04	14.52	4.13	3.60	18.71	4.05
Alternate Focus	8.06	44.71	5.76	8.90	46.85	7.35
Self-Comfort	2.56	13.83	3.72	2.54	11.83	3.21

1. Total frequency
2. Total duration, measured in seconds
3. Bout length, measured in seconds

TABLE 19

ANOVA SUMMARY FOR SELF-REGULARTORY SCORING SYSTEM

BEHAVIOR: MONITOR MEASURE: BOUT

SOURCE	SS	DF	F	P½
SESSION	.01	1	.02	.90
SEX	.64	1	1.09	.30
INTERACTION	4.99	1	8.53	.00
RESIDUAL	58.45	100		

BEHAVIOR: POS. SIGNAL MEASURE: NUMBER

SOURCE	SS	DF	F	P½
SESSION	6.54	1	.78	.38
SEX	105.42	1	12.58	.00
INTERACTION	.77	1	.09	.76
RESIDUAL	837.71	100		

BEHAVIOR: POS. SIGNAL MEASURE: DURATION

SOURCE	SS	DF	F	P½
SESSION	69.62	1	.42	.52
SEX	719.18	1	4.29	.05
INTERACTION	65.85	1	.39	.53
RESIDUAL	16785.49	100		

BEHAVIOR: NEG. SIGNAL MEASURE: NUMBER

SOURCE	SS	DF	F	P½
SESSION	47.51	1	6.08	.02
SEX	14.51	1	1.86	.18
INTERACTION	1.83	1	.23	.63
RESIDUAL	781.11	100		

TABLE 19 (continued)

BEHAVIOR: NEG. SIGNAL MEASURE: DURATION

SOURCE	SS	DF	F	P¼
SESSION	2696.22	1	7.00	.01
SEX	2.82	1	.01	.93
INTERACTION	76.80	1	.20	.66
RESIDUAL	38522.00	100		

BEHAVIOR: NEG. SIGNAL MEASURE: BOUT

SOURCE	SS	DF	F	P¼
SESSION	77.46	1	6.47	.05
SEX	4.96	1	.42	.52
INTERACTION	.94	1	.08	.78
RESIDUAL	1196.36	100		

BEHAVIOR: SCAN MEASURE: DURATION

SOURCE	SS	DF	F	P¼
SESSION	309.89	1	1.20	.28
SEX	1423.27	1	5.54	.05
INTERACTION	523.08	1	2.04	.16
RESIDUAL	25703.30	100		

BEHAVIOR: SCAN MEASURE: BOUT

SOURCE	SS	DF	F	P¼
SESSION	.78	1	.20	.66
SEX	38.57	1	9.79	.002
INTERACTION	9.05	1	2.30	.13
RESIDUAL	349.05	100		

TABLE 19 (continued)

BEHAVIOR: ALTERNATE FOCUS MEASURE: DURATION

SOURCE	SS	DF	F	P¼
SESSION	348.37	1	.60	.44
SEX	82.39	1	.14	.70
INTERACTION	2643.37	1	4.55	.05
RESIDUAL	58157.69	100		

BEHAVIOR: SELF-COMFORT MEASURE: DURATION

SOURCE	SS	DF	F	P¼
SESSION	182.98	1	.46	.50
SEX	1952.27	1	4.90	.05
INTERACTION	503.02	1	1.26	.26
RESIDUAL	39827.59	100		

TABLE 20

INTERCORRELATION OF FREQUENCY OF SELF-REGULATORY SYSTEM

SESSION ONE

	MON	POS	NEU	NEG	OUT	TRN	SCN	DIS	PRS	PRO	PMS	PMO	ORS	ORO	SFC	RCK	ESC
MON	---																
POS	.39**	---															
NEU	.26*	.27*	---														
NEG	.09	-.20	.23	---													
OUT	-.01	-.25*	-.02	.80**	---												
TRN	.27*	.20	.13	-.37**	-.31*	---											
SCN	.04	-.08	-.08	-.34**	-.29*	.21	---										
DIS	.13	.08	.23*	-.11	-.20	.34**	.06	---									
PRS	.24*	.11	.14	.01	.05	.24*	.27*	.11	---								
PRO	-.20	-.11	-.24*	-.15	-.09	.18	.30*	-.14	-.04	---							
PMS	-.16	.14	.14	-.20	-.21	.37**	.08	.21	.35**	.26*	---						
PMO	-.27*	.06	-.25*	-.60**	-.43**	.27*	.25*	-.03	-.33**	.12	.03	---					
ORS	-.19	-.31*	-.25*	.18	.10	-.18	-.19	-.04	.05	.08	.03	-.44**	---				
ORO	-.11	-.28*	-.21	.04	.10	-.29*	-.12	-.21	-.04	-.11	-.41**	-.01	.25*	---			
~FC	.23*	.31*	.14	-.12	-.14	.27*	.04	.24*	.15	.06	.04	-.05	-.08	-.09	---		
RCK	.02	-.17	-.15	-.10	-.08	-.22	-.09	.12	-.17	-.16	-.10	-.04	.21	.10	-.07	---	
ESC	.33**	.05	.37**	.35**	.14	.00	-.04	.36**	.26*	-.09	.20	-.50**	.08	-.22	.02	-.06	---

* p.05
** p.01

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; OUT-Cry-No-Look; TRN-Transition; SCN-Scan; DIS-Distal Focus; PRS-Prox. Alt. Foc. Self; PRO-Prox. Alt. Foc. Other; PMS-Prox. Alt. Man. Self; PMO-Prox. Alt. Man. Other; ORS-Oral Self; ORO-Oral Other; SFC-Self-Clasp; RCK-Rock; ESC-Escape

TABLE 21

INTERCORRELATIONS OF FREQUENCY OF SELF-REGULATORY SYSTEM

SESSION TWO

	MON	POS	NEU	NEG	OUT	TRN	SCN	DIS	PRS	PRO	PMS	PMO	ORS	ORO	SFC	RCK	ESC
MON	---																
POS	.30*	---															
NEU	.31*	.04	---														
NEG	-.17	-.15	.05	---													
OUT	-.31*	-.09	-.01	.45**	---												
TRN	.47**	.33**	.31*	-.01	-.33*	---											
SCN	.05	.03	-.02	.00	.06	-.25*	---										
DIS	.18	-.01	.13	.15	-.24*	.27*	.29*	---									
PRS	.09	-.10	.21	-.05	-.24*	.34**	-.03	.20	---								
PRO	.01	-.16	.02	-.06	-.07	.03	.13	.00	.16	---							
PMS	.12	.08	.43**	-.14	.07	.07	-.07	.01	.16	-.18	---						
PMO	.03	.01	-.24**	-.42**	-.20	.15	-.22	-.26*	-.11	-.12	-.00	---					
ORS	.13	-.16	.02	-.10	-.07	.03	-.17	-.04	.01	.15	.00	.05	---				
ORO	-.14	-.26*	-.46**	-.00	.04	-.35**	-.18	-.32**	-.17	-.07	-.12	.38**	.25*	---			
SFC	-.00	-.26*	.16	.03	-.10	.13	-.10	.18	.19	-.06	.32**	-.11	.29*	-.02	---		
RCK	-.06	-.17	.16	-.07	-.05	.09	.19	.16	.18	.13	.21	-.05	.10	-.13	.47**	---	
ESC	-.11	-.17	-.10	.56**	.17	-.11	-.02	.22	.11	-.01	-.25*	-.29*	-.12	-.03	.02	-.08	---

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

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; OUT-Cry-No-Look; TRN-Transition; SCN-Scan; DIS-Distal Focus; PRS-Prox. Alt. Foc. Self; PRO-Prox. Alt. Foc. Other; PMS-Prox. Alt. Man. Self; PMO-Prox. Alt. Man. Other; ORS-Oral Self; ORO-Oral Other; SFC-Self-Clasp; RCK-Rock; ESC-Escape

TABLE 22

INTERCORRELATION OF DURATIONS OF SELF-REGULATORY SCORING SYSTEM

SESSION ONE

	MON	POS	NEU	NEG	OUT	TRN	SCN	DIS	PRS	PRO	PMS	PMO	ORS	ORO	SFC	RCK	ESC
MON	---																
POS	.07	---															
NEU	.29*	.18	---														
NEG	.06	-.14	.19	---													
OUT	-.13	-.16	-.12	.55**	---												
TRN	.07	.10	-.02	-.37**	-.25*	---											
SCN	-.06	-.15	-.20	-.37**	-.21	.04	---										
DIS	-.08	-.07	.02	-.09	-.15	.43**	.01	---									
PRS	.01	-.06	-.12	-.11	.04	.02	.13	-.03	---								
PRO	.19	-.14	-.28*	-.24*	-.13	-.02	.27*	-.15	-.16	---							
PMS	-.31*	.06	-.01	-.20	-.22	.20	.04	-.10	.18	-.01	---						
PMO	-.29*	-.12	-.27*	-.37**	-.32*	.04	.11	-.09	-.29*	.14	-.04	---					
ORS	-.03	-.15	-.17	-.02	.10	-.16	-.13	-.11	-.06	-.09	-.12	-.22	---				
ORO	-.09	-.17	-.13	-.13	-.05	-.13	-.11	-.09	-.15	-.16	-.20	.06	.07	---			
SFC	-.03	-.04	-.04	.00	.10	.06	-.22	.02	.15	-.06	.04	-.16	-.07	-.11	---		
RCK	-.08	-.07	-.08	-.07	-.06	-.21	-.09	.00	-.10	-.10	-.08	-.10	.14	.02	-.04	---	
ESC	.04	-.06	.25*	.22	.03	.06	-.13	.22	.12	-.11	.02	-.29*	-.03	-.13	-.07	-.05	---

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

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; OUT-Cry-No-Look; TRN-Transition; SCN-Scan; DIS-Distal Focus; PRS-Prox. Alt. Foc. Self; PRO-Prox. Alt. Foc. Other; PMS-Prox. Alt. Man. Self; PMO-Prox. Alt. Man. Other; ORS-Oral Self; ORO-Oral Other; SFC-Self-Clasp; RCK-Rock; ESC-Escape

TABLE 23

INTERCORRELATION OF DURATIONS OF SELF-REGULATORY SCORING SYSTEM

SESSION TWO

	MON	POS	NEU	NEG	OUT	TRN	SCN	DIS	PRS	PRO	PMS	PMO	ORS	ORO	SFC	RCK	ESC
MON	---																
POS	.04	---															
NEU	.30*	-.12	---														
NEG	-.19	-.13	.09	---													
OUT	-.24*	-.10	-.07	.69**	---												
TRN	.43**	.05	.19	-.07	-.25*	---											
SCN	-.13	-.21	-.03	-.09	-.06	-.40**	---										
DIS	.10	-.11	-.00	.11	-.15	.16	.19	---									
PRS	.13	-.09	.08	-.16	-.20	.21	-.08	.03	---								
PRO	-.17	.00	-.14	-.04	-.01	-.08	.02	-.15	-.06	---							
PMS	.17	.05	.14	-.09	-.09	.06	-.18	-.04	.11	-.13	---						
PMO	-.22	-.10	-.24*	-.29*	-.17	-.04	-.33**	-.24*	-.21	-.20	-.05	---					
ORS	-.02	-.10	-.09	.01	-.01	.06	-.13	-.15	.13	.12	-.14	-.22	---				
ORO	-.30*	-.17	-.27*	.04	.24*	-.33**	-.20	-.23*	-.13	-.07	-.12	.03	-.02	---			
SFC	-.08	-.08	.10	.09	-.06	.12	-.16	.03	.25*	-.13	.13	-.17	.40**	-.07	---		
RCK	-.15	-.09	-.01	-.05	-.03	-.02	.15	-.02	.09	.07	-.03	-.11	.23	-.07	.01	---	
ESC	-.07	-.08	-.09	.47**	.32**	-.04	-.00	.17	.04	-.08	-.18	-.23	.01	.09	.06	-.05	---

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

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; OUT-Cry-No-Look; TRN-Transition; SCN-Scan; DIS-Distal Focus; PRS-Prox. Alt. Foc. Self; PRO-Prox. Alt. Foc. Other; PMS-Prox. Alt. Man. Self; PMO-Prox. Alt. Man. Other; ORS-Oral Self; ORO-Oral Other; SFC-Self-Clasp; RCK-Rock; ESC-Escape

TABLE 24

INTERCORRELATIONS OF BOUT OF SELF-REGULATORY SCORING

SESSION ONE

	MON	POS	NEU	NEG	OUT	TRN	SCN	DIS	PRS	PRO	PMS	PMO	ORS	ORO	SFC	RCK	ESC
MON	---																
POS	.21	---															
NEU	.32**	.29*	---														
NEG	.10	-.24*	.22	---													
OUT	-.05	-.26*	-.01	.68**	---												
TRN	-.14	-.11	-.14	.27*	.32*	---											
SCN	-.09	-.13	-.28*	-.28*	-.23	.05	---										
DIS	-.26*	.06	.23	-.14	-.20	.04	.15	---									
PRS	.10	-.09	-.03	.08	.24*	.09	.27*	.12	---								
PRO	-.09	-.05	-.24*	-.02	-.00	-.06	.14	-.18	-.07	---							
PMS	-.11	.12	.18	-.22	-.19	-.20	-.22	.12	-.02	.17	---						
PMO	-.06	.01	.09	-.24*	-.31*	-.03	.31*	.10	-.07	.32*	-.00	---					
ORS	-.17	-.28*	-.16	.15	-.01	.21	-.06	-.01	-.06	.06	-.00	-.17	---				
ORO	.02	-.37**	-.27*	.02	.00	.16	.13	-.15	.07	-.08	-.39**	.05	.28*	---			
SFC	.04	.19	.11	-.15	-.14	-.23*	-.09	.19	-.12	.12	-.03	.02	-.04	-.08	---		
RCK	-.16	-.17	-.15	-.10	-.08	.18	-.09	.19	-.18	-.16	-.10	-.13	.23*	.23*	-.07	---	
ESC	-.09	-.00	.34**	.32**	.17	.15	-.20	.28*	.08	-.10	.10	-.27	.11	-.24*	.02	-.06	

* ½.05
** ½.01

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; OUT-Cry-No-Look; TRN-Transition; SCN-Scan; DIS-Distal Focus; PRS-Prox. Alt. Foc. Self; PRO-Prox. Alt. Foc. Other; PMS-Prox. Alt. Man. Self; PMO-Prox. Alt. Man. Other; ORS-Oral Self; ORO-Oral Other; SFC-Self-Clasp; RCK-Rock; ESC-Escape

TABLE 25

INTERCORRELATIONS OF BOUT OF SELF-REGULATORY SCORING

SESSION TWO

	MON	POS	NEU	NEG	OUT	TRN	SCN	DIS	PRS	PRO	PMS	PMO	ORS	ORO	SFC	RCK	ESC
MON	---																
POS	.34*	---															
NEU	.26*	.43**	---														
NEG	.07	-.11	-.02	---													
OUT	-.08	-.29	.11	.46**	---												
TRN	-.03	-.11	-.09	-.01	.04	---											
SCN	-.08	-.08	-.08	.-08	.00	-.01	---										
DIS	.05	.14	.03	.07	-.24*	.15	-.03	---									
PRS	.12	-.01	.16	-.05	-.12	-.06	.04	.03	---								
PRO	-.08	.01	.04	-.07	-.09	.11	.12	.02	-.06	---							
PMS	.14	.13	.45**	-.11	-.01	-.01	-.14	.17	.05	-.04	---						
PMO	.09	.22	.10	-.45**	-.10	.06	-.10	-.23*	-.10	.04	-.09	---					
ORS	-.09	-.10	-.05	.02	.02	.03	-.08	-.14	-.15	.04	-.01	-.11	---				
ORO	-.27*	-.36**	-.36**	.01	.05	.25*	.04	-.21	-.04	.10	-.11	-.14	.09	---			
SFC	-.14	-.20	.04	.-6	-.10	.10	-.20	.14	.08	-.11	.19	-.18	.30*	-.02	---		
RCK	-.23*	-.17	.03	-.07	-.05	.11	.01	.19	.12	.11	.13	-.07	.06	-.13	.46**	---	
ESC	.13	-.19	-.10	.58**	.15	.25	-.08	.15	.08	-.02	-.24*	-.18	-.05	.00	.01	-.08	

* ≤.05
** ≤.01

Key: MON-Monitor; POS-Positive Signal; NEU-Neutral Signal; NEG-Negative Signal; OUT-Cry-No-Look; TRN-Transition; SCN-Scan; DIS-Distal Focus; PRS-Prox. Alt. Foc. Self; PRO-Prox. Alt. Foc. Other; PMS-Prox. Alt. Man. Self; PMO-Prox. Alt. Man. Other; ORS-Oral Self; ORO-Oral Other; SFC-Self-Clasp; RCK-Rock; ESC-Escape

TABLE 26

SESSION ONE WITH SESSION TWO CORRELATIONS OF SELF-REGULATORY BEHAVIORS (SET OF 17 BEHAVIORS)

BEHAVIOR	TOTAL FREQUENCY	TOTAL[1] DURATION	BOUT[1] LENGTH
Monitor	.142	.076	-.070
Positive Signal	.363**	.493**	.220
Neutral Signal	-.015	.305*	.313*
Negative Signal	.161	.332**	.161
Cry No Look	.215	.144	.249*
Transition	-.038	.012	.003
Scan	.144	.182	.081
Distal Focus	.017	.106	.221
Proximal Focus Self	-.112	.036	.084
Proximal Focus Other	.044	.287*	-.103
Prox. Foc. Man. Self[2]	-.016	-.114	.161
Prox. Foc. Man. Other[3]	.189	.152	.036
Oral Self	.468**	.310*	.449**
Oral Other	.301*	.341**	.324*
Self-Clasp	.194	-.069	.168
Rock	.714**	.994**	.714**
Escape	-.026	.015	-.023

1. Total duration and bout length measured in seconds.
2. Proximal Focus Manipulation Self
3. Proximal Focus Manipulation Other

* ¼ .05
** ¼ .01

APPENDIX 2

SUMMARY OF DATA MANAGEMENT PROCEDURES

The self-regulatory scoring stystem has 6 major categories: Monitor, Signal, Avert, Self-Comfort, Escape, and Withdrawal. Adding the subcategories of Signal, Avert, Self-Comfort, and Withdrawal produces 18 potential coping behaviors. The absense of any Withdrawal left 17 behaviors. Since Escape and the 4 subcategories of Self-Comfort (Oral-Self, Oral-Other, Self-Clasp, and Rock) can each occur in combination with Monitor or one of the subcategories of Signal or Avert, 55 (5 x 11) subcategories were scored within Self-Comfort and Escape. This maintained the mutually exclusive nature of the coding system. Initially, these 55 categories were reduced to more useful proportions by collapsing them into the 4 Self-Comfort categories and Escape for a total of 5 categories. Means, correlations, and analyses of variance were then obtained on the remaining 17 coping categories. The results are presented in Appendix 1, Tables 16, 17, and 20 - 26.

The results suggested that the data could be further reduced without sacrificing any of the significant findings. Specifically, it was found that the 4 Self-Comfort behaviors and the five Alternate Focus subcategories within Avert could each be combined to produce one Self-Comforting and one Alternate Focus measure, respectively. Partly on theoretical grounds and partly because of the strength of the correlation, it was concluded that Cry-No-Look could be collapsed into Negative Signal. Lastly, because of the very few occurances of Escape, it was combined with Monitor, Signal, and Avert, depending on what the infant was doing while Escaping. This left 7 behaviors: Monitor, Positive Signal, Neutral Signal, Negative Signal, Scan, Alternate Focus, and Self-Comfort. One final category was then introduced. The definition of Scan is such that it does not discriminate between short and long bouts of Scanning. A Scan can last, therefore, from 1 to an indefinite number of seconds. In reviewing the tapes, it was observed that the Scans of 2 seconds or less had a different quality and, by inference, a different function than those of longer duration. The shorter Scans appeared to function as transitions between behaviors, e.g., between a Monitor and an Alternate Focus. The longer Scans, on the other hand, appeared to more truely indicate an absence of focus. Of course when studying dyadic, that is, interactive, sequences, shorter Averts are important to track and do not necessarily indicate a mere passage between behaviors; they are often very closely synchronized to some behavior of the mother. But in the still-face design the mother is unresponsive and expressionless, rendering the study of such dyadic connections unnecessary. For that reason all bouts of Scan 2 seconds or less were designated Transitions for these analyses, and all those 3 seconds or longer remained Scan. The resulting data set now included 8 coping categories.

APPENDIX 3

TABLE 27

MEANS OF SELF-REGULATORY BEHAVIORS
SET OF 8 BEHAVIORS

SESSION 1

	MALES			FEMALES		
BEHAVIOR	FREQ1	DUR2	BOUT3	FREQ1	DUR2	BOUT3
MONITOR	4.67	7.97	1.45	5.41	10.22	2.05
POSITIVE SIGNAL	3.17	7.67	1.51	.96	3.96	1.44
NEUTRAL SIGNAL	2.20	6.47	1.40	1.86	5.55	1.69
NEGATIVE SIGNAL	1.57	12.70	2.54	2.59	14.77	2.29
TRANSITION	9.63	12.50	1.34	8.73	11.36	1.34
SCAN	3.27	15.77	4.40	2.73	12.82	3.76
ALTERNATE FOCUS	8.67	48.27	5.66	7.22	39.86	5.89
SELF-COMFORT	1.90	8.23	2.05	3.46	21.46	6.00

1. Total frequency
2. Total duration, measured in seconds
3. Bout length, measured in seconds

TABLE 28

MEANS OF SELF-REGULATORY BEHAVIORS
SET OF 8 BEHAVIORS

SESSION 2

	MALES			FEMALES		
BEHAVIOR	FREQ1	DUR2	BOUT3	FREQ1	DUR2	BOUT3
MONITOR	5.60	10.83	1.87	6.86	12.68	1.59
POSITIVE SIGNAL	3.50	10.93	2.03	1.64	4.00	1.19
NEUTRAL SIGNAL	2.17	5.37	1.62	3.23	6.73	1.41
NEGATIVE SIGNAL	.47	4.13	.98	.96	2.73	.35
TRANSI-TION	10.13	12.60	1.29	11.14	14.00	1.28
SCAN	4.17	23.80	4.82	2.82	11.77	2.99
ALTERNATE FOCUS	8.53	41.77	5.01	9.41	53.77	10.55
SELF-COMFORT	2.30	10.00	3.42	2.86	14.32	2.92

1. Total frequency
2. Total duration, measured in seconds
3. Bout length, measured in seconds

TABLE 29

INTERCORRELATION OF FREQUENCY OF SELF-REGULATORY SYSTEM SET OF 8 BEHAVIORS

SESSION ONE-MALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.75**	---						
NEU	.27	.28	---					
NEG	.04	-.20	.28	---				
TRN	.28	.39*	.24	-.28	---			
SCN	-.15	-.06	-.37*	-.33*	-.04	---		
DIS	-.13	.12	-.15	-.53**	.50**	.43**	---	
SFC	-.03	.23	-.30	.07	-.21	-.04	-.19	---

SESSION ONE-FEMALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	-.05	---						
NEU	.25	.24	---					
NEG	.03	-.25	-.03	---				
TRN	.41*	-.06	.02	-.38*	---			
SCN	.36*	-.24	.21	-.18	.41*	---		
DIS	.10	.06	-.24	-.51**	.72**	.20	---	
SFC	-.18	.04	-.34	.16	-.17	-.21	-.31	---

key: Mon-Monitor; Pos-positive signal; Neu-Neutral Signal; Neg-Negative Signal; Scn-Scan; Alt-Alternate Focus; Sfc-Self-comfort; Trn-Transition.

* ¼.05   ** ¼.01

TABLE 29 (continued)

SESSION TWO- MALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.48**	---						
NEU	.18	-.03	---					
NEG	-.28	-.24	-.19	---				
TRN	.42*	.37*	.30	-.30	---			
SCN	.27	-.32*	.02	-.00	-.36*	---		
DIS	.08	-.21	.16	-.25	.59**	-.14	---	
SFC	-.21	-.23	-.08	.03	-.04	-.22	.16	---

SESSION TWO-FEMALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.07	---						
NEU	.49*	.17	---					
NEG	.07	.12	.51**	---				
TRN	.58**	.34	.32	.13	---			
SCN	-.21	.36	-.01	.11	-.09	---		
DIS	.04	.09	-.36*	-.49*	.29	.36	---	
SFC	.04	-.65**	-.39*	-.19	-.26	-.16	.06	---

key: Mon-Monitor; Pos-positive signal; Neu-Neutral Signal; Neg-Negative Signal; Scn-Scan; Alt-Alternate Focus; Sfc-Self-comfort; Trn-Transition.

* ¼.05
** ¼.01

TABLE 30

INTERCORRELATION OF DURATION OF SELF-REGULATORY SYSTEM SET OF 8 BEHAVIORS

SESSION ONE-MALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.26	---						
NEU	.49**	-.02	---					
NEG	.01	-.16	.05	---				
TRN	.20	.34*	.21	-.35*	---			
SCN	-.19	-.11	-.25	-.39*	-.20	---		
DIS	-.43**	-.28	-.41*	-.57**	.05	.32*	---	
SFC	-.17	-.20	-.13	-.08	-.26	-.17	-.30	---

SESSION ONE-FEMALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	-.15	---						
NEU	.06	.44*	---					
NEG	-.06	-.16	.19	---				
TRN	-.04	-.35	-.29	-.34	---			
SCN	.17	-.26	-.16	-.31	.36	---		
DIS	-.02	-.12	-.37*	-.57**	.46*	.17	---	
SFC	-.18	-.19	-.31	-.13	-.21	-.27	-.44*	---

key: Mon-Monitor; Pos-positive signal; Neu-Neutral Signal; Neg-Negative Signal; Scn-Scan; Alt-Alternate Focus; Sfc-Self-comfort; Trn-Transition.

* ¼.05 ** ¼.01

TABLE 30 (continued)

SESSION TWO-MALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.06	---						
NEU	.03	-.17	---					
NEG	-.31*	-.17	-.10	---				
TRN	.38*	.05	-.02	-.33*	---			
SCN	.01	-.37*	.02	-.11	-.57**	---		
DIS	-.03	-.11	-.15	-.43**	-.47**	-.38*	---	
SFC	-.44**	-.17	-.14	.31*	-.04	-.33*	-.22	---

SESSION TWO-FEMALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.10	---						
NEU	.58**	.07	---					
NEG	-.04	-.08	.35	---				
TRN	.47*	.22	.40*	.27	---			
SCN	-.32	-.01	-.08	-.13	-.10	---		
DIS	-.40*	-.06	-.44*	-.35	-.38*	-.20	---	
SFC	-.22	-.34	-.39*	-.09	-.38*	-.14	-.36*	---

key: Mon-Monitor; Pos-positive signal; Neu-Neutral Signal; Neg-Negative Signal; Scn-Scan; Alt-Alternate Focus; Sfc-Self-comfort; Trn-Transition.

* ¼.05
** ¼.01

TABLE 31

INTERCORRELATION OF BOUT OF SELF-REGULATORY SYSTEM SET OF 8 BEHAVIORS

SESSION ONE-MALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.39*	---						
NEU	.55**	.32*	---					
NEG	.10	-.14	.32*	---				
TRN	-.00	-.42*	-.11	.45**	---			
SCN	-.06	-.06	-.39*	-.43**	-.09	---		
DIS	.08	-/23	-.16	-.14	.03	.32*	---	
SFC	-.14	-.38*	-.28	-.15	.27	.15	-.06	---

SESSION ONE-FEMALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.22	---						
NEU	.12	.06	---					
NEG	-.05	-.39*	-.00	---				
TRN	-.14	.00	.11	.28	---			
SCN	.02	-.28	-.12	.11	-.01	---		
DIS	.12	.41	.08	-.47*	.10	.21	---	
SFC	-.23	-.24	-.06	-.05	-.00	.12	-.03	---

key: Mon-Monitor; Pos-positive signal; Neu-Neutral Signal; Neg-Negative Signal; Scn-Scan; Alt-Alternate Focus; Sfc-Self-comfort; Trn-Transition.

* ¼.05 ** ¼.01

TABLE 31 (continued)

SESSION TWO-MALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.32*	---						
NEU	.06	.47**	---					
NEG	.14	-.25	-.15	---				
TRN	-.08	0.11	-.31*	.03	---			
SCN	-.11	-.35*	.07	-.10	.05	---		
DIS	.21	.41*	.29	-.34	-.07	.14	---	
SFC	-.34*	-.23	.00	20	.15	-.21	-.39*	---

SESSION TWO-FEMALE

	MON	POS	NEU	NEG	TRN	SCN	DIS	SFC
MON	---							
POS	.28	---						
NEU	.52**	.37	---					
NEG	.05	.20	.40*	---				
TRN	.28	-.07	.30	-.07	---			
SCN	-.26	.14	-.34	.01	.04	---		
DIS	-.05	-.06	.17	-.08	.21	-.57**	---	
SFC	-.29	-.59**	-.49*	-.10	.08	.18	-.24	---

key: Mon-Monitor; Pos-positive signal; Neu-Neutral Signal; Neg-Negative Signal; Scn-Scan; Alt-Alternate Focus; Sfc-Self-comfort; Trn-Transition.

* ¼.05
** ¼.01

TABLE 32

ANOVA SUMMARY FOR LAG ONE CONDITIONAL PROBABILITIES
SET OF 8 BEHAVIORS

BEHAVIOR: MONITOR TO POS.SIGNAL

SOURCE	SS	DF	F	P¼
SESSION	.00	1	.00	.96
SEX	.29	1	4.56	.05
INTERACTION	.05	1	.86	.36
RESIDUAL	6.30	100		

BEHAVIOR: MONITOR TO ALTERNATE FOCUS

SOURCE	SS	DF	F	P¼
SESSION	.00	1	.22	.64
SEX	.28	1	8.02	.00
INTERACTION	.00	1	.18	.68
RESIDUAL	3.53	100		

BEHAVIOR: NEUTRAL SIGNAL TO TRANSITION

SOURCE	SS	DF	F	P¼
SESSION	.10	1	.88	.35
SEX	.10	1	.91	.34
INTERACTION	.84	1	7.50	.01
RESIDUAL	11.13	100		

BEHAVIOR: SCAN TO NEGATIVE SIGNAL

SOURCE	SS	DF	F	P¼
SESSION	.24	1	4.60	.05
SEX	.03	1	.51	.48
INTERACTION	.09	1	1.70	.20
RESIDUAL	5.16	100		

TABLE 32 (continued)

BEHAVIOR: SCAN TO ALTERNATE FOCUS

SOURCE	SS	DF	F	P¼
SESSION	.02	1	.16	.69
SEX	.91	1	7.13	.01
INTERACTION	.17	1	1.35	.25
RESIDUAL	12.54	100		

BEHAVIOR: ALTERNATE FOCUS TO NEGATIVE SIGNAL

SOURCE	SS	DF	F	P¼
SESSION	.06	1	4.18	.05
SEX	.01	1	.89	.35
INTERACTION	.02	1	1.27	.26
RESIDUAL	1.45	100		

BEHAVIOR: TRANSITION TO ALTERNATE FOCUS

SOURCE	SS	DF	F	P¼
SESSION	.01	1	.16	.69
SEX	.23	1	3.60	.06
INTERACTION	.43	1	6.77	.05
RESIDUAL	6.41	100		

TABLE 33

LAG ONE CONDITIONAL PROBABILITIES AND SUMMARY STATISTICS

FEMALE SUBJECTS - SESSION ONE

CRITERION: MONITOR

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	---	.08	.12	.09	.13	.16	.04	.38
Pe	---	.03	.07	.09	.10	.27	.12	.32
SD	---	.02	.02	.03	.03	.04	.03	.04
Z	---	2.56	2.17	-.08	1.04	-2.53	-2.65	1.48

CRITERION: POSITIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.20	---	.05	---	.15	.10	.05	.45
Pe	.17	---	.06	.08	.09	.23	.11	.27
SD	.08	---	.05	.06	.06	.09	.07	.10
Z	.37	---	-.19	-1.28	1.02	-1.37	-.81	1.81

CRITERION: NEUTRAL SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.20	.15	---	.05	.05	.20	.05	.32
Pe	.18	.03	---	.08	.09	.24	.11	.28
SD	.06	.03	---	.04	.04	.07	.05	.07
Z	.34	4.35	---	-.72	-.92	-.63	-1.27	.54

CRITERION: NEGATIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.15	.02	.08	---	.12	.10	.27	.27
Pe	.18	.03	.06	---	.09	.24	.11	.28
SD	.05	.02	.03	---	.04	.06	.04	.06
Z	-.47	-.47	.42	---	.63	-2.45	3.59	-.24

CRITERION: SCAN

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.27	.02	.08	.12	---	.41	.08	.02
Pe	.18	.03	.06	.08	---	.24	.11	.29
SD	.05	.02	.03	.04	---	.06	.04	.06
Z	1.82	-.67	.66	1.08	---	2.92	-.70	-4.60

TABLE 33 (continued)

CRITERION: ALTERNATE FOCUS

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.07	.01	---	.06	.17	---	.17	.52
Pe	.21	.04	.08	.10	.11	---	.13	.34
SD	.03	.02	.02	.02	.03	---	.03	.04
Z	-4.35	-2.02	-3.57	-1.37	2.54	---	1.18	4.87

CRITERION: SELF-COMFORT

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.08	---	.01	.19	.10	.23	---	.38
Pe	.18	.03	.07	.08	.09	.25	---	.29
SD	.05	.02	.03	.03	.03	.05	---	.05
Z	-2.25	-1.53	-1.80	3.39	.06	-.34	---	1.69

CRITERION: TRANSITION

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.28	.01	.09	.07	---	.44	.11	---
Pe	.22	.04	.08	.10	.11	.30	.14	---
SD	.03	.01	.02	.02	.02	.03	.03	---
Z	1.90	-1.99	.35	-1.36	-4.86	3.97	-1.06	---

Key:
- Po - Observed Probability
- Pe - Expected Probability
- SD - Standard Deviation of the Expected Probability
- Z - Z Score: Po-Pe/SD (Pe)

- MON - Monitor
- POS - Positive Signal
- NEU - Neutral Signal
- NEG - Negative Signal
- SCN - Scan
- DIS - Alternate Focus
- SFC - Self-Comfort
- TRN - Transition

TABLE 34

LAG ONE CONDITIONAL PROBABILITIES AND SUMMARY STATISTICS

MALE SUBJECTS - SESSION ONE

CRITERION: MONITOR

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	---	.34	.14	.04	.12	.07	.05	.25
Pe	---	.11	.07	.05	.11	.28	.06	.32
SD	---	.03	.02	.02	.03	.04	.02	.04
Z	---	8.93	3.02	-.61	.23	-5.50	-.54	-1.86

CRITERION: POSITIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.14	---	.01	.02	.11	.15	.05	.52
Pe	.15	---	.07	.05	.10	.27	.06	.30
SD	.04	---	.03	.02	.03	.05	.02	.05
Z	-.27	---	-2.21	-1.12	.06	-2.66	-.21	4.57

CRITERION: NEUTRAL SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.16	.21	---	.16	.06	.03	---	.38
Pe	.14	.10	---	.04	.10	.26	.06	.30
SD	.04	.04	---	.03	.04	.06	.03	.06
Z	.34	2.88	---	4.50	-1.00	-4.16	-1.93	1.48

CRITERION: NEGATIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.12	.02	.07	---	.12	.17	.19	.31
Pe	.14	.10	.06	---	.10	.26	.06	.29
SD	.05	.05	.04	---	.05	.07	.04	.07
Z	-.39	-1.59	.19	---	.46	-1.34	3.84	.30

CRITERION: SCAN

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.26	.06	.06	.07	---	.46	.08	---
Pe	.15	.10	.07	.05	---	.27	.06	.31
SD	.04	.03	.03	.02	---	.05	.02	.05
Z	2.99	-1.31	-.27	1.28	---	4.25	1.01	-6.52

TABLE 34 (continued)

CRITERION: ALTERNATE FOCUS

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.08	.02	.04	.02	.20	---	.05	.59
Pe	.18	.12	.08	.05	.13	---	.07	.37
SD	.02	.02	.02	.01	.02	---	.02	.03
Z	-4.10	-5.15	-2.67	-2.45	3.74	---	-1.18	7.43

CRITERION: SELF-COMFORT

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.15	.02	.02	.15	.20	.13	---	.33
Pe	.14	.10	.07	.04	.10	.26	---	.29
SD	.05	.04	.03	.03	.04	.06	---	.06
Z	.13	-1.96	-1.40	3.80	2.52	-2.18	---	.66

CRITERION: TRANSITION

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.15	.07	.09	.04	---	.60	.05	---
Pe	.19	.13	.09	.06	.13	.34	.07	---
SD	.02	.02	.02	.01	.02	.03	.02	---
Z	-1.64	-2.68	.36	-1.54	-6.53	9.28	-1.55	---

Key:
Po - Observed Probability
Pe - Expected Probability
SD - Standard Deviation of the Expected Probability
Z - Z score: Po-Pe/SD (Pe)

MON - Monitor
POS - Positive Signal
NEU - Neutral Signal
NEG - Negative Signal
SCN - Scan
DIS - Alternate Focus
SFC - Self-Comfort
TRN - Transition

TABLE 35

LAG ONE CONDITIONAL PROBABILITIES AND SUMMARY STATISTICS

FEMALE SUBJECTS - SESSION TWO

CRITERION: MONITOR

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	---	.13	.18	.01	.11	.14	.04	.39
Pe	---	.05	.10	.03	.09	.29	.09	.35
SD	---	.02	.03	.01	.02	.04	.02	.04
Z	---	4.16	3.33	-1.58	1.17	-4.18	-2.06	1.02

CRITERION: POSITIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.11	---	.03	---	.14	.14	---	.58
Pe	.19	---	.09	.02	.08	.25	.08	.30
SD	.07	---	.05	.03	.04	.07	.04	.08
Z	-1.14	---	-1.26	-.92	1.44	-1.55	-1.72	3.67

CRITERION: NEUTRAL SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.17	.07	---	.09	.12	.07	.04	.43
Pe	.19	.05	---	.02	.08	.26	.08	.32
SD	.05	.03	---	.02	.03	.05	.03	.06
Z	-.42	.98	---	3.37	1.15	-3.58	-1.11	2.13

CRITERION: NEGATIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.11	---	.42	---	---	.05	.05	.37
Pe	.18	.04	.08	---	.07	.25	.07	.30
SD	.09	.05	.06	---	.06	.10	.06	.11
Z	-.86	-.94	5.30	---	-1.22	-1.96	-.37	.70

CRITERION: SCAN

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.33	.02	.12	.03	---	.43	.07	---
Pe	.19	.05	.09	.02	---	.26	.08	.31
SD	.05	.03	.04	.02	---	.06	.04	.06
Z	2.80	-1.11	.73	.46	---	3.10	-.35	-5.20

TABLE 35 (continued)

CRITERION: ALTERNATE FOCUS

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.15	.01	.04	.01	.14	---	.15	.52
Pe	.23	.06	.11	.03	.09	---	.10	.38
SD	.03	.02	.02	.01	.02	---	.02	.03
Z	-2.94	-3.14	-3.33	-1.60	2.23	---	2.59	3.93

CRITERION: SELF-COMFORT

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.20	---	.02	---	.07	.34	---	.38
Pe	.19	.05	.09	.02	.08	.26	---	.31
SD	.05	.03	.04	.02	.03	.06	---	.06
Z	.10	-1.72	-2.00	-1.23	-.35	1.54	---	1.11

CRITERION: TRANSITION

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.26	.04	.08	.04	---	.51	.07	---
Pe	.25	.06	.12	.03	.10	.34	.10	---
SD	.03	.02	.02	.01	.02	.03	.02	---
Z	.29	-1.50	-1.84	.79	-5.20	5.81	-1.64	---

Key: Po - Observed Probability
Pe - Expected Probability
SD - Standard Deviation of the Expected Probability
Z - Z score: Po-Pe/SD (Pe)

MON - Monitor
POS - Positive Signal
NEU - Neutral Signal
NEG - Negative Signal
SCN - Scan
DIS - Alterante Focus
SFC - Self-Comfort
TRN - Transition

TABLE 36

LAG ONE CONDITIONAL PROBABILITIES AND SUMMARY STATISTICS

MALE SUBJECTS - SESSION TWO

CRITERION: MONTITOR

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	---	.24	.13	.01	.17	.04	.02	.39
Pe	---	.11	.07	.01	.13	.27	.08	.33
SD	---	.02	.02	.01	.03	.04	.02	.04
Z	---	5.11	2.87	-.11	1.45	-6.62	-2.78	1.84

CRITERION: POSITIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	---	.13	---	.07	---	.18	.08	.53
Pe	.17	---	.07	.01	.12	.25	.07	.30
SD	.04	---	.02	.01	.03	.04	.03	.05
Z	-1.13	---	.12	-1.11	1.63	-4.07	-2.02	4.94

CRITERION: NEUTRAL SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.13	.23	---	---	.17	.08	.09	.30
Pe	.16	.10	---	.01	.12	.24	.07	.29
SD	.05	.04	---	.01	.04	.05	.03	.06
Z	-.82	3.57	---	-.84	1.31	-3.09	.79	.05

CRITERION: NEGATIVE SIGNAL

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.08	---	---	---	.25	.08	.25	.33
Pe	.16	.10	.06	---	.11	.23	.06	.28
SD	.10	.09	.07	---	.09	.12	.07	.13
Z	-.69	-1.12	-.88	---	1.52	-1.22	2.63	.42

CRITERION: SCAN

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.32	.03	.08	.03	---	.47	.08	.01
Pe	.17	.11	.07	.01	---	.26	.07	.31
SD	.03	.03	.02	.01	---	.04	.02	.04
Z	4.18	-2.60	.40	1.31	---	5.21	.13	-7.15

TABLE 36 (continued)

CRITERION: ALTERNATE FOCUS

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.08	.04	.03	.01	.19	---	.10	.56
Pe	.20	.12	.08	.01	.14	---	.08	.36
SD	.03	.02	.02	.01	.02	---	.02	.03
Z	-4.84	-4.16	-2.89	-.80	2.24	---	.80	6.56

CRITERION: SELF-COMFORT

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.06	.04	.09	.01	.20	.32	---	.28
Pe	.16	.10	.06	.01	.12	.25	---	.29
SD	.04	.04	.03	.01	.04	.05	---	.06
Z	-2.38	-1.60	.79	.24	2.13	1.41	---	-.35

CRITERION: TRANSITION

	MON	POS	NEU	NEG	SCN	DIS	SFC	TRN
Po	.23	.10	.05	.02	.01	.52	.07	---
Pe	.21	.13	.08	.02	.15	.32	.09	---
SD	.02	.02	.02	.01	.02	.03	.02	---
Z	.89	-1.33	-2.20	.71	-7.07	7.44	-1.10	---

Key: Po - Observed Probability
Pe - Expected Probability
SD - Standard Deviation of the Expected Probability
Z - Z score: Po-Pe/SD (Pe)

MON - Monitor
POS - Positive Signal
NEU - Neutral Signal
NEG - Negative Signal
SCN - Scan
DIS - Alternate Focus
SFC - Self-Comfort
TRN - Transition

APPENDIX 4

SELECTION AND COMPOSITION OF CLUSTER ANALYSES

Nine different cluster analyses were performed, each based on a different combination of coping categories. Each analysis resulted in a different set of categorical classifications for the infants in each session, enabling a comparison of each infant's classification across the 2 sessions. For each analysis the total duration of behavior, standarized to unit variance, was used, since the correlational analysis had identified greater stability for total duration than for frequency. Since the cluster analysis partitioned the infants of each session into clusters based on their behavioral scores, the means of each behavior constituting the clusters were compared after each analysis. Each cluster was described as being high, medium, or low on the mean total durations of each behavior. Thus a cluster might be defined as high Signal, medium Alternate Focus, medium Scan, and low Self-Comfort. After clusters were defined, a comparison of each session's clusters was made in order to identifying similiarly defined clusters. An assessment of stability was then obtained by counting the number of infants who fell into the 'same', i.e., similiarly defined, cluster on the two sessions.

The first combination of behaviors assessed by the cluster analysis included all of the 8 coping categories: Monitor, Positive Signal, Neutral Signal, Negative Signal, Transition, Scan, Alternate Focus, and Self-Comfort. Comparing the two sessions, each of which was grouped into 3, 4, and 5 clusters of infants, suggested a limited measure of stability. One reason for this was that a cluster analysis effectively assigns equal importance to all behaviors input into the analysis unless they are weighted differently. Since it was possible that not all behaviors were equally important, particularly not for discriminating underlying individual differences, it was decided that different combinations of behaviors would be tried and the results compared. To provide some guidance for the selection of behaviors, the self-regulatory perspective, presented in the Introduction, was referenced. Drawing upon that perspective, four more combinations of behaviors were then analyzed.

The first of these, the second overall, dropped Transition, since it was hypothesized to have a less important function than the other behaviors. The analysis also combined Positive and Neutral Signal, since both involve at least a Neutral attempt to evoke a maternal response.

The third attempt exluded Monitor, partly becaue it is the least interactive of those categories in which the infant is engaged with the mother and partly because the cluster means for each of the first two analyses suggested that Monitor was contributing least of all the behaviors, with the exception of Transition, to the selection of groups.

In the fourth cluster analysis, Scan was excluded, Positive Signal and Neutral Signal were again combined, and Monitor again excluded. The impetus for using this combination was that although Scan appears to reflect the infant's level of distress, from the point of view of the regulative perspective, Positive and Negative Signal, Alternate Focus and Self-Comfort are the most adaptive coping behaviors.

For the fifth analysis, Negative Signal, excluding Cry-no-Look, was combined with Neutral and Positive Signal to create an All Signal category, and Scan was added. A number of researches have stated that the ability to signal while distressed is an important capacity (see Ricks) and that this may be indicative of individual differences in adaptive functioning. Cry-No-Look was excluded because there is less question of the infant's intention to Signal the mother if the infant is looking at her while crying than if the infant is looking away. Many instances of Cry-No-Look gave the appearance of 'tension discharge'. Scan was added because a comparision of the cluster analyses which contained it with those that did not suggested that it was helping to discriminate individual differences. The last of this group of analyses, therefore, contained All Signal, Scan, Alternate Focus, and Self-Comfort.

For the last group of cluster analyses Self-Comfort was used in two ways. First its measure of total duration was used, and, secondly, it was added to the subcategories of Signal and Avert, depending on what else the infant was doing while Self-Comforting. The rationale for the second step was that it would be useful to know what the infant was typically doing while Self-Comforting. Some infants Scanned the entire time, while others Monitored and Signalled. It was thought that this added information might help uncover underlying individual differences in the infant's deployment of coping behaviors. After adding the behaviors which accompanied Self-Comforting to the appropriate behaviors, the second, third, fourth, and fifth cluster analyses were performed again.

In selecting the most appropriate cluster analysis from among the 9 performed, two considerations were most important. These were that the selection of behaviors used and the selection of the number of clusters formed significantly influenced the defining features of each cluster, as evidenced in the behavioral means, and thus the group into which each infant was placed. For example, the first analysis, which included 8 behaviors, found significant differences in behavioral stability depending on whether 4, 5, or 6 clusters were formed. When 4 clusters were created, 26 out of the 52 infants were classified into similiar groups in the two sessions, i.e., were identified as exhibiting behavioral stability. When 5 clusters were done, 19 infants fell in the same group on the two sessions. And 19 infants again showed stability when 6 clusters were formed. Although the numbers make it appear that the amount of behavioral stability was little affected by the three analyses, in fact only 8 infants were identified as behaviorally stable on all three analyses, and 38 different infants were classified as stable on at least one of the three analyses. Merely by manipulating the number of clusters used one could effect very different conclusions about which infants exhibited stability and which did not. This phenomena occurred most frequently once the number of clusters became larger than the number of behaviors responsible for the clustering divisions, which in this case was 5 (Positive Signal, Negative Signal, Scan, Alternate Focus, and Self-Comfort). Once that number was exceded, the analyses tended to form clusters whose defining characteristics bared little obvious relationship to any of those clusters formed when the number of clusters was smaller. To put it another was, the process of adding clusters did not continue to produce a hierarchy of categories. For example, if the behaviors Scan, Alternate

Focus, Signal, and Self-Comfort were employed to form three clusters, one typical outcome might be a group of 20 (out of 50) infants defined by both high Alternate Focus and high Scan. If the same behaviors were used to form four clusters, the froup of 20 infants would typically be broken into a high Alternate Focus group of, say 12 infants and a high Scan group of 8 infants. Taking it one step further, if five clusters were then formed with the same combination of behaviors, all of the original 20 infants which comprised the high Alternate Focus and high Scan group would be regrouped with the other 30 infants into signficantly different clusters based on different behavioral means. Since the goal was to produce a classification system of major categories and subcategories, i.e, a classification tree, much like the attachment classification system is designed, it was decided that cluster sizes larger than the number of categories used were unhelpful.

As already noted, a comparison of the cluster analyses which were formed out of different combinations of behaviors revealed similiar complications as the selection of the number of clusters. The problem, although interactive with the choice of cluster size, produced its own, independent effects. That is, apart from the inconsistencies revealed when comparisons were made of clusters of different sizes, it was found that the very same infants who appeared behaviorally stable with one combination of behaviors appeared unstable with another. It was also found that some combinations suggested more stability than others. To provide a rationale for the choice of behaviors, it was decided to adopt the combination of behaviors most strongly indicated by the regulatory perspective. Thus the cluster analysis selected was the one performed on All Signal, Alternate Focus, Scan, and Self-Comfort and which also combined those behaviors exhibited by the infant while Self-Comforting. Since 4 behaviors were included, the results of forming 2, 3, and 4 clusters were examined.