

BULLETIN OF
THE NEW YORK ACADEMY
OF MEDICINE



VOL. 61, No. 9

NOVEMBER 1985

PATTERNS OF INFANT-MOTHER
ATTACHMENTS: ANTECEDENTS AND
EFFECTS ON DEVELOPMENT*

MARY D. SALTER AINSWORTH, PH.D.

Professor Emeritus
Department of Psychology
University of Virginia
Charlottesville, Virginia

JOHNS BOWLBY'S¹ first extended formulation of attachment theory sparked an impressive volume of research into mother-infant interaction and its influence on the qualitative nature of infants' attachment to their mother figures. This research has fed back into attachment theory to elaborate and extend it. In this lecture I wish first to highlight certain features of attachment theory that seem essential as a framework for the discussion of research findings. Then I shall refer to my own two short-term longitudinal studies of mother-infant interaction during the first year, emphasizing the development of infant-mother attachment, the identification of major patterns of attachments and their relationships to patterns of maternal behavior. Next I shall consider the issue of stability of these patterns across time and across situations. Finally, I shall describe later studies undertaken by others that

*Presented as the Thomas William Salmon Lecture, sponsored by the section on Psychiatry of the New York Academy of Medicine December 6, 1984.

focus on the influence of early attachment patterns upon subsequent development throughout the preschool year.

SOME HIGHLIGHTS OF ATTACHMENT THEORY

Basic to Bowlby's view is the concept of the behavioral system. The system underlying attachment behavior is one such system—and as fundamental a part of the equipment of many species as the systems underlying reproductive behavior, parental behavior, feeding, and exploratory behavior and secondary to or derivative from none of these. It is manifested by attachment behavior, which has the usual or predictable outcome of keeping in proximity to one or a few significant others, who, in the case of an infant, are likely to be the principal caregiver and one or a few other secondary care-giver into closer proximity. The repertoire includes also a few active ess of natural selection because it yielded survival advantage, in this case through increasing the chances of an infant being protected from harm by those to whom proximity is kept. In the same evolutionary sense, attachment behavior is adapted to a complementary behavioral system characteristic of adults which promotes keeping proximity to the infant and which also has the function of protecting the infant—a system which may be termed variously the maternal, parental or care-giving system.

At birth the infant is equipped with a repertoire of behaviors that promote proximity to a caregiver. Most conspicuous of these are signaling behaviors, such as crying, that operate to activate care-giving behavior, attracting the care-giver into closer proximity. The repertoire includes also a few active but reflexlike behaviors through which close contact can be attained or maintained once the adult has come into close proximity. In the first phase of development these attachment behaviors are simply emitted, rather than being directed toward any specific person, but very soon a second phase begins, and the baby begins to discriminate one person from another and to direct his attachment behaviors differentially. However, neither discrimination, differential behavior nor seeming preference are necessarily taken as indications that an attachment has yet been formed.

At about the middle of the first year a third phase of development can be identified. A number of important changes occur more or less simultaneously. These include the emergence of locomotion and directed reaching and grasping, with which proximity-keeping behavior becomes more active and more effective—although signaling behavior by no means disappears, but

indeed gradually develops into more mature modes of communication. Behavior becomes intentional or, in Bowlby's terms, "goal-corrected." Means and ends are distinguished, component attachment behaviors become alternate ways to keep proximity and gradually become organized in a rough plan hierarchy, with the overall plan being adapted to the present situation in the light of past experience. Finally, the baby forms the first representational model of his principal attachment figure (usually his mother) having attained some capacity for believing she exists even when not present to perception, and with this achievement comes the onset of separation distress when she leaves him. At this point in development the baby is capable of attachment, and indeed is entirely likely to have become attached to his mother figure and to one or a few other familiar persons as well.

Throughout the whole course of the first year the infant gradually builds up expectations of regularities in what happens to him. At first these are primitive, as his sleep-wake and other cycles become adapted to caregiving rhythms, but at some stage, not yet pinpointed, these expectations begin to be internally organized into what Bowlby has termed "working models"—or representational models—of his physical environment, of his attachment figures and eventually of himself.

The attachment system is but one of several biologically-based and species-characteristic behavioral systems. Several of these systems may be active simultaneously, but usually at different intensities of activation, so that the one that is activated most intensely dominates overt behavior. Thus, the overt manifestations of any system tend to be episodic, and this is true of attachment behavior. Furthermore, behaviors that serve the attachment system when it is in ascendance may serve other systems at other times. Thus, for example, locomotor approach that serves to keep proximity to an attachment figure may serve other systems at other times.² Thus, it is difficult to identify attachment behavior—or behavior serving any other system—out of its environmental and behavioral context. There are, however, certain contexts in which attachment behavior is most likely to be manifested, for example, when a child is tired, ill, or hungry, when he is alarmed, when an attachment figure leaves him or returns after an absence, when he is rebuffed and indeed also when he has strayed too far from an attachment figure or has been away too long. Furthermore, the way in which the attachment system has become internally organized influences when attachment behavior will be activated, and how intensely, as well as what specific pattern of behavior will be manifested.

AINSWORTH'S LONGITUDINAL RESEARCH PROJECTS

My first longitudinal study^{3,4} was undertaken with 28 infants and their mothers in semiacculturated villages near Kampala, Uganda. It enabled me to trace the manifestations of attachment behavior throughout the first year and slightly beyond. I distinguished several phases of the development of attachment that are congruent with the phases I have already mentioned. I identified a number of specific behaviors, focusing especially on those that are characteristic of infants in Phase 3, when they have clearly become attached to their mothers. Of these I want especially to mention the use of the mother as a secure base from which to explore the world and as a secure haven to which to return when alarmed. Furthermore, I distinguished between infants whose attachments to their mothers seemed secure and those whose attachments seemed to be anxious. Although my assessment procedures in this pioneer study were unavoidably imprecise, I concluded that the mothers of securely attached infants had been more accessible and more positively responsive to them than the mothers of anxiously or insecurely attached infants.

The second study was begun nearly 10 years later with a sample of 26 mother-infant dyads in white, middle-class families in Baltimore—obviously differing from the Ganda sample culturally and racially. The attachment behaviors previously identified were essentially identical in the Baltimore sample, and so were the phases of development. This supported Bowlby's claim for an evolutionary, genetic bias for human infants to become attached to their principal care givers. Nevertheless there were some differences attributable to cultural differences in mothers' infant-care practices, which in turn affected infant responses to strangers and everyday separations and affected the circumstances under which an infant could use his mother as a secure base from which to explore.⁵ These latter findings have confirmed my conviction that cultural context must be taken into account when assessing the security versus insecurity of attachments.⁶

The Baltimore study could be much more intensive than the Ganda study, involving approximately 72 hours of home observation time for each dyad, and the measures of the behavior of both mother and infant in interaction with each other could be more precise. Our data analyses were concentrated on interaction in situations particularly relevant to attachment behavior: crying episodes, feeding, face-to-face situations, close bodily contact, separation and reunion situations—and how such interactions changed in the course of development.⁷ These analyses yielded substantial evidence that a mother's

behavior in interaction with her baby had significant influence on her baby's behavior and on the pathway along which his development proceeded. This in itself is not surprising, but some of the particulars did not square with expectations stemming from other theoretical orientations. Thus, a mother's prompt responsiveness to infant crying early on led an infant to cry less in later months rather than reinforcing a tendency to cry.⁸ Giving the baby close bodily contact when he signaled for it was associated both with secure attachment and the growth of self-reliance rather than making for a clingy dependence.⁷ Sensitive responsiveness to infant signals fostered cooperative compliance with commands, whereas emphasis on training the child to obey fostered noncompliance.⁹ Findings such as this suggest that individual differences in maternal behavior have a differential effect on infant behavior, and this leads us on to a consideration of patterns of attachment.

PATTERNS OF ATTACHMENT AS HIGHLIGHTED IN THE STRANGE SITUATION¹⁰

I shall show that there are qualitative differences in patterns of attachment of infants to their mothers that can be identified on the basis of an intensive study of mother-infant interaction in the home environment—but these patterns were highlighted in a laboratory situation called the “strange situation” to which we introduced our Baltimore babies with their mothers at the end of the first year.¹⁰ This is a 20-minute situation in which the balance of attachment behavior to exploratory behavior is examined under conditions which progressively tip the balance away from exploratory behavior toward attachment behavior. There is a sequence of episodes which progressively activates the attachment system at higher intensity—entrance into an unfamiliar environment, the arrival of a stranger, two brief separations from the mother and two subsequent reunions with her.

Three major patterns of behavior could be distinguished, which we initially called Patterns A, B and C—together with eight subpatterns which cannot concern us here. Very briefly, Pattern A babies tended to maintain exploration across all episodes, not to be upset by separations from the mother, and to avoid her when reunited with her. Pattern C babies tended to be wary of the stranger, intensely upset by the separations and ambivalent to the mother when she returned, both wanting to be close to her and at the same time being angry with her, thus being difficult to soothe. Pattern B babies, on the other hand, were ready to explore when the mother was present, less so when she was absent and prompt to seek to be close to the mother in

the reunion episodes or at least to initiate positive interaction with her across a distance, showing neither the avoidance nor the angry resistance shown by the other two groups. The strange situation has been widely accepted as the basis for the assessment of infant-mother attachment, and the patterns themselves have been confirmed again and again in many studies. However, the psychological significance of these patterns rests upon their close association with patterns of mother-infant interaction at home and over time.

PATTERNS OF INFANT ATTACHMENT AND MATERNAL AND INFANT BEHAVIOR AT HOME¹⁰

On the basis of the behavior of the Baltimore dyads at home during the first year, Pattern B was identified as signifying secure attachment of infant to mother. Pattern B babies cried less than Pattern A or C babies even in in little everyday separations at home, greeted their mothers more positively upon reunion, responded more positively when held and also when put down and responded more cooperatively to maternal commands. Their mothers had been more sensitively responsive to infant signals across many contexts—reading signals more accurately and responding more appropriately, promptly and contingently. Of especial importance seemed to be their responsiveness to infant crying and to other bids for close bodily contact. They were less rejecting, interfering and/or ignoring than the mothers of the other infants. As a consequence, Pattern B babies could construct a working model of the mother as someone upon whom they could rely to be accessible and responsive so they could readily leave her to explore even an unfamiliar situation, and ordinarily did not protest everyday separations because they felt that mother was still available—that she would respond to a call or a cry or could be found when sought.

Both Pattern C and Pattern A babies were identified as insecure or anxious in their attachment to the mother. They cried more, more frequently protested little everyday separations at home and were more likely to greet the mother with a cry when she returned. They responded less positively to being held by their mothers and yet more negatively when put down. They were less responsive in face-to-face situations, less likely to comply with maternal commands and in general more often angry. We concluded that both Pattern A and Pattern C babies were attached to their mothers, but anxious in that attachment. Because of their behavior in the strange situation, we called the Pattern A babies anxious/avoidant and the Pattern C anxious/resistant or alternatively anxious/ambivalent.

The mothers of these babies who were anxiously attached to them were generally less sensitively responsive to infant signals and communications across all contexts and throughout the first year. Especially conspicuous was their delay in responding to crying and their relative lack of tender, careful or affectionate behavior when holding the baby. Mothers of Pattern A babies differed, however, from the mothers of Pattern C babies. Mothers of Pattern A anxious/avoidant babies were the most rejecting, their positive feelings toward the baby being more frequently submerged by anger and irritation. Upon a second analysis of the data, Mary Main demonstrated that they showed a strong aversion to close bodily contact with their babies (despite the fact that they spent as much time holding them as did other mothers), and they provided their babies with more unpleasant, even painful experiences associated with such contact. They were not only less frequently affectionate than the mothers of securely attached babies, but when they did demonstrate affection it was most likely through kissing, rarely through cuddling or hugging.¹¹ Mothers of Pattern C anxious/ambivalent babies were not rejecting, although they tended to be either interfering or ignoring. They were inconsistent in their responsiveness, but when they did respond they could be positive; they often failed to respond to bids for close contact or offered contact when it was not sought by the baby, but they could themselves enjoy close bodily contact.

It was more difficult to perceive how Pattern A and Pattern C babies differed from each other at home on the basis of our original data analysis, but Mary Main's recoding of our observations yielded three significant differences. The anxious/avoidant babies were more angry at home, even though they were not overtly angry in the strange situation. They were unlikely to "sink in" when held by the mother, and yet showed less actively positive contact behavior when held.

Although for quite some time no confirmatory longitudinal, naturalistic studies were forthcoming and thus no further validation of the strange situation procedure as an assessment device in terms of antecedent mother-infant interaction, such further validation has recently appeared. The findings of three extensive and detailed longitudinal studies now together provide essential confirmation of our findings—studies by Belsky and his associates,¹² Egeland and Farber¹³ with a high-risk low SES sample and Grossmann and associates¹⁴ with a sample of North German middle-class dyads. The Grossman study was the one to most closely approximate a replication of the procedures and measures of our Baltimore study. Because it was found that there were more Pattern A and fewer Pattern B babies in the North German sample

than in most middle-class American samples, some have considered its findings as evidence of invalidity of the strange situation assessment procedure; in fact, its confirmation of the relationship between the strange situation behavior of the babies and the nature of mother-infant interaction at home yielded strong evidence of validity.

INTERPRETATION OF PATTERNS OF ATTACHMENT

Now let us return to theory in considering how these patterns of attachment may be interpreted. I have already suggested that the securely-attached infant has built up a working model of his mother as responsive and accessible. At this age this is considered to be the core of the inner organization that he carries with him from one situation to another. Although his actual behavior may differ from one situation to another, this inner organization gives some coherence to the patterning of his behavior across contexts so that one can predict his behavior from one to another. He brings with him to the strange situation confidence in his mother's availability. He can use her as a secure base from which to explore the unfamiliar environment. Even after his mother has left the room for the first time he is likely to feel that she is still accessible, and he only gradually builds up to distress when she inexplicably is not. When the mother does return he seems assured of her responsiveness, so if he is distressed he promptly and unambivalently seeks comfort from her, is readily soothed and soon ready to resume exploratory play.

On the other hand, the anxious/resistant Pattern C babies have built up a working model of the mother as inconsistently accessible and responsive. They protest little everyday separations more often because they have no confidence that mother is accessible when out of sight, and even when she is present they do not expect her to be responsive to their signals and communications. When their attachment behavior is intensely activated they increase the intensity of their demands, but at the same time their experience has led them to expect frustration, and hence their intense attachment behavior itself is suffused with anger. The inner pattern of organization they bring with them to the strange situation leads them to be wary of the unfamiliar situation and of the stranger, to try to keep proximity to the mother and to have their insecurity about her uncertain accessibility confirmed when she leaves the room. Because she is clearly inaccessible, they are distressed in the separation episodes, and when the mother returns they are ambivalent, both wanting contact and being angry at her, so that they are difficult to soothe.

At first glance the behavior of the anxious/avoidant Pattern A babies seem quite paradoxical. Whereas at home they seem insecure, crying more than do securely-attached infants and showing more separation distress, in the strange situation they seem unperturbed by separation, and in the reunion episodes they tend to avoid the mother rather than seeking proximity and contact as the anxious/resistant babies do. The key to the discrepancy is to identify their avoidance as a defensive maneuver, and their apparent imper-turbability as a proof of the success of the defense. Their experience with their mothers at home has led them to form a working model of her as rejecting, and likely to rebuff any intense bid that they may make for close bodily contact. Thus, whenever their attachment behavior is activated at high intensity they experience a severe approach-avoidance conflict; like other infants they very much want close contact with the mother, feel angry because they expect to be rebuffed and are afraid both of a painful rebuff and of expressing the anger they feel. Their defensive strategy is much akin to the defensive detachment often shown by young children when reunited with their mothers after major separations, although many psychoanalysts hold that the ego is not well enough developed in the first year for defenses to be formed. Fraiberg,¹⁵ who worked with infants at risk because of pathologically inadequate mothering, confirmed the existence of defensive avoidance in infancy, and indeed of several other forms of what she termed "behavioral defenses."

According to Bowlby's reformulation of defensive processes,¹⁶ one can interpret the anxious/avoidant child as deactivating his attachment system and also its concomitant anger by defensively excluding from higher level processing input that would activate attachment behavior. At the same time, the child tends to continue to busy himself with locomotor activity or with toys as a kind of defensive diversion. Thus, although in the strange situation he may well see his mother depart, he seems not to interpret this to mean that she has left him, nor does he interpret his mother's return as a reunion. The sensory input has been cognitively disconnected from the stored experiences he has had of distressful experiences of separation. Thus, in a situation in which attachment behavior and anger would otherwise be intensely activated, he avoids becoming distressed, he avoids painful rebuff and furthermore he avoids angering his mother with his importunities. Mary Main,¹⁷ who has given much attention to these mother-avoidant babies, further points out that although the avoidance operates to obviate the seeking of contact, the child may still remain in sufficient proximity to the mother

that the protective function of attachment behavior is sustained.

I want now to proceed to discuss the issues of stability of attachment pattern over time and the coherence this is believed to give to behavior, but before I go on I would like briefly to mention that the strange situation procedure may be used to examine the nature of the infant's attachments to other figures. Lamb,¹⁸ Main and Weston¹⁹ and Grossmann and his colleagues²⁰ have compared infants' patterns of attachment to both mother and father, and found that one cannot predict the quality of attachment to the father from that displayed toward the mother. The implication is that the particular pattern of attachment depends on the history of interaction the child has had with a particular figure. This also implies that security versus insecurity of attachment is neither a traitlike construct, nor can it be comprehensively accounted for by temperament.

STABILITY OF ATTACHMENT PATTERNS OVER TIME

The obvious way to discover the extent to which patterns of attachment remain stable over time is to repeat the assessment with the same child-adult dyad after a lapse of time. A major drawback to the strange situation procedure for assessing attachment is that this lapse of time cannot be much longer than six months. As the child approaches his second birthday he finds the strange situation less stressful. His attachment behavior is aroused less intensely. He may still be distressed by separation but upon reunion, if securely attached, he is less likely to seek contact with his mother, and perhaps less likely even to seek proximity than when he was younger. The classificatory system established for one-year-olds is no longer applicable, and if it is applied he may even be identified as avoidant so casual is he. For those who are very insecure, however, avoidant or resistant behavior still tends to be manifested clearly enough for the classification system to be applicable. For a high-risk sample it still may be valid, but not for a normal sample.

Therefore, stability of attachment patterns as assessed by the strange situation has been examined with a lapse only of six or seven months, with the first assessment being at 12 months. In white middle-class samples roughly comparable to my original Baltimore sample, three studies have reported high stability. Waters²¹ found 96% of the infants to be placed in the same A/B/C category at both times, David Connell²² found 81% and Main and Weston¹⁹ 80%. Although such findings suggest an impressive degree of stability in the way a baby organizes his behavior toward an attach-

ment figure, it is not clear whether this is because the inner organization itself tends to resist change despite changing circumstances or because the nature of the interaction between mother and child tends to remain stable.

Thompson and his associates²³ found only 53% stability with a middle class sample, and attributed the shifts from secure to insecure status or vice versa to changes associated with maternal employment and/or the onset of "regular nonmaternal care"—and indeed they seemed to have a sample in which more mothers returned to work and/or arranged for substantial amounts of substitute care than had been characteristic of the other samples I mentioned. The authors concluded "that the security of attachment reflects the current status of infant-mother interaction"—thus implicitly rejecting any contribution by the tendency of inner organization to resist change. But let us leave this issue for a while and turn to another study that showed less stability of attachment pattern than the findings of Main and Connell and Waters had led us to expect.

This is a large and very complex longitudinal study undertaken by a group of collaborators at the University of Minnesota of a large "high-risk" sample of infant-mother dyads with low socioeconomic status. Vaughn and his associates²⁴ found for the first 100 of the sample 62% stability of attachment pattern from 12 to 18 months. The shifts from secure to anxious and vice versa were found usually to be associated with changing stress impinging on the mother, presumably leading her toward changes in the way she interacted with her infant. A later report by Egeland and Farber¹³ on the full sample of 189 dyads that focused especially on changes from secure to insecure patterns or vice versa yielded a more complex picture. By this time the research team had processed a very large variety of behavioral, demographic and test variables beginning in the prenatal period and continuing for the post-natal 18 months, at the end of which the second attachment assessment was made. Their findings are so complex that I shall merely summarize them here.

In the case of the mothers of anxious/avoidant infants the issue seemed to rest with the mother's personality and the degree to which it permitted her to become more responsive to her infant as time went on. In the case of the mothers of anxious/resistant infants, the issue seemed to rest more on the interaction among factors of maternal youth, lower IQ, lack of knowledge and experience and life circumstances that provided more or less support to the mother as time went on, thus making it more or less difficult for her to be adequately responsive to her baby.

PREDICTIVE VALIDITY OF INFANT ATTACHMENT PATTERNS

Some of the issues raised by these studies of stability of pattern can be settled only by longitudinal research continuing beyond the age span of applicability of strange situation assessments. In the second lecture I shall consider changes in the nature of a child's attachments to parents with increasing age, as well as various new methods proposed for the assessment of quality of attachment at later ages. However, there is an important body of research that preceded these later efforts consisting of studies of the predictive validity of infant attachment patterns. Here we must first return to attachment theory.

I mentioned previously that one important feature of the onset of attachment some time in the middle of the first year is the way in which an infant can use his attachment figure as a secure base from which to explore the world. With the more secure infants, confidence in the accessibility and responsiveness of that figure enables the child to venture forth to learn about his surroundings and what effect he can have on them or them on him. The less secure child may have so much uncertainty about the availability of the attachment figure that he is preoccupied with keeping proximity to the detriment of exploratory activity. Indeed, the experience of largely consistent maternal responsiveness that leads to secure attachment has another more indirect effect on exploratory activity; since the baby has perceived that what he does has an effect on his mother's behavior toward him, he builds up what White²⁵ called "a sense of competence," which gives him confidence that he can have an effect on the world around him and exert some control over what happens to him. It is a small step to assume that this encourages an active, exploratory approach to the objects in his physical environment as well.²⁶

Furthermore, as I implied earlier, the working model that the infant has built up of his mother during his everyday interaction with her influences his expectations of her in a new situation and thus influences the way in which he perceives it and the way in which he organizes his behavior to meet it. His behavior is not wholly dependent on his mother's behavior in the new situation, as indeed the strange-situation research demonstrates. As he develops and his mother's behavior adjusts both to this development and to other changing circumstances in her life, it is reasonable to assume that he at least initially deploys his working model of her to the new situations brought about thereby. As Piaget²⁷ insisted, inner organization resists change even though it accommodates itself to change.

Another aspect of inner organization as a significant determinant of man-

ifest behavior is the defensive processes that an infant may have built up, and indeed these tend to make the organization especially resistant to change because the expectations underlying the defense tend to be self-fulfilling. Thus, a child who adopts an avoidant defense because he fears rejection should he seek close contact therefore does not seek close contact when he most wants it. Thus he avoids the very experiences that might lead him to change his working model; he cannot learn that he can trust an attachment figure not to reject him because his defense prevents him from putting the matter to the test. It is considerations such as these that underlie the body of research examining the predictive validity of infant attachment patterns.

Sroufe^{28,29} outlined the rationale for such predictive research in terms of the ways in which an infant organizes his behavior toward his principal attachment figure, influencing the ways in which he organizes his behavior relevant to later age-appropriate tasks. It is not the continuance of specific behaviors that can demonstrate continuity of the nature of his attachment to his mother, but rather the underlying organization. However, one should not look for identities, not even in organization, from one age to another but rather for "coherence" in development. An infant's organization of behavior toward his mother, which is perhaps his major task in infancy, is expected to lead predictably to transformations of that organization at a later age relevant to the major issues facing him at that time.

In the second year of life two major developmental tasks are learning to cope flexibly and autonomously with the physical environment and to improve communication with other people. Main^{30,31} predicted that toddlers who had been securely attached to their mothers at 12 months of age would explore more effectively, and because they thus would learn more about the world around them they would score higher in mental development. She also predicted that they would be more advanced in language development. She observed 21-month-olds in a play situation with their mothers present but essentially noninterventive and indeed found that those who had been identified as securely attached, in comparison with those who were nonsecure, had longer bouts of exploratory play, attended more to the details of complex objects, and manifested more positive affect during exploration. Her predictions about communication were also confirmed. As a result of a separate testing session she found that the securely attached toddlers had significantly higher Bayley mental development quotients than the nonsecure ones, and this seemed at least in part attributable to socioemotional factors because they also showed more "gamelike spirit" in the test situation, and were more cooperative with the examiner.

Sroufe and associates³² introduced 24-month-olds and their mothers to a complex situation that included a free-play episode, a clean-up episode and a problem-solving episode. Symbolic play was the focus of interest in the play episode, and was found to be significantly more frequent with toddlers who had earlier been identified as securely attached than with those who had been identified as either anxious/avoidant or anxious/resistant. The last two tasks in the problem-solving episode were intended to challenge the competence of the toddler to handle them effectively, flexibly and autonomously; both were very difficult, and the last problem was insoluble without adult assistance. The securely-attached toddlers were more enthusiastic than the insecure toddlers, more likely to cooperate with maternal suggestions and less likely to ignore the mother or to show frustration behavior. They still had some characteristics of the "terrible twos" however, for they were non-compliant in the clean-up session when their play was interrupted despite their greater cooperativeness in the problem-solving tasks. In conjunction with the problem-solving tasks, ratings were made of the supportiveness of mother's presence and the quality of her assistance; these ratings were higher for the mothers of the securely attached toddlers, so that maternal behavior in the situation as well as the children's inner organization contributed to the picture of coherence in development.

In the same Sroufe study the Bayley Mental Scale was administered a month earlier. Although the mean of the securely attached toddlers was higher, the difference from the mean of the anxiously attached toddlers fell short of statistical significance. Indeed, the findings of a variety of studies that correlated security of attachment with DQ or IQ at various ages have yielded variable results, some significant and others nonsignificant.¹⁰

To separate what is attributable to the child's inner organization from the effect of the mother's behavior in the immediate situation, one must wait until later in the preschool period, for 24-month-olds are still too much affected by being separated from attachment figures to perform effectively without one being present. In studies of three to six-year-olds three major issues have been addressed: the relationship of infant attachment patterns to children's interaction with age-peers, their interaction with preschool teachers and their emotional and/or personality development. Let us consider some of these studies.

Waters and associates³³ made comparisons of assessments for security versus insecurity of attachment at 15 months with Q-sort data for the behavior of these children in preschool at age 3 1/2—the data for both assessments having been collected in a longitudinal study by Wanda Bronson.³⁴

Those identified as securely attached to their mothers as one-year-olds were found to be more competent in interaction with other children, and were also rated higher than the insecure children in ego strength and effectiveness.

Sroufe³⁵ recruited for attendance in a preschool class 40 four-year-olds drawn from the Minnesota high-risk sample, representing equal numbers of those who had been identified as one-year-olds as secure, avoidant and resistant in attachment to their mothers. In the course of the several months of their preschool attendance many observations and assessments were made, including Q-sort measures. Among the highlights of the findings were that children who had been securely attached were more ego-resilient, that is, more flexible in their management of impulses and feelings, than those who had been anxiously attached. Several measures indicated that they had higher self-esteem and better emotional health, and that they had fewer problem behaviors or behavior aberrations. Furthermore, they showed more positive and less negative affect, and were more socially competent and had more friends. They were more compliant with their teachers, but showed less emotional dependency on teachers than either of the insecure groups.³⁶ Empathy was judged to be characteristic of the secure children, uncharacteristic of the avoidant children, with the resistant children falling in between. On the whole, these many different measures did not distinguish between patterns of anxious attachment, nor indeed had they been expected to do so. However, among a few distinctions that could be made, one example is that teachers perceived most of the anxious/avoidant children as hostile, isolated and/or disconnected and most of the anxious/resistant group as impulsive and/or helpless.

In addition to these 40 children who had attended the special preschool classes organized by the project, there were 56 attending various other preschools. The combined group of 96 was assessed with regard to behavior problems.³⁷ With this larger sample the characteristics of the two insecure groups became clearer, but on the whole the findings confirmed those of the study just discussed. However, the new study was notable for its investigation of the factors that might account for the exceptions to the relationships that had been predicted between early infant-mother attachment quality and preschool behavior of four-year-olds. For this comparison, data from the problem-solving tasks at 24 months and a mother-as-teacher situation at 42 months were used. The mothers of securely attached infants who had behavior problems in preschool provided less support and expressed more negative affect as their children attempted the problem-solving tasks and, later at 42 months, they gave less clear instructions and were less confident in deal-

ing with their children than were the mothers whose securely attached infants were relatively free from behavior problems in preschool. Apparently, some mothers, for whatever reason, were more sensitive in their interaction with the child as a one-year-old than they were able to be later on. The mothers of anxiously-attached children who did not have behavior problems in preschool were, in the 42-month teaching situation, more respectful of the child's autonomy, more supportive, gave clearer instructions, set more consistent limits and were more confident in dealing with the child and less hostile than were the mothers of anxiously-attached children who had behavior problems in preschool. Further distinctions were made in regard to the degree of stimulation offered in the home and changes in family composition. For example, children whose mothers lived with the same male partner between the child's first and fourth birthdays were less likely to have behavior problems during their fifth year.

Lewis and his associates³⁸ found that boys who had been identified as anxiously attached to their mothers at one year were more likely to be identified as at risk for behavioral problems at age six than those who were securely attached, although the same trend did not hold for girls. They examined the exceptions to the trend. Among the factors that discriminated between the anxiously-attached boys that developed behavioral problems and those who did not were unplanned birth, life stress, second-born status and few friends. In summary, the authors suggested that "although the child's attachment relationship plays an important role in the development of psychopathology, the child is neither made invulnerable by an early secure attachment nor doomed to psychopathology by an insecure attachment."

Thus, although there is impressive evidence of stability of patterns of early attachment and of coherence in development associated with these patterns, Lewis's caveat is a sound one, and indeed is entirely congruent with attachment theory. Bowlby's³⁹ own account of the relationship between attachment pattern and the growth of personality is based on Waddington's⁴⁰ evolutionary, epigenetic theory in which different individuals are viewed as proceeding along different pathways of development—not all along the same pathway as the Freudian concepts of fixation and regression would suggest. Initially, the pathways are close together and an individual has access to a large proportion of them, but the one that is chosen at birth depends on the way in which the genetic potentialities inherent in the genome have interacted in the prenatal environment to structure development. This principle holds throughout life; whenever there is a "choice point" of remaining on the same pathway or diverging from it, the "choice" is determined by the

interaction between the internal organization that the individual has already developed and the environment in which he now finds himself. Meanwhile, in the course of development the internal organization of the person is constantly subject to transformation in the light of experience, whether this be in the direction of consolidation or change.

Among the inner organizational factors that tend to favor continuation along the same pathway are habits, the working or representational models the person has built up of his environment, his attachment figures and himself, as well as defensive processes. The fact that the environment into which an infant is born tends to remain essentially the same also favors continuation along the pathway of development upon which he first started, and at the same time the internal structures he develops also predispose the person to experience the environment as stable. Bowlby³⁹ suggests that these structures "determine what is perceived and what is ignored, how a new situation is construed, and what plan of action is likely to be constructed to deal with it. [They also] determine what sorts of person and situation are sought after and what sorts are shunned. In this way an individual comes to influence the selection of his own environment."

As spokesman for the biological view of development, Waddington⁴⁰ insisted that in any species the highest degree of sensitivity to environmental change is to be found in the very young, and that such sensitivity decreases with increasing age. In humans, Bowlby believes, the period of diminishing sensitivity spans all of childhood and adolescence and is by no means limited to the earliest years. And, although by the end of adolescence sensitivity to environmental change is indeed limited, Bowlby conceives of change being possible throughout the rest of the life span despite the fact that inner organization resists change and relatively potent environmental influences are necessary to effect major changes.

If we are to gain further understanding of patterns of attachment and their influence on the choice of developmental pathway, it is not enough merely to seek for and assess developmental continuities. We must seek for and assess the factors that work for or against such continuity. I am delighted that researchers are increasingly turning to an examination of exceptions to stability of attachment-pattern and/or coherence of development. The factors are numerous and complex and must be examined in the framework of intensive longitudinal research—which is indeed formidable to undertake.

However, light may be thrown on some of these factors by an examination of patterns of attachment in various diverse samples—special populations or samples drawn from diverse cultural groups. I can do little more

here than mention that there has been some excellent research on maltreated children,^{41,42,43} on children of depressed parents, for example, that undertaken at the National Institute of Mental Health under the direction of Marion Radke-Yarrow,⁴⁴ studies of preterm infants such as these by Susan Goldberg and her associates⁴⁵ and Leila Beckwith,⁴⁶ a variety of studies on the effects of day care on the quality of young children's attachment to their mothers, studies that focus on the effects of mothers' social support systems on the attachment patterns that infants develop^{47,48} and a variety of studies of samples drawn from other cultural groups—in West Germany, Holland, Sweden, Japan and Israel. To be successful in throwing additional light on the factors affecting stability of attachment pattern and/or coherence of development, these studies of special populations or special factors must themselves be intensive and preferably also longitudinal. If we are to understand how environmental factors achieve their influence, we must not only assess attachment pattern, but also investigate the environmental factors themselves in detail with a view to seeing how they influence individual differences and exceptions to general trends. Satisfactory short-cuts are difficult, perhaps impossible, to find.

Even more difficult would be the task of assessing the part played by genetic factors upon the pattern of attachment developed by the individual. If we follow Waddington's argument, the phenotype at any stage of development is a resultant of the interaction between present environment and internal structure as it has already been continually transformed by environmental factors in the course of previous development. So potent are environmental factors in the development of attachment pattern, especially the behavior of early attachment figures and the various factors influencing such behavior, that it is indeed difficult to detect a heritability component, let alone to assess its strength. If temperament is defined as largely genetic, as I believe it implicitly is, no evidence has yet been adduced to demonstrate that because of temperamental differences some children are predestined to become securely attached to their mothers and others anxious.

So far, attachment research has been largely preoccupied with attachment patterns in infants and young children, with attachment of child to parent and with developmental continuity or change only over the first five or six years of life. In my second lecture I intend to take the story forward to consider attachment across the life span.

REFERENCES

1. Bowlby, J.: *Attachment and Loss*. Vol. 1. *Attachment*. New York, Basic Books, 1969, 2nd ed. 1982.
2. Tracy, R.L., Lamb, M.E., and Ainsworth, M.D.S.: Infant approach behavior as related to attachment. *Child Dev.* 47: 571-78, 1976.
3. Ainsworth, M.D.S.: Development of Infant-Mother Interaction Among the Ganda. In: *Determinants of Infant Behaviour II*, Foss, B.M., editor. New York, Wiley, 1963, pp. 67-104.
4. Ainsworth, M.D.S.: *Infancy in Uganda: Infant Care and the Growth of Love*. Baltimore, Johns Hopkins University Press, 1967.
5. Ainsworth, M.D.S.: Infant Development and Mother-Infant Interaction Among Ganda and American Families. In: *Culture and Infancy: Variations in the Human Experience*. Leiderman, P.H., Tulkin, S.R., and Rosenfeld, A., editors. New York, Academic Press, 1977, pp. 119-49.
6. Ainsworth, M.D.S.: The Usefulness of the Strange-Situation Procedure in Cross-Cultural Research. *International Conference on Infant Studies*. New York, April 6, 1984.
7. Ainsworth, M.D.S.: Attachment as Related to Mother-Infant Interaction. In: *Advances in the Study of Behavior*, Rosenblatt, J.S., Hinde, R.A., Beer, C., and Busnel, M., editors. New York, Academic Press, vol. 9, 1979, pp. 1-51.
8. Bell, S.M. and Ainsworth, M.D.S.: Infant crying and maternal responsiveness. *Child Dev.* 43: 1171-90, 1972.
9. Stayton, D.J., Hogan, R., and Ainsworth, M.D.S.: Infant obedience and maternal behavior: The origins of socialization reconsidered. *Child Dev.* 42: 1057-69, 1971.
10. Ainsworth, M.D.S., Blehar, M.C., Waters, E., and Wall, S.: *Patterns of Attachment: A Psychological Study of the Strange Situation*. Hillsdale, N.J., Lawrence Erlbaum Associates, 1978.
11. Tracy, R.L. and Ainsworth, M.D.S.: Maternal affectionate behavior and infant-mother attachment patterns. *Child Dev.* 52: 1341-43, 1981.
12. Belsky, J., Rovine, M., and Taylor, D.G.: The Pennsylvania Infant and Family Development Project, III: The origins of individual differences in infant-mother attachment: Maternal and infant contributions. *Child Dev.* 55: 718-28, 1984.
13. Egeland, B. and Farber, E.A.: Infant-mother attachment: Factors related to its development and changes over time. *Child Dev.* 55: 753-71, 1984.
14. Grossman, K.E., Grossman, K., Spangler, G. et al.: Maternal sensitivity in Northern Germany. In: *Growing Points in Attachment Theory and Research*, Bretherton, I. and Waters, E. editors. *Monog. Soc. Child Dev.* In press.
15. Fraiberg, S.: Pathological defenses in infancy. *Psychoanal. Q.* 51: 612-35, 1982.
16. Bowlby, J.: *Attachment and Loss*. Vol. 3. *Loss: Sadness and Depression*. New York, Basic Books, 1980.
17. Main, M.: Analysis of a Peculiar Form of Reunion Behavior Seen in Some Day Care Children: Its History and Sequelae in Children who are Home-Reared. In: *Social Development in Childhood: Day-care Programs and Research*. Baltimore, Johns Hopkins University Press, 1977, pp. 33-78.
18. Lamb, M.E.: Qualitative aspects of mother- and father-infant attachments. *Infant Behav. Dev.* 1: 265-75, 1978.
19. Main, M. and Weston, D.R.: The quality of the toddler's relationship to mother and to father: Related to conflict behavior and the readiness to establish new relationships. *Child Dev.* 52: 932-40, 1981.
20. Grossmann, K.E., Grossman, K., Huber, F., and Wartner, U.: German children's behavior towards their mothers at 12 months and their fathers at 18 months in Ainsworth's strange situation. *Int. J. Behav.* 4: 157-81, 1981.
21. Waters, E.: The reliability and stability of individual differences in infant-mother attachment. *Child Dev.* 49: 483-94, 1978.
22. Connell, D.B.: Individual differences in attachment: An investigation into stabil-

- ity, implications, and relationships to structure of early language development. Unpublished doctoral dissertation, Syracuse University, 1974.
23. Thompson, R.A., Lamb, M.E., and Estes, D.: Stability of infant-mother attachment and its relationship to changing life circumstances in an unselected middle-class sample. *Child Dev.* 53: 144-48, 1982.
 24. Vaughn, B., Egeland, B., Sroufe, L.A., and Waters E.: Individual differences in infant-mother attachment at twelve and eighteen months: Stability and change in families under stress. *Child Dev.* 50: 971-75, 1979.
 25. White, R.W.: *Ego and Reality in Psychoanalytic Theory*. New York, International Universities Press, 1963.
 26. Ainsworth, M.D.S. and Bell, S.M.: Mother-Infant Interaction and the Development of Competence. In: *The Growth of Competence*, Connolly, K.J. and Bruner, J., editors. New York, Academic Press, 1974, pp. 131-64.
 27. Piaget, J.: *The Origins of Intelligence in Children*. New York, International Universities Press, 1952, 2nd ed.
 28. Sroufe, L.A.: The coherence of individual development: Early care, attachment, and subsequent developmental issues. *Am. Psychol.* 34: 834-41, 1979.
 29. Sroufe, L.A. and Waters, E.: Attachment as an organizational construct. *Child Dev.* 48: 1184-99, 1977.
 30. Main, M.: Exploration, play, and level of cognitive functioning as related to infant-mother attachment. Unpublished Ph.D. dissertation, Johns Hopkins University, 1973.
 31. Main, M.: Exploration, play, and level of cognitive functioning as related to security of infant-mother attachment. *Infant Behav. Dev.* 6: 167-74, 1983.
 32. Matas, L., Arend, R.A., and Sroufe, L.A.: Continuity of adaptation in the second year: The relationship between quality of attachment and later competence. *Child Dev.* 49: 547-56, 1978.
 33. Waters, E., Wippman, J., and Sroufe, L.A.: Attachment, positive affect, and competence in the peer group: Two studies in construct validation. *Child Dev.* 50: 821-29, 1979.
 34. Bronson, W.: Developments in Behavior with Age-Mate During the Second Year of Life. In: *Friendship and Peer Relations*, Lewis, M. and Rosenblum, L.A., editors. New York, Wiley, 1975, pp. 131-52.
 35. Sroufe, L.A.: Individual Patterns of Adaptation from Infancy to Preschool: The Roots of Maladaptation and Competence. In: *Minnesota Symposia in Child Psychology*, Perlmutter, M., editor. Hillsdale, N.J., Erlbaum, 1983, vol. 16, pp. 41-83.
 36. Sroufe, L.A., Fox, N.E., and Pancake, V.R.: Attachment and dependency in developmental perspective. *Child Dev.* 54: 1615-28, 1983.
 37. Erickson, M.F., Sroufe, L.A., and Egeland, B.: The Relationship Between Quality of Attachment and Behavior Problems in Preschool in a High-Risk Sample. In: *Growing Points in Attachment Theory and Research*, Bretherton, I. and Waters, E., editors. *Monog. Soc. Res. Child Dev.* In press.
 38. Lewis, M., Feiring, C., McGuffog, C., and Jaskir, J.: Predicting psychopathology from early social relations. *Child Dev.* 55: 123-36, 1984.
 39. Bowlby, J.: *Attachment and Loss*. Vol. 2. *Separation: Anxiety and Anger*. New York, Basic Books, 1973.
 40. Waddington, C.H.: *The Strategy of the Genes*. London, Allen and Unwin, 1957.
 41. Crittenden, P.M.: Maltreated infants: Vulnerability and resilience. *J. Child Psychol. Psychiatry.* 26: 85-96, 1985.
 42. Egeland, B. and Sroufe, L.A.: Attachment and maltreatment. *Child Dev.* 52: 44-52, 1981.
 43. Schneider-Rosen, K., Braunwald, K.G., Carlson, V., and Cicchetti, D.: Current Perspectives in Attachment Theory: Illustration from the Study of Maltreated Infants. In: *Growing Points in Attachment Theory and Research*, Bretherton, I. and Waters, editors. *Monog. Soc. Child Devl.* In press.
 44. Radke-Yarrow, M., Cummings, E.M., Kuczynski, L., and Chapman, M.: Patterns of attachment in two- and three-year-olds in normal families and families with parental depression. *Child Dev.* In press.

-
45. Goldberg, S., Perrotta, R.R., Minde, K., and Corter, C.: Maternal behavior and attachment in low-birth-weight twins and singletons. Submitted for publication.
 46. Beckwith, L.: Patterns of Attachment in Preterm Infants. In: *Intervention with Infants at Risk: Patterns of Attachment*. Symposium at the biennial meeting of the Society for Research in Child Development, Toronto, April 1985.
 47. Crittenden, P.M.: Social networks, quality of child-rearing, and child development. *Child Dev.* In press.
 48. Ricks, M.H.: The origins of individual differences in competence: Attachment history and environmental support. Unpublished Ph.D. dissertation, University of Massachusetts, 1983.