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What Is Adult Attachment?

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The question posed by the title of this chapter may strike some readers as odd, coming nearly two decades after the field of adult romantic attachment was born. In less than 20 years, hundreds of studies on the topic have been published, along with many additional edited volumes and review papers. Surely by now we know the answer!

Our reasons for asking the question may be elucidated by reframing it: How do researchers who conduct studies of adult romantic attachment know—that is, what “markers” do they use to determine—whether study participants are attached to their romantic partners? In fact, this question has yet to be fully answered because, as a field, we have yet to fully address it.

In all areas of scientific inquiry the specific issues that occupy researchers at any given point in time often follow directly from the most recent developments and discoveries. Normative aspects of infant-caregiver attachment, such as the process by which they are established, were the primary focus of Bowlby’s (1969/1982) original theory and subsequently the focus of early attachment research. But when Ainsworth and her colleagues (Ainsworth, Blehar, Waters, & Wall, 1978) published the results of their landmark study revealing “secure,” “ambivalent,” and “avoidant” patterns of infant attachment, the emphasis shifted to individual differences.

The field of adult romantic attachment grew more out of Ainsworth et al.'s research than out of Bowlby's theory. It was founded on self-report and interview measures designed to capture adult versions of the infant patterns (Bartholomew & Horowitz, 1991; Brennan & Shaver, 1995; Collins & Read, 1990; Hazan & Shaver, 1987; Levy & Davis, 1988; Simpson, 1990). Much has since been learned about the nature and correlates of adult attachment patterns or "styles" (see Feeney, 1999, for a review).

However, as a result of this near-exclusive focus on individual differences, relatively little progress has been made on the normative front. Increasingly, investigators in the fields of both infant and adult attachment (e.g., Berlin & Cassidy, 1999; Diamond, 2001; Fraley & Shaver, 2000; Hazan & Zeifman, 1994; Hazan, Gur-Yaish, & Campa, 2004; Kobak, 1999; Main, 1999; Marvin & Britner, 1999; Simpson & Rholes, 1998) are calling for more research on normative aspects of attachment. They (and we) have argued that attachment research thus far has not taken full advantage of all that Bowlby's deep and rich theory of human affectional bonding has to offer. Many basic issues remain entirely unexplored.

Our aim here is not to provide a definitive answer to the question raised in the title. In fact, we do not believe it *can* be answered satisfactorily from the empirical evidence currently available. Instead, we wish to make the case that the question itself is important and deserving of research attention. In our view, identifying markers of adult attachment is a crucial next step for the field. And we think the payoff in terms of theoretical advance could be significant.

The development of an attachment bond is presumed to result from the interaction of multiple intraindividual and interindividual processes operating at multiple levels over time. This includes the different levels at which attachment has already been studied—that is, behavior, cognition, emotion, and physiology. Thus, in addition to finding multilevel markers of attachment, it will be important to specify *what* the related processes are and *how* they change over time.

We begin with a brief theoretical background that focuses on Bowlby's definition of attachment and normative model of attachment formation. In the second section, we describe some of the research challenges of defining adult attachment in terms of markers and processes. In the third section, we offer additional thoughts on potential markers and processes as a way of suggesting possible areas and avenues for future research on adult attachment.

THEORETICAL BACKGROUND

Bowlby (1969/1982) defined attachment bonds in terms of four distinct but interrelated classes of behavior, all of which are regulated by an innate be-

havioral system: *proximity maintenance*, *safe haven*, *separation distress*, and *secure base*. These features of attachment and the dynamic functioning of the attachment system are most readily observable in the behavior of 12-month-olds in relation to their primary caregivers (typically mothers). The infant continuously monitors the caregiver's whereabouts and makes adjustments as necessary to maintain proximity, retreats to her as a haven of safety in the event of perceived threat, is actively resistant to and upset by separations from her, and uses her as a base of security from which to explore the environment. Although infants often direct one or more of these behaviors toward individuals to whom they are not attached, it is the selective orientation of all four behaviors toward a specific individual that defines attachment.

Bowlby (1969/1982) proposed four phases in the development of infant-caregiver attachments, which Ainsworth (1972) further elaborated and labeled as follows. In the *preattachment* phase (birth to 2 months of age), infants are inherently interested in and responsive to social interaction with virtually anyone. In the *attachment-in-the-making* phase (2–6 months), they begin to show preferences by, for example, smiling and vocalizing to and settling more quickly with some caregivers than others. In the *clear-cut attachment* phase (beginning at around 6 or 7 months), all of the behaviors that define attachment are selectively directed toward the primary caregiver. This is evident in the infant's efforts to maintain proximity (differential following), the use of this individual as a haven of safety (differential comfort seeking) and secure base (differential exploration), and reactions to separation (differential distress). In the fourth phase, *goal-corrected partnership* (after about 2 years), children have less urgent needs for physical proximity and are increasingly capable of negotiating with caregivers regarding separations and availability.

The separation-distress feature of attachment is particularly important for both theoretical and historical reasons. A major source of inspiration for attachment theory was reports during the 1940s and 1950s (e.g., Burlingham & Freud, 1944; Robertson, 1953) that infants and young children who are separated from primary caregivers for extended periods of time pass through a predictable sequence of reactions. At first, they actively resist by crying and searching in an attempt to regain contact. Eventually, agitation and anxiety are replaced by deeper and more pervasive signs of distress, including depressed mood, decreased appetite, and disturbed sleep. In time these symptoms subside, giving the appearance of full recovery. It is only when they are reunited with caregivers that otherwise invisible lingering effects of the separation show up in the form of emotional withdrawal or anger mixed with anxious clinging. This sequence of reactions is known as *protest*, *despair*, and *detachment*.

According to Bowlby (1979), romantic relationships or "pair bonds" are the prototype of attachment in adulthood. Nevertheless, adult attach-

ments differ from infant–caregiver bonds in at least two important respects. First, they tend to be more reciprocal in the sense that partners alternately seek care from and provide care to each other. Second, such relationships are inherently sexual in nature. Thus adult attachments involve not only the attachment system but also the caregiving/parental and sexual/reproductive systems (Ainsworth, 1990; Hazan & Shaver, 1994; Shaver, Hazan, & Bradshaw, 1988).

The earliest reported evidence that pair bonds qualify as true attachments came from reports that adults grieving the death of a spouse exhibit a similar protest–despair–detachment sequence of reactions (Parkes, 1972; Weiss, 1975). Differential separation distress is still considered the standard marker of attachment in infancy (Ainsworth et al., 1978; Sroufe & Waters, 1977a).

RESEARCH CHALLENGES

At the Level of Behavior

In theory, if person A maintains proximity to person B, uses B as a haven of safety and base for exploration, and is distressed by separations from B, then person A is attached to person B. There are two major challenges that need be addressed if these behaviors are to be used as markers of adult attachment. Given that adults do not usually behave like babies, the first challenge is to operationally (re)define the behaviors in adult terms. The second is to determine the contexts in which the behaviors do and do not indicate the existence of an attachment bond.

Although many adult attachment studies have focused directly or indirectly on the behaviors that Bowlby proposed to define attachment, the vast majority have relied solely on self-reports as opposed to actual behavior. Two noteworthy exceptions are a laboratory-based experiment and a naturalistic observational study.

Simpson, Rholes, and Nelligan (1992) designed an experimental paradigm similar in several respects to the laboratory procedure developed by Ainsworth et al. (1978) to assess infant attachment. Female undergraduates were separated from their male romantic partners and then (falsely) led to expect a stressful experience. Subsequent reunions with partners were unobtrusively videotaped and later coded. The experimental manipulation was designed to elicit anxiety and attachment behavior, and in females with a “secure” attachment style it did. The more anxious they were, the more they sought contact with and comfort from their partners.

The Simpson et al. (1992) study is an excellent example of how attachment behaviors can be investigated in adulthood. In considering the specific behaviors the researchers observed—proximity seeking and safe haven—as potential markers of adult attachment, it is essential to take contextual and

relational factors into account. The researchers engineered a context that should elicit attachment behavior. However, in situations that arouse anxiety, individuals of all ages have been shown to seek contact with and comfort from whoever is nearby, even relative strangers (Shaver & Klinnert, 1982). In theory, what sets attachment figures apart is that they are reliably preferred over other targets of distress alleviation.

Fraley and Shaver (1998) observed couples in an airport lobby awaiting either a joint trip on a departing flight or a separation entailed by one person departing while the other remained behind. In this study, the impending separation was expected to elicit anxiety and thereby trigger attachment behavior. In general, contact seeking (e.g., hugging, kissing, hand holding) was significantly higher in couples facing a separation than in those traveling together. The incidence of these behaviors also varied as a function of relationship length. Overt displays of attachment behavior were less common in longer term compared with shorter term couples.

The Fraley and Shaver (1998) study represents another creative approach to investigating attachment behavior in adults, and the results accord well with theoretical predictions that actual or anticipated separations from attachment figures activate proximity and comfort seeking. Further, the specific behaviors the researchers observed (e.g., kissing, hand holding) are not likely to be directed toward strangers. Such physical intimacy signals a special relationship, but it still may be insufficient evidence of attachment. Romantic partners tend to be most physically affectionate at the beginning of their relationships. Fraley and Shaver (1998) found that the longer the couples in their study had been together, the less they exhibited various proximity and contact maintenance behaviors. If one assumes that longer term couples are more likely than shorter term couples to be attached, the limitations of inferring attachment solely on the basis of such behaviors become clear.

Recall that separation reactions in infancy and childhood undergo qualitative change over time. The immediate (protest) response is anxiety, agitation, and heightened activity, whereas the later (despair) response is depression, lethargy, and diminished activity. In considering response to separation as a potential marker of adult attachment, it is important to distinguish between acute and slower developing reactions. It is also necessary to take into account how manifestations of separation distress change over the course of bond development. If children in the goal-corrected phase of attachment formation are able to tolerate short-term separations without undue upset, presumably adult partners can, also. It may require more than a few days of separation to elicit measurable distress in romantic couples.

Vormbrock's (1993) review of research on marital separations lasting weeks or months revealed that responses also differ depending on whether one leaves or is left behind. Reactions of homebound spouses included pro-

test, despair, and detachment behaviors, but responses on the part of traveling spouses did not.

Individual differences or attachment styles complicate the picture even further. In the Simpson et al. (1992) experiment, the behavior of avoidant females was opposite that of secure females. Instead of turning to their partners when they were most anxious and thus in greatest need of support, they exhibited less proximity and comfort seeking the more anxious they were. This is reminiscent of the findings reported by Ainsworth et al. (1978) that avoidant infants are more likely to evade contact with caregivers under high- than under low-stress conditions. It is also consistent with results from Fraley and Shaver's (1998) airport study. Avoidant women sought more contact with their partners when the two were traveling together and less when a separation was imminent.

In summary, the challenges associated with using attachment behaviors as markers of adult attachment bonds include the facts that proximity and comfort seeking are sometimes directed toward strangers and occur more frequently in shorter term than longer term couples and that reactions to separation vary as a function of individual differences, relationship length, separation duration, and leaver versus left behind status.

At the Level of Physiology

Attachment theory specifies a broad range of ways that infants are affected by relationships with primary caregivers. What the theory underestimates, in the opinion of some, are the effects of attachment figures on infant physiology (Kraemer, 1992; Polan & Hofer, 1999; Reite & Capitano, 1985). Interest in this issue has grown in recent years, and there is now a large body of empirical work on the psychophysiology of infant-caregiver attachment (reviewed in Fox & Card, 1999). The main focus of this research has been individual differences, especially the effects of temperament and attachment organization on infant reactivity.

A few studies of adult attachment have incorporated physiological measures (e.g., Feeney & Kirkpatrick, 1996; Fraley & Shaver, 1997; Mikulincer, 1998), again with an emphasis on how attachment styles influence arousal under various conditions. In the field of health psychology, hundreds of studies have examined the physiological correlates of social interaction (reviewed in Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Although many of the findings are relevant to attachment issues and questions, the studies were not designed explicitly to address them. Missing from the literature are systematic investigations of the physiological underpinnings of normative adult attachment (Diamond, 2001).

In contrast, animal researchers have made significant progress in identifying the neuroanatomical and neurobiological substrates of attachment in a variety of mammalian species (see Carter, Lederhendler, & Kirkpatrick,

1997, for a review). Several (e.g., Carter, 1998; Hofer, 1994; Reite & Boccia, 1994; Suomi, 1999) have explicitly discussed the implications of their findings for research on human attachment.

Prominent among them is Hofer, who, in a 1987 *Child Development* article, summarized his research on separation distress in rat pups. The work was motivated by the question of what, exactly, the pups missed about their mother during separations from her. To find out, Hofer and his colleagues designed a series of experiments in which they introduced specific features of the absent mother, one by one, and then measured the effect of each on the pups' distress. The studies revealed that each of the pups' distress symptoms was tied to a specific maternal feature. For example, in her absence, the pups became listless, but warming the cage to match her body temperature normalized their activity levels. Their heart rates returned to normal when gastric canulas were used to fill their stomachs with her milk. By imitating her grooming behavior with rhythmic stroking, sleep disturbances were corrected.

The major discovery was that each maternal feature alleviated a single distress symptom while having no effect on the others. Hofer (1987) interpreted the findings as evidence that specific features of the mother regulate the pups' physiological systems. In his view, the reason that the pups showed the constellation of symptoms that in human young and bereaved adults is called despair was because in the mother's absence all of these "hidden" regulators were also absent. The fact that extended separations cause behavioral and physiological disorganization is widely accepted as evidence that an attachment exists. The flip side, according to Hofer, is that attachment bonds are what keep these systems organized and regulated. In essence, he raised the intriguing possibility that across species and ages, physiological coregulation may be an inherent part and reliable marker of attachment.

Extrapolating findings from one species to another can be risky, but cross-species comparisons can also be an invaluable source of new ideas. In formulating attachment theory, Bowlby drew inspiration from Harlow's experiments on affectional bonding in rhesus monkeys and from research by Lorenz on imprinting behavior in goslings, both of which led him to postulate an innate system to regulate human attachment behavior.

It is relatively easy to accept that the physiology of helpless newborn rats is regulated by the mother who nurses, protects, and grooms them. But is this a plausible model of attachment in our species, especially beyond infancy? In fact, there is ample evidence for the social entrainment of biological rhythms in human adults. Biological systems have a 24-hour functional rhythm run by two pacemakers in the hypothalamus. These pacemakers require daily synchronization, and for every species there are specific aspects of the environment (*Zeitgebers*, from the German word for timekeepers) that entrain the rhythms. For example, insect timekeepers include such

things as ambient temperature and light–dark cycles. A major *Zeitgeber* for humans is social interaction.

The field of chronobiology is replete with examples of this phenomenon. Vernikos-Danellis and Winget (1979, cited in Hofer, 1984) found that adults who are removed from their usual surroundings and housed in sensory-deprivation environments show circadian rhythm synchronization. Examples from other literatures include evidence of menstrual synchrony among coresident women (McClintock, 1971), earlier pubertal onset for girls sharing households with unrelated adult males (Moffitt, Caspi, Belsky, & Silva, 1992; Surbey, 1990), and more regular ovulation in women with steady male sexual partners (Veith, Buck, Getzlaf, Van Daltsen, & Slade, 1983).

A different kind of coregulation is suggested by evidence (Carter, 1998; Carter et al., 1997; Hennessy, 1997) that, across mammalian species, bonds between infants and caregivers and between adult reproductive partners involve the same psychoneuroendocrine core: the hypothalamic–pituitary–adrenocortical (HPA) axis and the autonomic nervous system (ANS). The primary function of this core is to up-regulate system activity to prepare an organism to take action in potentially harmful situations and then down-regulate system activity to restore homeostasis after the threat has passed. Evidence that this physiological core is involved in attachment comes from both human and animal research.

In a sample of cohabiting and married couples, Gump, Polk, Kamarck, and Shiffman (2001) used blood pressure as an index of ANS activity. All participants wore ambulatory monitors during waking hours for 1 week. At least once per hour, blood pressure was recorded, and participants made diary entries to report what they were doing and feeling and whether anyone was with them at the time. Blood pressure was found to be significantly lower when partners were present than during one-on-one interactions with others or when alone. Although exchanges with partners were rated as more intimate, this did not mediate the association with blood pressure.

Mason and Mendoza (1998) have found evidence of physiological markers of attachment in titi monkeys. Specifically, HPA effects appear to be uniquely associated with attachment bonds. Titi mates maintain close proximity, often sitting shoulder-to-shoulder for hours with their long tails intertwined, and they show extreme distress and increased HPA activation when separated. In contrast, they do not display attachment behaviors toward their offspring, nor do they experience increased HPA activation when separated from them. Titi infants tend to be primarily attached to their fathers. Correspondingly, separations from fathers, but not mothers, are associated with increased HPA activation in the infants.

Carter (1998) has investigated physiological markers of attachment in prairie voles, another pair-bonding species. Prairie vole pairs simply housed in the same cage eventually become attached, but the process is speeded by

sexual contact and stress. Carter's work focuses on the hormones oxytocin and vasopressin, which are closely associated with the parasympathetic branch of the ANS and have a down-regulating effect on arousal. Through a series of experiments, Carter et al. (1997) demonstrated that oxytocin and vasopressin play central roles in the formation of pair bonds. For example, prairie voles display proximity maintenance and separation distress in relation to mates, but these behaviors are precluded by the administration of an antagonist (see also Insel, 2000).

Based on their findings, Carter (1998) proposed a model of prairie vole attachment formation: It begins with sustained proximity, sexual contact, and/or stress, all of which trigger HPA activation and social approach. HPA activation signals the hypothalamus, which in turn signals the posterior pituitary to release oxytocin or vasopressin. The ensuing hormone-induced state of calm is thus experienced in the context of social contact. When contact and calming coincide with sufficient frequency or intensity, conditioning occurs. That is, a specific individual becomes associated with feelings of security.

In humans, oxytocin is best known for triggering labor in pregnant women and milk letdown in nursing mothers and is thought to foster infant bonding via a similar mechanism—a conditioned association between the mother and feelings of security (Uvnas-Moberg, 1994, 1998). Oxytocin release is not limited to infant–caregiver relationships. In fact, levels are highest in both men and women at the moment of sexual orgasm (Uvnas-Moberg, 1997). This suggests that the effects of intimate physical contact on adult attachment formation may also be hormonally mediated and involve a similar conditioning mechanism. Of course the challenge for researchers will be to distinguish between sex-related and attachment-related releases of oxytocin.

In summary, animal research on the neurobiology of pair bonding has resulted in normative models of mammalian attachment to mates that have tremendous potential for human application. In addition, research on the physiological effects of human social interaction offers clues and methods that should prove useful in the development of a normative model for our species. These literatures highlight two processes that appear to be good candidates for markers of romantic attachment, each of which involves a different type of coregulation.

One type is evident when individuals modulate each other's physiological arousal in specific situations. Most pertinent to attachment is the attenuation of arousal responses to threats and stressors. In considering this form of coregulation as a possible marker of adult attachment, at least two challenges must be addressed.

The first is that studies comparing the effectiveness of (presumed) attachment figures versus others in buffering stress reactivity have produced conflicting results. In the Gump et al. (2001) study, participants had signifi-

cantly lower blood pressure in the presence of partners than in the presence of others or alone, but other studies (e.g., Fontana, Diegman, Villeneuve, & Lepore, 1999) have found supportive strangers to be as effective as close friends in attenuating physiological responses to stress. Clearly, these inconsistencies will need to be resolved if physiological stress buffering is to be used as a marker of attachment.

The second challenge concerns the complicating effects of attachment style. In one study (Carpenter & Kirkpatrick, 1996), undergraduate females experienced a physiological stressor on two separate occasions, once in the presence of romantic partners and once alone. For secure women, the presence of a partner had no effect on physiological responses. In contrast, avoidant women had higher blood pressure with a partner present than when alone. Whether there are circumstances in which partner effects on physiological stress responses are reliable markers of attachment remains to be seen.

The other type of coregulation involves more generalized effects on multiple physiological systems of the sort that Hofer (1987) identified in rat pups. The primary challenge associated with using this kind of physiological coregulation as a marker of adult attachment is that our physiological systems, even in adulthood, remain "open" to a variety of social influences. Some may be indicative of attachment whereas others may not.

At the Level of Cognition

As individuals mature they become less dependent on the physical presence of attachment figures and increasingly reliant on mental representations of them. Some of the most exciting new work on adult attachment takes advantage of this normative shift to the level of representation by borrowing methods from the field of cognitive psychology.

Using a lexical decision task and cognitive priming paradigm, Mikulincer, Gillath, and Shaver (2002) tested the hypothesis that activating the attachment system via threat would increase the accessibility of mental representations of attachment figures. Study participants completed a shortened version (Fraley & Davis, 1997) of a self-report measure (WHOTO) created by Hazan and Zeifman (1994) that asks respondents to name the targets of the four behaviors that, according to Bowlby, define attachment. In addition, they provided names of close or known others not mentioned as targets of attachment behavior. Subsequently, on a computer screen, they were subliminally exposed to either a neutral ("hat") or threatening ("separation") prime word followed by the name of an attachment figure, close or known other, or a nonword. Their task was to indicate as quickly as possible, by a key stroke, whether the string of letters that appeared on the screen was a word or a nonword. The dependent measure was reaction time (RT).

The findings supported the main hypothesis: Following the threatening but not the neutral prime word, participants more quickly recognized as words the names of individuals they had listed as attachment figures. Importantly, this effect was observed across attachment styles. Regardless of how participants scored on measures of avoidance, ambivalence, or security, their RTs were shorter in response to attachment than to nonattachment figures.

Another cognitive method that shows promise for investigating adult attachment comes from the work of Andersen and colleagues (Andersen & Glassman, 1996; Andersen, Reznik, & Chen, 1997). Their research program is based on the clinical concept of transference, the idea that mental representations of important interpersonal relationships affect how information about a new person is processed. To explore this concept, they have developed a paradigm that incorporates idiographic methods into a nomothetic experimental design. For example, in a sentence-completion task, participants provide descriptions of individuals with whom they have a "significant" personal relationship. In a follow-up, weeks later, they are presented with descriptions of several new persons. The test set contains descriptions composed to resemble one significant other of each participant. Afterward, participants complete a standard recognition memory task consisting of sentences, some of which were taken from the descriptions they provided at Time 1, some of which were included in the test set at Time 2, and some that were included as fillers. Across a series of studies (reviewed in Andersen & Berk, 1998), the results support their transference hypotheses. One finding is that participants are more likely to falsely remember having seen an unrepresented sentence if it was derived from a description of their significant other. Another is that they make more errors when unknown persons are described as having traits in common with their significant other.

In summary, these methods show great promise for identifying cognitive markers of adult attachment. But, again, there are challenges to be addressed.

One is the apparent inconsistency in findings across studies and methods, as well as inconsistencies between the findings and predictions derived from attachment theory. Bowlby (1969/1982) emphasized the distinction between attachment behaviors and attachment bonds. As previously noted, attachments are defined by the presence of four specific behaviors: proximity maintenance, safe haven, separation distress, and secure base. Importantly, some of these behaviors may, under certain circumstances, be directed toward nonattachment figures. Thus the presence of any one or two may or may not indicate the existence of an attachment bond. As also noted, separation distress is considered the standard marker of infant attachment because it is the one behavior that is selectively directed toward individuals who are presumed to be primary attachment figures. In other

words, not all attachment behaviors are equally indicative of an attachment bond.

Hazan and Zeifman's (1994) WHOTO instrument asks respondents to name the individuals toward whom they direct proximity-seeking, safe-haven, separation-distress, and secure-base behaviors (e.g., the persons they most want to spend time with, turn to when upset, hate being away from, and count on to be available when needed). In a 1994 study, they administered the WHOTO to a sample of adults. On the proximity and safe-haven items, nearly all participants named a romantic partner or close friend. In contrast, for the separation-distress items, they tended to name either a romantic partner or parent. Among the participants who reported having a romantic partner at the time of the study, the difference in whether they named the partner or a parent on separation-distress items depended on the length of their romantic involvement. Over 80% of those whose romantic relationships met the definitional criteria for attachment (i.e., contained all four behavioral components) had been with their partners for 2 or more years, compared with 30% who had been with their partners for less than 2 years.

In analyses of the data from their cognitive priming study, Mikulincer et al. (2002) did not distinguish among items representing different types of attachment behavior. Individuals who were named on any item were considered attachment figures, and reaction times were averaged across them (for comparison with individuals not named on any items). Thus it is unclear whether every individual named would meet Bowlby's definition of an attachment figure, whether the priming effects would have been observed for all named persons if considered individually, or whether in adults separation distress is simply not a better marker of attachment than other behaviors.

In the Hazan and Zeifman (1994) study, which used all four criterion behaviors, parents and partners often qualified as attachment figures, whereas friends rarely did. However, this finding may have resulted from the method they used. Participants were asked to name just one individual (the "most important") on each item. In a study by Trinke and Bartholomew (1997), participants were allowed to name as many people as they wished, and friends were often included on the lists (as they were in the Mikulincer et al., 2002, study). Andersen and Berk (1998) also found that friends were frequently cited as "significant" others. Trinke and Bartholomew (1997) argued that although infants tend to have one *primary* attachment figure, they also typically have additional *secondary* attachment figures, and, therefore, the same could reasonably be expected of adults.

It seems reasonable to assume that the way people process social information will be influenced more by mental representations of individuals who are of greater (versus lesser) significance to them. But deciding when a particular cognitive effect indicates the existence of an attachment bond will

require additional research. In this effort we should not be limited by theoretical notions of what types of relationships are more or less likely to qualify as attachments.

At the Level of Emotion

Emotions occupy a central place in attachment theory. "Many of the most intense emotions arise during the formation, the maintenance, the disruption, and the renewal of attachment relationships" (Bowlby, 1979, p. 130). In the first volume of his trilogy, Bowlby (1969/1982) emphasized the importance of physical proximity to attachment figures. In the second volume (Bowlby, 1973), he placed greater emphasis on the child's appraisal of attachment figure availability. Specifically, feelings of security or insecurity derive less from the physical presence or absence of particular individuals than from the sense of their availability or unavailability.

The proximal function of attachment bonds is to modulate individuals' emotional states in a manner that facilitates effective coping and exploratory engagement—that is, to reduce anxiety and induce security. The primary source of "felt security" (Sroufe & Waters, 1997a) is the perception that attachment figures are accessible and responsive; maintaining proximity to them is the primary strategy for achieving it. Accordingly, adult attachment researchers have viewed emotion regulation as a core feature of romantic relationships (e.g., Brennan & Shaver, 1995; Feeney, 1995; Simpson & Rholes, 1994).

Several findings described earlier are relevant here. In the Simpson et al. (1992) experiment, secure females whose behavior indicated anxiety sought contact with their partners, presumably for the purpose of anxiety reduction. In the Fraley and Shaver (1998) airport study, couples awaiting an anxiety-provoking separation sought contact with their partners, again for what is assumed to be the same reason. In the Gump et al. (2001) study, participants' blood pressure was lower during interactions with partners, an indication that contact with them had a calming, anxiety-reducing effect. All of these studies provide support for Bowlby's conceptualization of attachment bonds as serving an emotion regulation function. Note, however, that in each case emotions or internal feeling states were inferred from other indicators (see also Mikulincer, Hirschberger, Nachmias, and Gillath, 2001).

Emotions are inherently multilevel, multicomponent processes (Frijda & Mesquita, 1998). Most involve some degree of *cognitive* appraisal, though not necessarily deliberative or conscious. They also have a *physiological* component. Arousal is a common feature, though no clear link has been established between specific emotions and particular patterns of physiological response (Caccioppo, Klein, Berntson, & Hatfield, 1993). Additionally emotions have *behavioral* components, including facial expressions, as well as action tendencies (e.g., to run away in fear, strike out in anger).

In summary, research thus far suggests that potential emotional markers of adult attachment may be found in behavioral, cognitive, and physiological indicators. If so, then identifying emotional markers will present essentially the same challenges as identifying possible markers in these other realms. An additional challenge is posed by the frequent lack of correspondence across behavioral, cognitive, and physiological indicators of emotion, which makes it difficult to draw inferences about internal feeling states from any single level.

ADDITIONAL THOUGHTS ON FUTURE RESEARCH

We have argued thus far that adult attachment formation is a process that unfolds over time and occurs at multiple levels. Implicit in this argument is the recommendation that it be studied over time and at multiple levels. In our view, it is important to know not only what changes as adult attachment bonds are established but also how the changes come about. This will require the identification of attachment markers, as well as the underlying processes that ultimately result in attachment.

One potentially helpful starting point is to think about how new romances evolve into long-term pair bonds and the changes that occur along the way. Even casual observations of couples can reveal whether they are just getting to know each other, are in the throes of romantic infatuation, or have settled into comfortable coexistence. The good news for researchers is that these qualitative changes in the ways partners interact take place over a relatively short period of time. If they reflect attachment-related developments, as we believe they do, it may be possible to capture the process of adult attachment formation in short-term longitudinal studies.

Zeifman and Hazan (1997) proposed that, in the absence of a framework for studying adult attachment processes, Bowlby and Ainsworth's four-phase model of infant attachment formation could serve as a preliminary research guide. In what follows we use this model to speculate about the types of changes that may occur at various levels as adult attachments develop. Our main objective in doing so is to suggest potentially fruitful areas and avenues of research by highlighting possible attachment markers and processes.

At the Level of Behavior

To date, there have been no descriptive longitudinal studies of attachment behavior over the course of romantic relationship development. Zeifman and Hazan (1997) hypothesized that phases in the development of attachment bonds between romantic partners would involve a logical progression in the emergence of attachment-defining behaviors.

In a hypothetical pair, the process of attachment formation at the level of behavior might look something like this: In the preattachment phase, sexual attraction and/or romantic interest draws partners together into flirtatious and arousing interactions. During this phase an increase in selective proximity seeking takes place, but other forms of attachment behavior are not yet evident. If the two begin to fall in love, the stage is set for the attachment-in-the-making phase. During this phase, physical contact is at its highest. In addition, the partners begin to display various forms of safe-haven behavior, such as increased proximity and comfort seeking when anxious or stressed. Repeated instances of intimate physical and verbal exchanges that reduce arousal foster the development of an attachment bond. Partners come to be preferred over others as sources of comfort and anxiety alleviation. If the relationship survives the inevitable waning of romantic infatuation, they may find themselves in the phase of clear-cut attachment. They have habituated to and are thus no longer as aroused by each other's presence. They have sex less often and experience less urgent needs for physical contact, but each has become sufficiently reliant on the other that separations are now distressing. And they begin to use each other as bases of security. With growing confidence that the relationship will endure, they enter the final, goal-corrected phase. From the base of security that has been established, attention is redirected toward previously neglected friendships, work obligations, and so forth. There are fewer overt displays of attachment behavior, and interactions between partners take on a more mundane, less passionate quality.

Even if this hypothetical scenario captures the major qualitative changes in behavior that occur as a secure attachment is established, it neglects the question of how the behavior of insecure individuals or couples might differ. Are there attachment-style-free behaviors that one could confidently point to as markers of adult attachment?

Infant and child attachment researchers continue to caution against confusing *quality* of attachment with *strength* of attachment (Main, 1999). Insecure children are differently but no less attached than their secure counterparts. So what do they all have in common? It is that their attachment behaviors are primarily organized around a specific person. This person may or may not be reliably responsive, may or may not be effective in alleviating distress, may or may not be approached for contact comfort in threatening or stressful situations. But she or he is nonetheless the selective target toward whom attachment behaviors are directed and around whom they are organized.

Similar patterns of selective orientation and organization might also be found in adults, perhaps in style-adjusted, mean-level changes in attachment behavior over time. Avoidant adults would not be expected to share their concerns with or request a reassuring hug from partners as readily as secure adults would, but when anxious they may nonetheless show an increase in

their own version of safe-haven behavior. Avoidant infants do not try to stay as far away from their attachment figures as possible but rather maintain a "safe" distance from them (Ainsworth et al., 1978). It is easy to imagine a comparable adult strategy of not overtly expressing anxiety or actively seeking comfort but instead engaging in more distal forms of approach (e.g., hanging around but not talking, calling but not disclosing, self-soothing in proximity to an attachment figure). If attachment behaviors are conceptualized and operationalized flexibly enough, they may reveal markers that supersede attachment style.

At the Level of Physiology

The hypothesis that romantic partners become attached at a physiological level has yet to be empirically tested, but there is evidence consistent with it. As Hofer (1984) pointed out, the cardiovascular, endocrine, and immunological changes that occur in adults grieving the loss of a long-term partner are similar to those found in rat pups during prolonged separations from their mothers. From his perspective, if the extended absence of attachment figures reliably leads to dysregulation in physiological systems, it implies that attachment figures play a major role in regulating these systems. Hofer's experiments have convincingly demonstrated that such coregulation occurs in rats. In a recent set of recommendations for future directions in attachment research, Main (1999) urged investigators to begin searching for hidden physiological regulators in humans.

In a hypothetical romantic pair, the process might unfold as follows: In the preattachment phase, partners would not show any signs of physiological coregulation beyond what has been observed among strangers. In the attachment-in-the-making phase, they would engage in the kinds of physically intimate and arousal-modulating exchanges known to foster the development of coregulation in multiple physiological systems, especially those related to distress. At some point, as a result of conditioning, they would begin to have unique effects on one another's acute stress reactions and chronic physiological functioning. These context-specific and more generalized effects could mark the onset of clear-cut attachment. In the goal-corrected phase, the effects may be further consolidated and less dependent on physical proximity or interaction.

Earlier we reviewed evidence of the effects of attachment style on physiology. In the Carpenter and Kirkpatrick (1996) study, avoidant women had higher blood pressure when their partners were present than absent, whereas secure women showed no difference. The findings are consistent with results from a study in which the heart rates of 1-year-olds were monitored during separations from and reunions with their mothers (Sroufe & Waters, 1977b). All infants, whether secure or insecure, appeared to be distressed by the separations, as indicated by heart rate acceleration. But there

were striking individual differences in reactions to reunion. Secure infants' heart rates returned to preseparation levels after less than a minute of maternal contact. Avoidant infants, who by definition avoid contact when stressed, continued to show increased heart rate well into the reunion.

In light of these and related findings, is there any basis for thinking that coregulation of stress reactivity is a marker of adult attachment? There may be. In the Sroufe and Waters (1977b) study, avoidant infants were distressed in both their mother's absence and her presence. We suspect that these reactions would not have been observed in relation to individuals other than the mothers, nor would we expect the avoidant women in Carpenter and Kirkpatrick's (1996) study to show elevated blood pressure in the presence of individuals other than their partners. As for the question of whether there are normative attachment markers to be found in physiological stress reactivity, the answer may lie not in *how* partners regulate each other but rather in the fact that they *do*. In situations of high stress, whether a partner's presence has a soothing or additionally arousing effect may be less revealing of attachment status than whether he or she has a significant effect of any kind.

At the Level of Cognition

A cornerstone of attachment theory is the idea that attachment experiences are internalized. The inborn attachment system enhances survival not by regulating behavior in a fixed or rigid manner but rather in a way that is adapted to the local environment, and attachment representations are the mechanism by which such adaptation occurs. Nearly all of the adult research on "internal working models" of attachment has been designed to explore attachment style differences (see Pietromonaco & Feldman Barrett, 2000, for a review). Indeed, the terms "working models" and "attachment styles" are often used interchangeably.

From an individual-differences perspective, the contents of people's representations are of interest, such as whether others are perceived as rejecting or responsive. Of course, simply knowing whether an individual expects his or her partner to be rejecting or responsive is insufficient for determining whether he or she is attached to the partner. From a normative perspective, of greater interest is whether partner representations are selectively activated under relevant circumstances and whether they have selective processing effects.

Assuming that long-term partners have mental representations of each other that they did not have before they met, theoretically it should be possible to track the development of such representations. In the absence of research on this topic, we speculate as follows:

Partners may begin to construct mental representations of each other in the preattachment phase, but the nature of their interactions during the

attachment-in-the-making phase is highly conducive to the formation of more extensive representations. Partners spend long periods in close physical proximity and intimate contact, which provides ample opportunities to get familiar with each other's faces, bodies, voices, and so forth, as well as each other's availability and responsiveness. At some point, partner representations begin to be activated in attachment-relevant (e.g., stressful, threatening) contexts and have specific effects on information processing (e.g., by being chronically accessible). The emergence of these effects marks the onset of clear-cut attachment. Partner representations may undergo further elaboration and/or organizational changes that would signal a goal-corrected phase, such as faster activation or more pervasive processing influence.

Mikulincer et al. (2002) found that attachment figures were called to mind more quickly following a threat prime than a neutral prime, and this result held across attachment styles. Had the researchers instead asked participants to report which persons they think of first when feeling threatened, the results may well have been different. The methods used by Andersen et al. (1997) and Mikulincer et al. (2002) may be useful for discovering basic cognitive markers of adult attachment precisely because they circumvent conscious processing. These methods could also be useful for addressing questions about the organization of attachment representations and, specifically, the unresolved issue of whether they are organized hierarchically. For example, one could test whether (following a threatening prime) individuals are reliably quicker to recognize the names of some attachment figures rather than others. And for the purpose of identifying potential cognitive markers of adult attachment, one could test whether reaction times to partner names change as relationships progress.

At the Level of Emotion

As Bowlby (1979) noted, emotions are central to attachment theory for two reasons—first, because the proximal function of the attachment system is to regulate emotions and, second, because the most intense emotions are experienced within the context of attachment relationships. Emotions must therefore also be central in attachment research. But as discussed previously, emotion research typically involves inferring internal feeling states from behavioral, cognitive, and/or physiological indices. Thus attempts to identify attachment markers and processes at the level of emotion will necessarily involve other levels of analysis. As for the hypothesized phases of adult attachment formation, we suspect that the changes in emotion, and specifically in partners' regulation of each other's emotions, will be reflected in changes occurring at the levels of behavior, cognition, and/or physiology as couples progress toward clear-cut attach-

ment and beyond. Whether attachment occurs simultaneously at all levels is yet another matter for future research.

CONCLUSION

In 1987 Hazan and Shaver published an article titled "Romantic Love Conceptualized as an Attachment Process." The idea that romantic involvement fosters the development of adult attachment bonds was taken directly from Bowlby: "In terms of subjective experience, the formation of an adult attachment bond is described as falling in love" (1979, p. 69). It takes a minimum of 6 months for infants to become fully attached to their primary caregivers, and this is within a context of near-total dependency and (in most parts of the world) almost nonstop contact. Common sense suggests that it would take at least this long, if not longer, for adult partners to become attached.

Maybe the model of infant-caregiver bonding is not applicable to adult attachment formation. If that proves to be the case, specifying what is changing and how it is changing at each level—and finding those elusive markers—would nonetheless lead to a deeper understanding of exactly what adult attachment is.

To our knowledge, the only study to date that offers clear evidence of an adult attachment marker is the one published in 2002 by Mikulincer, Gillath, and Shaver. It may be informative to think about why their approach worked. The key, we think, is that they tapped into a process very much like the one that Aron and colleagues (Aron, Aron, & Norman, 2001; Aron, Norman, Aron, & Lewandowski, 2002; see Chapter 14, this volume) have been investigating—that is, the integration of another person into the self.

In many respects attachment figures are like everyone else in our social networks. We may seek proximity to them, turn to them for comfort when stressed, and even become entrained to their physiological rhythms. What distinguishes our attachment figures from everyone else is that, in a very literal sense, they reside inside of us. Their effects on us do not require their physical presence. We carry around mental images of them that we invoke when we need comforting. We go about our daily business more confidently because we know that they are cheering us on and ready to help if needed. Our emotional reactions are tempered by anticipating their embrace or reassuring words. Our physiological homeostasis is sustained beyond immediate interactions because our physiological systems have been conditioned to them.

The overarching challenge for adult attachment researchers is to figure out how romantic partners go from being completely separate (others) to

being integral parts of each other's selves. It may not be easy or straightforward, but it will surely be stimulating!

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