

Research Report

INFANT ATTACHMENT SECURITY AND AFFECTIVE-COGNITIVE INFORMATION PROCESSING AT AGE 3

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Abstract—*Three-year olds' attention toward and memory of affectively laden information presented in specially designed puppet shows were examined to test the hypothesis, based on Bowlby's theory of attachment and the internal-working-model construct central to the theory, that children with secure attachment histories (measured at 12 months) would prove less distractable during positive than negative events and would remember positive events more accurately than negative events, with the reverse being true of children with insecure attachment histories. Support for this hypothesis emerged in the case of memory but not attention (for which no attachment effects emerged), even when infants' temperament-emotionality and general verbal intelligence were taken into consideration. Results are discussed in terms of life-course implications of affective-cognitive information processing and directions for future research.*

Central to Bowlby's (1969/1980) theory of attachment is the view that secure and insecure children actively—and differentially—filter information selectively, evoke responses from other people, and select niches in a manner consistent with their secure or insecure attachment relationships (Belsky & Cassidy, 1994). The construct of the *internal working model* (IWM) forms the core of the theory's account of how early infant-mother relations come to influence the child's perception of the world, the responses he or she evokes from other people, the relationships and experiences that attract or fail to attract him or her, and, thereby, continuity in development. The IWM is conceptualized as an affective-cognitive mechanism that guides the processing of information:

Internal working models of relationships provide rules and rule systems for the direction of behavior and the felt appraisal of experience. Internal working models of relationships will provide rules for the direction and organization of *attention and memory*, rules that permit or limit the individual's access to certain forms of knowledge. . . . Many [internal rules] will be unconscious. . . . Internal working models are best conceived as structured processes serving to obtain or to limit access to information. (Main, Kaplan, & Cassidy, 1985, p. 77, italics added)

Children who experience supportive care, it is theorized, are inclined to develop secure attachments, see themselves as lovable and others as caring, and act in ways consistent with this benign, if not benevolent, view of the world. This interpersonal

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orientation and behavioral response are considered to maintain this worldview, evoke experiences in accord with it, and, thereby, sustain an early-established developmental trajectory. In contrast, children who experience unsupportive, inconsistent, or rejecting care develop a dramatically different view of themselves, of others, and of the world, but sustain their developmental trajectory through the very same processes of affectively "biased" information processing, evocative social behavior, and niche picking.

The IWM is routinely invoked in empirical and theoretical analyses to explain why anticipated relations obtain between early measurements of attachment security and subsequent assessments of behavioral functioning. Evidence, for example, that secure children get along better with peers, tolerate frustrations more successfully, or more fully express a full range of emotions (Belsky & Cassidy, 1994) is explained not simply in terms of acquired social skills, but more principally in terms of experientially induced, internal, psychological, affective-cognitive processes that mediate linkages between past and present.

Especially interesting about such interpretations is how little empirical evidence there is to substantiate them. Even though attachment theory clearly specifies the centrality of processes of (selective or biased) attention and memory, and of expectations, these processes have gone virtually unmeasured in research on the developmental sequelae of attachment security. Although students of attachment theory have moved "to the level of representation" (Main et al., 1985) to examine relations between attachment security and children's play with dolls, reactions to photographs, and, more recently, causal attributions (Cassidy, Kirsh, Scolton, & Parke, 1994; Wartner, Grossman, Fremmer-Bombik, & Suess, 1994), there remains no direct evidence to indicate that core IWM processes involving attention, memory, and expectations vary as a function of earlier measured attachment security.

In the present report, we address this lacuna empirically. Specifically, we tested the general hypothesis that 3-year-olds with secure and insecure infant-mother attachment histories differ in the attention they pay toward, and their memory of, positive and negative social events that they either witness or are more directly involved in. On the basis of social psychological research with adults highlighting preferential processing of schema-consistent information (for review, see Baldwin, 1992), we predicted that children with insecure attachment histories would attend more to negative events (i.e., be less distractable during them) than to positive events and would remember negative social events more accurately than positive social events, with the reverse being true of children with secure attachment histories. Thus, a significant interaction between attachment

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security (secure vs. insecure) and target event (positive vs. negative) was anticipated. To control for the potentially confounding effect of general memory ability and discount rival hypotheses concerning infant temperament, these constructs were included in the study design. Because no differential predictions were advanced with regard to varying patterns of insecure attachment, only a comparison between secure and insecure children was tested.

METHOD

Sample

The initial subject pool for this study was 69 firstborn, male Caucasian infants participating in a longitudinal investigation of family interaction during the toddler years. Only males were included in this project to maintain a homogeneous sample so that multiple antecedents of family interaction could be investigated. All children lived in maritally intact, working- and middle-class families when informed consent was obtained (at age 10 months).

Procedures

At age 12 months, each child visited the university laboratory with his mother; 2 years later, two separate laboratory visits were scheduled. All sessions were videotaped.

One-year assessments

On the basis of the attachment behavior displayed in the strange situation (Ainsworth, Blehar, Waters, & Wall, 1978), infant-mother attachment was classified as insecure-avoidant (28%), secure (60%), and insecure-resistant (12%). Tests of intercoder agreement yielded a kappa of .91 for agreement in classifying children.¹

Following the strange situation, mother and infant engaged in 5 min of free play in a different lab room before the child was placed in a high chair to carry out a series of emotion-eliciting procedures involving separate approaches by mother and a stranger, the presentation of a brief hand-puppet show, and the engagement and disengagement of mother with baby (for details, see Belsky, Hsieh, & Crnic, in press). The infant's positive and negative emotionality were rated every 15 s in the strange situation and in the emotion-elicitation procedures by two separate teams of video coders using 5 point rating scales (0 = *no emotion expressed*; 4 = *intense emotion expressed*). One team coded the degree of positive emotionality expressed, and the other team coded the degree of negative emotionality expressed. Interobserver agreement (kappa) was .82 for each emotionality scale. For purposes of data reduction, ratings made in the strange situation and during each phase of emotion elicitation were averaged. Internal consistency analyses were then undertaken separately for the sets of positivity and negativity scores. Final composite positive and negative emotional-

ity scores were generated by summing those component scores that yielded an internally consistent (alpha) construct (positivity: .71; negativity: .81).

Three-year assessments

Lab visits were organized around two puppet shows at 36 months and one at 37 months. These shows were designed to present logically sequenced stories. Each show included four discrete positive and four discrete negative events. For example, in one puppet show, the child witnessed a happy response by a puppet who received a birthday present and an unhappy response by a puppet who spilled his juice. The child was also recruited by the mother puppet to pick up the puppet child's birthday present and was thanked enthusiastically by the mother puppet for doing so; he was also criticized by the child puppet for wearing "an ugly vest" that all subjects wore in the laboratory.

Prior to the onset of each puppet show, the child was trained, using verbal reinforcement, to look toward a sound made by the experimenter using a clicker device. During the puppet shows, the clicker sound was made whenever one of the eight affective events occurred. On the basis of videotapes of the child's face, judges determined whether he was even momentarily distracted from the puppet show by the clicker sound (intercoder agreement = .91, kappa).² Summing across the three puppet shows, each child received a score reflecting the number of positive and negative events he was distracted from.

Following each puppet show, one or two verbal reasoning or memory subtests of the Stanford-Binet Intelligence Scale (Thorndike, Hagen, & Sattler, 1986) were administered to the child (Vocabulary, Comprehension, Absurdities, Memory for Sentences, Bead Memory). Because all subtest scores except the Bead Memory score were highly intercorrelated, all scores but this one were summed to create a general index of verbal intelligence.

Following the testing, the child's delayed recognition memory for the eight affective events embedded within each puppet show was evaluated by testers blind to attachment history. Each child was presented a series of elaborately drawn pairs of pictures, along with verbal descriptions, and asked which of the alternative events in each pair occurred in the puppet show. Each pair included one picture and verbal description depicting an event as it actually occurred (e.g., happy puppet receiving present) and one picture and verbal description depicting the affective opposite of the same event (e.g., sad puppet receiving present). Picture pairs were purposefully presented out of sequence relative to how the story line actually developed. Each child received one point for each accurately identified event; points were summed across puppet shows.

To ensure that children understood the memory-test instructions, each child was presented with up to three pairs of pictures pertaining to nonaffective features of the show (e.g., whether the show involved a birthday party or a car ride) prior to presentation of the test pictures. The 16 children who failed

1. In this study, a fourth attachment classification, disorganized, could not be coded reliably.

2. We acknowledge Ken Dodge for ideas shared in a discussion years ago when this work was still in the planning stage. These ideas gave rise to this strategy for measuring attention.

Table 1. Mean adjusted attention and recognition memory scores of children with secure and insecure attachment histories

Score	Secure (<i>n</i> = 29)		Insecure (<i>n</i> = 24)	
	Positive events	Negative events	Positive events	Negative events
Attention	3.06 (2.14)	3.52 (2.26)	3.30 (2.44)	4.32 (2.89)
Memory	8.19 (2.98)	7.11 (2.50)	6.64 (3.31)	8.30 (2.13)

Note. Scores are adjusted for general-intelligence composite and infant negative-positive emotionality. Higher attention scores indicate children were more frequently distracted from, and not attending to, the puppet show. Numbers in parentheses are standard deviations.

these basic comprehension items were not given the puppet-show memory test and were excluded from all analyses. These children excluded from the analyses scored lower on the verbal intelligence composite ($M = 95$) than those who understood the puppet-show memory task ($M = 106$).

RESULTS

Attention and memory scores were residualized to control for the effect of verbal intelligence and infant emotionality. To test the primary hypothesis that children with secure and insecure histories would differentially attend to (i.e., be distracted from) and remember positive and negative puppet-show events, these residualized attention and memory scores were subjected to a 2 (attachment: secure vs. insecure) \times 2 (emotion: positive vs. negative) repeated measures analysis of variance. Only a significant main effect for emotion emerged in the case of attention scores, $F(1, 51) = 15.40, p < .001$; Table 1 shows that children proved more distractible during negative ($M = 3.88$) than positive ($M = 3.17$) events. In the case of memory scores, only the predicted Attachment \times Emotion interaction proved significant, $F(1, 51) = 6.77, p < .05$: Children with secure attachment histories remembered positive events more accurately than negative events ($M = 8.19$ vs. $M = 7.11$), with the reverse being true of children with insecure attachment histories ($M = 6.64$ vs. $M = 8.30$). This interpretation was substantiated by a follow-up test comparing the difference between negative and positive events across the two attachment groups, $t(2) = 2.60, p < .05$. Indeed, this difference between secure and insecure children corresponds to an effect size of $d = .73$, just shy of .80, which Cohen (1977) labeled a large effect.

DISCUSSION

The linking of a myriad of behavioral outcomes with earlier measured infant-mother attachment security has typically been interpreted in terms of the IWM, a theoretical heuristic that has much in common with the constructs of schemas and scripts more familiar to social psychologists (Baldwin, 1992). Noteworthy is the fact that specific IWM processes involving attention

and memory have gone unstudied, though these are considered central to understanding how the IWM operates on-line during everyday experiences. It is, after all, because children with differential attachment histories are presumed to differentially attend to, encode, remember, and even anticipate events and interactions with others that behavioral outcomes have been expected to vary between children with secure and insecure attachment histories.

Because sensitive, responsive care has been linked with security of attachment, and because such care is presumed to involve pleasurable exchange between infant and caregiver, we predicted that children with secure attachment histories would be less distracted by the clicker sound while watching positive than negative events and would remember positive events better than negative events. In contrast, because insensitive care has been found to predict insecure attachment, and because such care is presumed to involve unpleasant, if not painful, experiences, we predicted that children with insecure attachment histories would be less distracted while watching negative than positive events and would remember negative events better than positive events. These predictions derived, in part, from extensive social psychological research indicating that schema-consistent information is attended to more and remembered better than schema-inconsistent information (Baldwin, 1992).

With preexisting differences between children in verbal intelligence statistically controlled, evidence consistent with predictions emerged only in the case of memory: Young children with secure attachment histories remembered positive events presented during the puppet shows more accurately than negative events, with the reverse being true of children with insecure attachment histories. It is important to emphasize that this finding could not be attributed to individual differences in infant temperament-emotionality.³ Moreover, although the main analysis did not distinguish between insecure-avoidant and insecure-resistant attachments, negative events were remembered

3. In fact, neither emotionality on its own nor the reconfiguration of strange situation subclassifications to reflect negative reactivity (A1-B2 vs. B3-C2) was related to 3-year affective-cognitive information processing.

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more accurately than positive events by both insecure subgroups. Because the sample consisted only of boys, generalizations to girls should be made cautiously.

Why predictions pertaining to attention were disconfirmed in this inquiry remains unclear. The logic underlying the prediction may have been wrong, though limitations with measurement cannot be discounted. More work is needed before any strong conclusions are drawn.

Whatever the reason why relations between attention and attachment security did not emerge, the memory results raise a number of intriguing questions. Did children with varying attachment histories differ in recognition memory because they differentially encoded the positive and negative events while watching the puppet shows or because they differed in ability (or proclivity?) to retrieve memories of positive and negative events? Moreover, do recognition errors primarily reflect failure to remember particular kinds of events (positive, negative), leading to guessing and increased mistakes, or do these errors reflect instead the theorized inclination to transform, presumably unconsciously, one type of memory (e.g., positive) into another kind of memory (i.e., negative)?

Whatever the answers to these questions, one is forced to wonder about the implications of the memory findings. On the one hand, the differences between children with secure and insecure attachment histories might be regarded as of such limited magnitude as not to be functionally significant. Recall, however, that the effect size for this difference approached the level Cohen (1977) considers large. Moreover, real-life events might be much more susceptible to differential processing by secure and insecure children because of heightened salience relative to events embedded in short puppet shows. Additionally, the fact that positive and negative events probably occur with great frequency when experiences across hours, days, weeks, months, and even years are considered raises the prospect that the small effects discerned in this inquiry could have broad implications when considered in the context of everyday life and extended lives.

To the extent that the discerned memory differences between 3-year-olds with secure and insecure attachment histories reflect what transpires day in and day out in affective-cognitive information processing, it is clear that even if children with different attachment histories have the same objective ex-

periences, they may experience them quite differently. As this process continues over time, the kinds of self-sustaining behavior and life-course processes that have been discussed with regard to IWMs by attachment theorists or in terms of schemas or scripts by social psychologists become eminently understandable. Children who are primed to experience pain and displeasure as a result of their rearing, and who selectively remember experiences that are negative relative to those that are more objectively positive, would be likely to behave in ways that are consistent with such expectations. The reverse would be true of children whose experiences prime them to selectively remember experiences that are positive.

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