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Attachment Without Fear

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Abstract

John Bowlby hypothesized an attachment system that interacts with caregiving, exploration, and fear systems in the brain, with a particular emphasis on fear. Neurobiological research confirms many of his hypotheses and also raises some new questions. A psychological model based on this neurobiological research is presented here. The model extends conventional attachment theory by describing additional attachment processes independent of fear. In this model, the attachment elements of trust, openness, and dependence interact with the caregiving elements of caring, empathy, and responsibility.

Keywords

adult; attachment; caregiver-child; caregiving; close relationships; emotion; family relationships; family theory

Attachment theory (Bowlby, 1969/1982/1973/1980) has had a phenomenal record of success in generating research on both parent-child and adult close relationships. This success has been documented in several edited volumes (Cassidy, 1999; Simpson & Rholes, 1998; Sperling & Berman, 1994) and in a comprehensive overview (Mikulincer & Shaver, 2007). In Bowlby's formulation, attachment is one of a number of closely interrelated brain systems: Others include caregiving, exploration, and fear systems. Although Bowlby spoke hypothetically about these systems well before the existence of any neurobiological corroboration, subsequent research in the past several decades has confirmed many of Bowlby's propositions and raised some questions about others.

In this paper, I look to understand attachment by focusing on attachment and caregiving as a dyadic system; that is, attachment is a psychological process directed at a specific partner (Bowlby, 1969/1982) who can be relied on for protection and comfort, whereas caregiving is a psychological process in the partner directed at providing protection and comfort. I begin with a review of Bowlbian attachment theory, pointing out many of the assertions of this theory that have been supported by research. I note several assertions that appear to be problematic. I then review the joint evolution of caregiving and attachment and explore the neurobiology associated with attachment. This review reveals both the distress-based form of attachment emphasized by most attachment theorists and a nondistress form of attachment. I then propose a psychological model of attachment and caregiving that includes both distress and nondistress forms and is congruent with the neurobiology associated with these systems. I end with some suggestions for how this expanded view of attachment can inform future research.

Distress Attachment

John Bowlby created an enormously rich theory to describe some fundamental processes of human development. In particular, he described an evolved brain system that produces and governs a human need to be protected and comforted, which he called the “attachment system.” He showed how this system produces different behaviors and different cognitive models depending on the social environment of a child’s development. He also described, in considerably less detail, a corresponding “caregiving system” that produces and governs a human need to care for others, which he saw operating in mothers and other nurturers of children. He suggested that the attachment and caregiving systems operate throughout life. In this section, I explore successes as well as some problems with Bowlby’s original formulation that emerge from evolutionary and neurobiological research.

Fear has always had an important place in attachment theory and research. Bowlby’s original formulation of an attachment theory of childhood was developed from his work as a clinical psychologist in London before and during World War II, where he was concerned with the effects on children of separation from parents (Bowlby, 1988; Karen, 1994; Kobak, 1999). Bowlby thus formulated his conception of attachment by studying the consequences of relationship disruption, focusing on children’s fear: fear of external dangers and the unknown and the fear of loss of a significant caregiver (Bowlby, 1969/1982/1980). For Bowlby (1973), “feeling secure” is equivalent to not being afraid (p. 182). Most subsequent attachment researchers have continued this emphasis. For this reason, I will refer to the traditional Bowlbian view of attachment as “distress attachment.”

Attachment has been described as an emotion-regulation system (Hazan, Gur-Yaish, & Campa, 2004; Magai, 1999; Mikulincer & Shaver, 2003, 2004; Sroufe, 1988); in particular, the attachment system is said to regulate fear and distress (Mikulincer & Shaver, 2007). It does this by seeking “comfort” and “relief” from a care-giving partner (Mikulincer & Shaver, 2007, pp. 17, 22). The “urgent desire for comfort and support in adversity” (Bowlby, 1988, p. 121) produces “high intensity” attachment behaviors. In children, “high intensity” attachment is characterized by clinging, crying, protesting, and demanding. Such high intensity behaviors are used to elicit caregivers’ protection and comforting behaviors. That is, under stress, people often turn to special others for support (Mikulincer & Shaver, 2007).

In the over half a century since Bowlby’s early publications, many aspects of the evolution (Clutton-Brock, 1991) and biology (Carter, 2005; Insel, 1997; MacLean, 1990; Panksepp, 1998) of attachment have been supported by research in multiple mammalian species. Much of the research on caregiving, attachment, and fear has been conducted in rats, mice, guinea pigs, voles, sheep, and monkeys. Until recently, few noninvasive techniques were available to study these systems in humans. As methods have been developed for the study of human neurobiology, however, similar processes have been reported.

But there are some assertions that Bowlby and his theoretical heirs have made that are problematic.

1. *Attachment is a human phenomenon.* Bowlby traced the evolution of caregiving and attachment back to the “environment of evolutionary adaptation” when humans were organized in hunting and gathering bands (Bowlby, 1969/1982). This chronology places the critical period of caregiving and attachment evolution during the Pliocene and Pleistocene geologic epochs starting about 5 million years ago (Mellen, 1981). It is clear now, from their functions and from studies of comparative evolution, that attachment and caregiving evolved together at least 180 million years ago, long before humans (MacLean, 1990). Caregiving in its

rudimentary form evolved in the reptilian precursors to mammals and was a prerequisite for the evolution of attachment (Bell, 2001).

2. *Attachment is a separate behavioral system from feeding.* Bowlby's functional analysis concluded that attachment and feeding were separate functions and thus separate systems (Bowlby, 1969/1982). There were historical reasons for this emphasis (Bowlby was arguing—against Freud—that the child's attachment to the mother was not just a matter of reinforcement for feeding). The neurobiological evidence that will be examined below, however, suggests strongly that this is an artificial separation. In its earliest evolution, caregiving was linked directly to proximity and feeding (Clutton-Brock, 1991).
3. *Emotions cannot be causal.* Bowlby described attachment as a cybernetic goal-corrected system. That is, the attachment system pursues a goal of proximity, safety, and security (Bowlby, 1969/1982; Feeney & Noller, 1996; Sroufe & Waters, 1977). The caregiving system pursues goals of retrieval, protecting, and comforting (Bowlby, 1969/1982; J. Solomon & George, 1996; West & Sheldon-Keller, 1994). Bowlby explicitly argued that attachment is not driven by emotion: Emotions are "phases of an individual's intuitive appraisal" (Bowlby, 1969/1982, p. 104). Although this characterization was consistent with behaviorist approaches of his time, I suggest that this is not a useful characterization. Neurological research supports the proposition that fear can cause one to run from a bear even before one has cognitively appraised the bear as dangerous (Damasio, 1994). Rather than tracing caregiving and attachment to largely cognitive decision processes, with perhaps an associated emotional tone, I will demonstrate the value of conceptualizing emotional motivations as the foundations of both caregiving and attachment.
4. *Fear is an inherent part of attachment and caregiving.* One of the oldest brain systems is the fear system (Damasio, 1994; MacLean, 1990; Panksepp, 1998). The fear system is tied into perception to detect danger, to memory to remember dangerous places and situations, and to the anger system for escaping from danger. With the detection of actual or potential threat, the fear system activates other systems to prepare for defense or flight. It also activates the attachment system to solicit protection. Thus, fear has had a central part in the conceptualization of attachment. Prominent contemporary conceptualizations of attachment still view attachment as only activated under conditions of threat. "We assume that every event perceived by a person of any age as threatening tends to activate the attachment system" (Mikulincer & Shaver, 2007, p. 32). Most other attachment researchers follow this model (Ainsworth, 1989; Berman & Sperling, 1994; Bowlby, 1973; Cassidy, 1999; Mikulincer & Shaver, 2007; Simpson & Rholes, 2000; Sroufe & Waters, 1977). This approach draws a conceptual boundary that restricts attachment to proximity seeking and security seeking under conditions of fear and distress. In this conceptualization of distress attachment, anything that happens in the absence of distress is not considered to be attachment.

Contemporary views of the caregiving system are not quite so restrictive. Mikulincer and Shaver (2007) described the goals of the complementary caregiving system as "to reduce other people's suffering, protect them from harm, and foster their growth and development" (p. 326). Consistent with the distress attachment view, they assert that the caregiving system provides comfort, protection, and support to a partner in danger or distress. But, in addition, once security from distress has been established, the caregiving system provides support for exploration, autonomy, and growth (Mikulincer & Shaver, 2007).

In the context of this discussion of the association between attachment and fear, it is useful to note that Bowlby actually described two forms in which attachment is manifest. In addition to high intensity, distress-elicited attachment, Bowlby (1969/1982) also described “low intensity” attachment characterized by “smiling, relaxed locomotion, watching, and touching” (p. 250). It seems to be low intensity attachment that is being described when attachment is seen as involving “comfort,” (as opposed to “comforting”) “depending,” “closeness,” and “love” (Mikulincer & Shaver, 2007, pp. 17, 19, 22, 27, 39), and as “being understood and accepted” (Rothbaum & Kakinuma, 2004, p. 36). Nondistress, low intensity attachment leads a child to respond to the caregiver’s caregiving behaviors such as rocking and being talked to with contentment (Bowlby, 1969/1982, pp. 294, 295) or comfort (Bowlby, 1973, p. 180). Nondistress attachment produces emotions of joy, love, happiness, and pleasure. In adulthood, nondistress attachment leads one “to collaborate with [another] person in such a way that a mutually rewarding relationship is initiated” (Bowlby, 1979, p. 104).

An implicit focus on nondistress attachment is seen in the work of theorists who have emphasized the “secure base” function of attachment rather than the “safe haven” function (Sroufe, 2005; Sroufe & Waters, 1977; Waters & Cummings, 2000). In the context of a dyadic relationship, a “secure base” describes a situation in which a person’s exploration system is active (while the attachment system is inactive) and supported by the partner’s caregiving system. There is an apparent contradiction in describing secure base phenomena as attachment phenomena because the attachment system is explicitly said to be inactive for exploration to occur. This apparent contradiction can be resolved by recognizing that the attachment system is *both* a system for securing proximity and protection *and* a system for choosing a partner to provide that support. It is clear from the centrality of the secure base concept in attachment theorizing that the attachment choosing-a-partner function applies to both achieving proximity and safety and also to achieving exploration support. It would not seem a difficult step for attachment theory to recognize that the attachment choosing-a-partner function should also apply to getting feeding support, shelter support, developmental support, and maybe any other kind of help. For example, Waters and Cummings described such support as evolving over the course of a child’s relationship to a parent from “explicit secure-base teaching in infancy, to a supervision partnership beginning in early childhood, to service as an experienced listener and testing ground for emerging beliefs about the self, others, and relationships” (p. 166). The behaviors described are, of course, mostly the behaviors of the caregiver and the caregiving system, but these behaviors are said to be in a partnership with the supported person’s attachment system.

Evolution of Caregiving and Attachment

In the discussion of the evolution, neurobiology, and psychology of attachment and caregiving, I use the term “system,” as Bowlby did, to refer to coordinated emotions, goals, and behaviors, and I use “circuit” to refer to the biological source of the system in the brain. Thus, in the terminology that I use, the “attachment circuit” refers to the brain’s neurons that are consolidated to produce the motivation to seek security and comfort from a particular partner. The attachment circuit is centered in the medial hypothalamus (Panksepp, 1998). The caregiving circuit is centered in the paraventricular nucleus of the hypothalamus.

Caregiving is a system that nurtures particular others. It is thought to have evolved in the earliest mammals out of a preference for the smell of one’s offspring (Del Cerro, 1998). Thus, the caregiving system was, from the first, oriented toward a particular other. Initially, the system appears to have operated only in mothers and only toward offspring (Clutton-Brock, 1991).

The attachment system in early mammals appears to have been a thermoregulation system activated by cold and terminated by warmth (Panksepp, 1998). A young pup emitted an ultrasonic squeak that was not audible to predators, but was heard by its own species. This attachment system was neither dyadic (it responded to cold, not to a particular other) nor goal directed (the cold pup was not purposively trying to call for help).

Although caregiving and attachment evolved separately, in the sense that the evolution of each involved different brain locations (discussed below), their evolution was coordinated in the sense that each served as the social context for the other. There were tremendous survival benefits that accrued when mutations in the maternal caregiving system enabled a retrieval response to cold-based attachment cries emitted when the pup wandered from the warm nest. Additional survival benefits accrued in later species when attachment became proactively oriented toward a particular partner, thus allowing a mammal to elicit its own protection and nurturance. Of course, this benefit depended on a corresponding evolution of the caregiving system in which its scope expanded beyond simple preference to include protecting, comforting, and training of the young (Bell, 2001). Furthermore, the caregiving system generalized beyond the parent-child dyad in many species to include adult-adult caregiving in the form of grooming and helping. In humans, with our expanded symbolic capability, the caregiving system supports nurturance to meet a very wide range of partner needs (Bell; Bell & Richard, 2000).

Over the course of the mutual evolution of the caregiving and attachment systems and their generalization from a mother-offspring to a general adult-adult relationship, the caregiving system came to be connected with a partner's attachment system (providing a "safe haven"). Other coevolution also occurred. In addition to its complementarity with the attachment system, the caregiving system also came to interact with the exploration system (providing a "secure base"; Bowlby, 1988). The safe haven function of a person's caregiving system may be activated by a partner's (child or adult) attachment behaviors; the resulting felt security deactivates the attachment system (Mikulincer & Shaver, 2007) so that secure base exploration is activated.

The Neurobiology of Distress Attachment

A simplified model of distress attachment and related systems emerging from neurobiological research is presented in Figure 1. In this model, the fear system continuously assesses environmental threat (arrow 1 in Figure 1). The earliest mammals were small animals surrounded by large predators, and the branch of mammals that has led to humans has never had strong physical defenses, so being afraid has always been an important survival mechanism.

The fear system is centered on the central nucleus of the amygdala (Carter, 1998; Damasio, 1994; LeDoux, 1996). With the detection of actual or potential threat, the fear system activates two other systems (arrow 2). First, the fear system activates the fast-acting sympathetic nerves (Porges, 2005): Adrenaline is released, the heart rate increases, muscles tense, and respiration, scanning, and vigilance increase. Second, the amygdala activates the longer-lasting hypothalamic-pituitary-adrenal stress system (the HPA axis), which controls reactions to stress and regulates the immune system and moods (Panksepp, 1998). Thus, the body is prepared for a fight-or-flight response. The fight-or-flight response may be enhanced in interaction with androgen and thus is more easily activated in males (Taylor, 2006).

Fear is a brain system that can be activated at different levels, and English speakers have different terms for these levels of fear. These terms include "terrified" to describe the highest levels of fear and "anxious," "afraid," and "cautious" to describe lower levels of fear. Some situations that activate the fear system in the brain are not usually labeled as fear;

the response to these situations is frequently labeled as “distress.” It is perhaps for this reason that Bowlby and other attachment researchers often refer to “fear and distress” as the compound activator of the attachment system. It is clear, however, that it is the brain’s fear system that reacts, whichever English terms are used to describe it.

The social effects of attachment and care-giving are mediated by the hormone oxytocin (Uvnäs Moberg, 2003). Oxytocin is synthesized in two areas in the hypothalamus (Carter, 2005; Insel, Young, & Wang, 1999; Panksepp, 1998; Uvnäs Moberg, 2003). Oxytocin is released in women during birth and nursing and in all humans with close personal contact and interaction (Carter, 1998; Hrdy, 1999, 2005; Insel et al.; Light et al., 2000; Nissen et al., 1996; Panksepp, 1998). Although oxytocin is a neurochemical in a single person’s brain, it is social interaction that largely stimulates oxytocin production and that largely is the target of the functioning of the system. Nature and nurture are mutually reinforcing. Oxytocin promotes development of an emotional bond associated with both caregiving and attachment (arrow 3). Mothers who have skin-to-skin contact with their infants immediately after birth bond with them more strongly (Klaus, Kennell, & Klaus, 1995; Uvnäs-Moberg, 1998). Furthermore, oxytocin is provided to the infant in the mother’s milk and is further produced in the infant as a result of being held. Strength of relationship in monogamous human adults is associated with higher levels of oxytocin (Carter, 2003; Grewen, Girdler, Amico, & Light, 2005; Light, Grewen, & Amico, 2005). Intranasally administered oxytocin increases trust in a partner (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005).

The attachment system makes the fear system less sensitive to distress and reduces emotional reactivity in both the short term and the long term. Fear reduction is achieved by oxytocin (arrow 4), which inhibits the fear system in the amygdala and thus down-regulates the HPA axis (Carter, 1998; Heinrichs, Baumgartner, Kirschbaum, & Ehler, 2003; Uvnäs-Moberg, 1998) and the sympathetic nervous system (Porges, 2005) to reduce adrenalin and other fight-or-flight responses. It has been shown that, in a variety of species, the presence of a bonded partner inhibits the fear system, at least under moderate levels of fear and uncertainty (Carter, 2005; Hennessy, 1999; Sachser, 2005; Sachser, Dürslag, & Hirzel, 1998). In humans, breastfeeding mothers, compared with bottle-feeding mothers, produce more oxytocin in interaction with their infants and show lower reactivity to a stressful situation (Light et al., 2000) and tend to have lower levels of stress hormones (Amico, Johnston, & Vagnucci, 1994). Infant monkeys raised without a mother to down-regulate their fear system show a lifetime increase in fear and depression (Harlow & Harlow, 1965). Because females tend to produce higher levels of oxytocin, they may have a reduced fear response compared to males (Taylor, 2006).

Some assertions of attachment theory imply that only long-term bonded partners moderate the fear system. It has been found, however, that nonbonded familiar partners can also reduce fear. Familiar partners who are not bonded (e.g., who do not create separation distress) also reduce the fear process, although the reduction is not as immediate as it is with bonded partners (Uvnäs Moberg, 2003). In guinea pigs (Hennessy, 1999; Sachser et al., 1998) and squirrel monkeys (Hennessy & Kaplan, 1982), surrogate mothers act like familiar partners, but not like bonded partners. Gump and colleagues (2001) found that female college students had higher stress responses (higher blood pressure) when they experienced a stressor with a stranger than with a romantic partner. Such a differential response did not occur, however, when the stranger was supportive (Carpenter & Kirkpatrick, 1996). Bonded partners may be preferred, but persons under stress are likely to turn even to relative strangers (Shaver & Klinnert, 1982). Fontana, Diegnan, Villeneuve, and Lepore (1999) found supportive strangers to be as effective as friends in reducing the stress response.

In counterpoint to the way that attachment reduces fear, fear activates the attachment system to increase oxytocin levels (arrow 5). This is what Taylor (2002) referred to as the “tend and befriend” response to distress. Taylor and colleagues (2006) found that adult women with lower levels of contact with their social network (and thus presumably higher separation distress) had higher levels of oxytocin. Simpson, Rholes, and Nelligan (1992) found that, for female undergraduates who expected a stressful experience, level of anxiety was associated with the level of seeking comfort from their male romantic partners. Adrenal steroids, produced in response to fear from stressful experiences, appear to facilitate the formation of a bond (Carter, 2005; Montagu, 1986). These findings suggest that persons who are under stress are more susceptible to developing new relationships.

Separation increases fear (arrow 6; Panksepp, 1998). Brain scans show that the amygdala and related areas are highly active when people experience social exclusion, a form of social separation (Eisenberger, Gable, & Lieberman, 2007). A second effect of separation from an attachment partner comes largely from circuits that are not related to fear (Panksepp, 1998). Separation leads to activation of parts of the attachment circuit in the periaqueductal gray, an area where physical pain processing occurs (arrow 7; Eisenberger et al., 2007; Eisenberger, Lieberman, & Williams, 2003; Panksepp, 2003). Thus the painful feelings of grief that Bowlby (1980) described in persons who lost an attachment partner do not involve just metaphorical pain: They appear to involve a genuine pain sensation (Panksepp, 1998).

The Neurobiology of Nondistress Attachment

In addition to high intensity distress attachment, neurobiological research points to a parallel low intensity attachment process that is not a reaction to distress. This section describes that process and considers its implications for the conceptual boundary that is appropriate for attachment and the related caregiving system.

In addition to its relationship with fear and pain, the attachment system is also associated with other important neural systems. The attachment system operates on the parasympathetic nervous system (arrow 8 in Figure 1; Uvnäs-Moberg, 1997). Neurons using oxytocin as a neurotransmitter extend from the attachment system in the medial hypothalamus to the parasympathetic system, producing calming effects (Porges, 1998; Uvnäs-Moberg, 1998). This activation of the parasympathetic system is not associated with fear. Activation of the parasympathetic system results in a drop in blood pressure and a slowing of the heart rate and, in general, produces calm (Porges, 2005). Levels of oxytocin are associated with lowered blood pressure in humans as well as with the self-reported number of hugs in a monogamous couple, although only for women (Grewen et al., 2005; Light et al., 2005). Breastfeeding women produce oxytocin at high rates: Such women are calmer and show increased levels of social interaction compared to bottle-feeding women (Uvnäs-Moberg, 1998). In a study of cohabiting and married couples, blood pressure monitors were worn for a week (Gump et al., 2001). The researchers found that, compared to interacting with a person who was not a significant other, interacting with a spouse or other significant other was associated with lower blood pressure and less arousal as well as greater intimacy and emotional support (Gump et al.).

These findings show how the oxytocin of the attachment system produces calm independently of fear and distress. This nondistress attachment creates short-term and long-term calm, contentment, relaxation, and dyadic trust and love (Uvnäs-Moberg, Arn, & Magnusson, 2005). Although the activation of the HPA axis of the sympathetic nervous system can facilitate an attachment bond (arrow 5 in Figure 1), parasympathetic activation also facilitates an attachment bond. Panksepp (1998, p. 223) used reinforcement terminology to describe how the attachment system provides “satisfying feelings of social gratification”

in the presence of the partner (arrow 9). Thus “comfort seeking” reinforces attachment bond, creating “a conditioned association between the mother and feelings of security” (Hazan, Campa, & Gur-Yaish, 2006, p. 55). Hazan and colleagues (2006) suggested that this association conditions a person to prefer a calming partner (see also Carter, 1998). Thus, the rewarding experience of attachment-driven calming acts to maintain and strengthen attachment relationships (arrow 10).

As Panksepp (1998) pointed out in his summary of research on the neurobiology of emotions, social comforting is the positive side of the same coin for which separation distress is the negative side. We know that the attachment process associated with fear promotes survival: Children who are protected from predators and other dangers are more likely to survive. The attachment process generating calm also promotes survival. Feeding and cuddling nondistress infants also has survival value. Reducing the effects of stress improves long-term and short-term health (Lovallo, 2005). Holding when a child is not afraid, as well as when the child is afraid, is a prototypical form of nurturance (Doi, 1986).

Boundaries of Caregiving and Attachment

By referring to a calming process as “nondistress attachment,” I am making two claims. First, I identify a term that can be used to describe the process by which the attachment system affects the parasympathetic nervous system. Second, I claim that this process should be accepted as a part of the attachment system. That is, I suggest that the boundary implied by contemporary descriptions of attachment needs to be enlarged. An associated recommendation is that attachment associated with the fear system be renamed “distress attachment” to indicate that it is only one form of attachment.

Furthermore, although Bowlby himself most often equated caregiving behaviors with retrieval and the provision of felt security, evolutionary evidence as well as brain biology now suggest that the caregiving system provides for many additional functions, from feeding and retrieval to protection and providing security to teaching and encouragement. Current attachment-caregiving theory (e.g., Mikulincer & Shaver, 2007) would generally agree that the caregiving system is operating when a parent hugs a child before the child goes out to explore the neighborhood; the parent’s caregiving provides the child’s secure base. But many attachment researchers would not consider the parent’s buying the child new shoes that the child would wear during exploration to be under the control of the caregiving system, because buying shoes is not easily classified as a secure base activity. Because I have suggested that human caregiving is best seen as oriented toward meeting the needs of the other, I would classify meeting the child’s needs for nutrition, shoes and clothing, exploration, education, and self-esteem all under the direction of the caregiving system. Ultimately, of course, the boundary around caregiving will be settled by research that combines behavioral measures with neurobiological data.

An Expanded Model of the Attachment and Caregiving Systems

I now turn to an examination of the psychology of attachment and caregiving that is consistent with neurobiological understandings of these systems. In so doing, I propose to expand current caregiving-attachment theory to include both distress attachment and calm (nondistress) attachment in a single theoretical model of attachment. I end this section by relating the proposed model of attachment and caregiving to traditionally described styles of attachment and caregiving working models.

In trying to understand the full operation of the attachment and caregiving systems, I incorporate what is known of the biological locations of attachment and caregiving circuits. These circuits are located in “lower” parts of the brain (the “limbic system”; MacLean,

1990), where emotions are located, although these circuits also extend into the neocortex, where cognitive perception and decision making occur. In the theoretical models presented here, I disagree with Bowlby's claim that emotions cannot be motivational. This is to some degree simply a disagreement over terminology. Although one could interpret my difference with Bowlby as merely a difference in language (Bowlby, 1967/1982, p. 116, talks about cognitively "appraising the baby as something to be comforted," whereas I talk about caring emotionally for the child and the child's needs), I believe this distinction is important. Thus, I will examine attachment and caregiving as complementary systems motivated by emotion. That is, instead of interpreting the caregiving system in terms of a goal of protecting the partner, I will ask what is the motivation of the caregiver that generates this goal. Instead of asserting that the goal of the attachment system is proximity to a partner and felt security, I will ask what is the motivation that leads a person to pursue this goal with this partner. Why does the caregiver choose to nurture a specific other? Why does a person seek and accept help from a particular caregiver? I will thus focus on the emotional motivations that energize the systems (Figure 2).

In the discussion that follows, I will emphasize Bowlby's assertion that attachment is an inherently dyadic phenomenon. The attachment system thus governs behaviors that are directed at a special other, and these attachment behaviors are only successful in achieving felt security if the other's behaviors are governed by the other's caregiving system. As this passage suggests, the language of attachment is a dyadic language, and it is necessary for clarity to make an explicit distinction between the two persons in the dyad. I will refer to the support-giving (nurturing) person in whom the caregiving system is operating as "the caregiver" or "alter." I will refer to the support-seeking (nurtured) person as "the person" or "ego" depending on context.

A Model of the Caregiving System

Many clues to the psychological configuration of attachment can be found in the complementary caregiving system. In the model proposed here, caregiving is seen as a psychological system based on a caregiving circuit centered in the paraventricular nucleus of the hypothalamus in which signals are sent using the neurotransmitter oxytocin (Panksepp, 1998). Like attachment, caregiving can sometimes occur in the context of fear. A parent seeing a child run into the street or a spouse seeing a partner with an addiction are both fearful of the potential consequences of the child's or partner's action. The parent or spouse is motivated by his or her fear or distress to protect and comfort. With caregiving, however, we most often see action that occurs without fear (Bell & Richard, 2000), as when a parent ties a child's shoes or when an adult prepares a meal for a significant other.

One of the psychological manifestations produced by the neurons of the caregiving circuit is an emotional preference for a particular other person. I refer to this preference as the emotion of *caring*. Note that I distinguish, on the one hand, "caregiving" as a functional system embodied in a network of neural circuits from, on the other hand, "caring," the name I give to the motivation produced by these circuits. In this paper, I use the noun "caring" and the verb "to care" exclusively to refer to an emotional motivation; thus I use the terms "emotion" and "motivation" interchangeably. I use the noun "nurturance" and the verb "to nurture" to refer to the behavior of providing for the needs of the partner; I do not use either "caring" or "caregiving" to refer to behaviors. I use "caregiving" as a noun and adjective exclusively to refer to the overall system that includes the emotion of caring, the intentions of empathy and responsibility, and the behavior of nurturance.

Caring is a dyadic emotion; that is, it always has a specific target. Caring is an emotional cherishment of another person in which that person's needs are meaningful and consequential to the caregiver. It is caring that motivates the caregiver's caregiving system

(Bell & Richard, 2000). Caring is a natural response (Noddings, 1984), a human response (Doi, 1981). J. Solomon and George (1996, p. 186) invoke a dyadic “need to protect and nurture the child.” Shaver and Hazan (1988, p. 479) describe “wanting best for other, wanting to give to other” as “reactions” to feelings of love for another. I use the term “caring” to refer to the emotion behind these feelings of love. For Miller (1991), it is wanting to preserve and be in the relationship that is the motivation. The common denominator in these interpretations is that the caregiver has a motivation to meet the needs of the partner (Klaus et al., 1995). Caring is seen as a proactive as well as a reactive emotion. Caring can autonomously motivate nurturance, and it can react to demands for nurturance from a partner.

An advantage of conceptualizing caring as a motivation is that a number of intentions and goals can be derived from it. In the psychological model of the caregiving system proposed here, the motivation of caring has two direct consequences. First, the caregiver’s caring directly energizes the caregiver’s *empathy*, an intention to know the partner (ego) and ego’s needs (Batson, 1991). Empathy is often characterized by attachment researchers as “sensitivity,” an attribute of caregivers that contributes to the partner’s secure attachment (George & Solomon, 1999). Empathy is seen in the proposed model as an emotional consequence of the caregiver’s dyadic caring emotion toward ego. It is close to Kohut’s (1984) “capacity to think and feel oneself into the inner life of another person” (p. 82). It involves being emotionally receptive to the other’s reality (Noddings, 1984), taking an “empathic stance toward another person’s need” (Mikulincer & Shaver, 2007, p. 327). This model of the caregiving system sees empathy as always active at some level, proactively monitoring the other’s needs. Thus, empathy is seen as active in the parent who anticipates that a child will be hungry or tired at a future time and active in the adult who anticipates a partner’s disappointment or anger and acts to forestall it. It is also active in any caregiver who decides to nurture another out of love or “just because,” even when the other is not distressed. And, of course, it is active when the caregiver is aware that the other is afraid or otherwise distressed.

Second, the caregiver’s emotion of caring directly energizes the caregiver’s *responsibility*, the intention that ego’s needs be met. Like caring and empathy, responsibility can be proactive as well as reactive. Because the caregiver cares emotionally for ego, the caregiver takes responsibility that ego’s needs are met. Responsibility is both an awareness of an emotional contact and a foundation for the nurturance of that contact (Befu, 1986). “Caring requires me to respond to the initial impulse with an act of commitment: I commit myself either to overt action on behalf of the cared-for (I pick up my crying infant) or I commit myself to thinking about what I might do” (Noddings, 1984, p. 81; see also Ruddick, 1989). The responsibility described here is related to Johnson’s concept of personal commitment focused on a particular other (Johnson, Caughlin, & Huston, 1999; Kapinus & Johnson, 2003). Attachment researchers have been consistent in recognizing that “responsiveness” is a major component of caregiving (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982; Feeney & Noller, 1996; J. Solomon & George, 1996). George and Solomon (1989, p. 225) describe a parent’s internal working model of caregiving in terms of responsibility (“willingness to respond”), empathy (“ability to read and understand the child’s signals”), and effectiveness (see a similar discussion in Heard & Lake, 1997). To the extent that the caregiver empathically understands the partner’s needs and takes responsibility to help the partner meet those needs, the caregiver will be able to provide effective *nurturance*.

Note that the caregiving system in this model has a more general motivation than that described by most attachment theorists. In the model presented here, the caregiving system is conceptualized as focused not only on the partner’s needs for security (to reduce distress

and support exploration). In this model, the caregiving system is seen as focused on all of the partner's needs. Furthermore, this model encompasses proactive caregiving (anticipating the other's unexpressed needs) as well as reactive caregiving (responding to the partner's direct attachment behaviors). In this model, attachment can vary from low intensity to high intensity. The caregiver can be both "comforter and protector" (Bowlby, 1973, p. 201) when the partner is in distress, but can also provide warmth and comfort when there is little or no distress.

A Model of the Attachment System

The model of the caregiving system just described can provide a useful template for a model of the attachment system. In particular, it shows the importance of identifying an emotional motivation for attachment. Bowlby, writing in a historical time where behaviorism was in the ascendancy, described attachment in terms of behavioral goals of proximity and felt security. This formulation begs the question of why a person should select this goal and why the person should select a particular partner as a means to the attainment of this goal.

In the model of attachment proposed here, the emotion underlying attachment behaviors is trust. I use the term "trust" to describe the unconscious preverbal emotional process produced by attachment neurons. At the psychological level, I see trust as the basic motivation of the attachment system. Bowlby himself referred to this trust as "confidence": For Bowlby, confidence in availability (sensitivity, accessibility, and responsiveness) underlies the attachment bond (Bowlby, 1973, p. 202). Trust has often been noted as a concomitant of attachment (Ainsworth et al., 1978; Berlin & Cassidy, 1999; Bowlby, 1969/1982; Zeifman & Hazan, 1997), but has not previously been seen as a motivation by attachment theorists. As we will see, however, trust makes sense as a basis for attachment because it explains *both* the choice of a caregiver and the intentions and behaviors that are expressed in an attachment relationship.

This conceptualization of trust as a dyadic emotion is congruent with "security" described in attachment theory as the set-goal of the attachment system. Attachment theorists have long recognized that security depends on the level of nurturance from a caregiver. In Figure 2, this effect is represented by the arrow from alter's emotion of caring to ego's emotion of trust, a process similar to "perceived partner regard" (Murray, Holmes, & Griffin, 2000; Reis & Shaver, 1988) and "perceived partner responsiveness" (Reis, Clark, & Holmes, 2004). When caregivers show a high level of caring, their partners develop a high level of trust. When caregivers show a low level of caring (as by being insensitive or inconsistent), partners develop a low level of trust. Ego, observing alter's actions of nurturance in support of ego's needs, infers alter's caring and thus comes to trust alter to respond to weakness and vulnerability with support and nurturance rather than exploitation (Rempel, Homes, & Zanna, 1985). Ego's trust ("I am confident that you will help me meet my need") is the direct emotional counterpart of alter's caring ("I want your need to be met").

Having identified the intentions of caregiving, one involving information (empathy, intending to know about the partner) and a second involving strategy (responsibility, intending that the partner's needs will be met), we can more easily identify the intentions of attachment. As a direct result of ego's trust in the alter's caring, ego is motivated to reveal his or her needs, described in this model of attachment as *openness*. Openness is complementary to empathy. Because the caring partner is empathic and thus emotionally receptive to ego's needs, ego can feel secure in revealing those needs. Thus, trust enables openness.

Just as ego responds to alter's empathy with openness, ego responds to alter's responsibility with *depending*. Trusting in alter's caring and responsibility, that is, in alter's cherishment

and commitment to ego's needs, ego feels secure to ask for alter's help in meeting these needs and can expect that alter will comply (Doi, 1986; Fairbairn, 1952; Rempel et al., 1985). Trust enables depending. Bowlby (1979) referred to this as "a capacity to rely trustingly on others when occasion demands" (p. 105).

Depending can be either passive or active. A child can passively expect to be fed; an adult can passively expect that a spouse will be supportive when disappointments occur. Depending can also be quite active. A child throws a tantrum when a parent won't buy a desired toy. An adult angrily demands an accounting of a partner's failure to fulfill a commitment. But when needs are met, ego, depending on alter for this nurturing behavior, responds to nurturance with satisfaction and a sense of overall security. Bowlby (1969/1982) himself avoided the term "dependency" for this process because of its association with immaturity and pathology (p. 228). It is for a similar reason that I prefer the term "depending." In the model I present here, depending has a healthy positive connotation as given in the Japanese concept of *amae* (Doi, 1981). "Depending" in this view corresponds to "I can depend on you" and "you are dependable" instead of "I am dependent on you."

In this model, the attachment system can be activated for multiple needs related to distress, such as sickness, boredom, safety, and fear. In addition, a person's trust in a caregiver can lead that person to depend on the caregiver for supportive nurturance for fatigue, hunger, learning, play, clothing and shelter, and love. The caregiver can become aware of these and other needs through the person's direct openness. The caregiver can also become aware in other ways: A parent may know about a child's patterns of hunger and fatigue and plan meals and naps ahead of the child's awareness of these needs. The caregiver may thus perceive needs of which ego is unaware. For example, a parent may prospectively anticipate a child's development and thus encourage the child's exploration and learning of skills. The caregiver can encourage exploration passively by being a safe haven that reduces ego's fear as well as by proactive support for exploration and other forms of individuation, even when this encouragement also raises ego's fears. A spouse can give a partner a hug, not just when the partner "needs" it, but also when the spouse wants to express love.

Brain Circuits Associated With Variable Levels of Attachment and Caregiving

Recognizing that attachment behavior is produced through a neural circuit in the brain emphasizes that brain circuits are constructed and consolidated (intensified) as a result of internal (genetic, developmental) factors as well as environmental (nutritional, social interactional) experiences. Within the model proposed here, both caregiving and attachment are treated as variable concepts. The level of attachment is seen as a reflection of the concentration of attachment neurons in the hypothalamus and related locations. If no neurons have been consolidated toward a given other, we would say that there is no attachment bond with that other. Observation of institutionalized children who did not receive consistent caregiving during the first 2 years of life shows that lack of sensitive caregiving creates conditions in which the attachment system is not consolidated and recognizable attachment behaviors do not emerge (Zeanah, Smyke, Koga, & Carlson, 2005). Toward a person perceived as somewhat caring, some neurons may have been consolidated to create a partial or low-level attachment bond. The terms "stranger," "acquaintance," "friend," and "best friend" can be used to label various levels of caregiving-attachment (increasing levels of caring, empathy, and responsibility on the caregiving side of the relationship, and increasing levels of trust, openness, and depending on the attachment side). When a very large number of neurons have been consolidated, there is a strong attachment involving high levels of trust. Likewise, when a large number of neurons have been consolidated in the caregiving circuit, there is a high level of caring.

Attachment Styles

Clearly a person's expectations (their internal working model) of others have an important impact on how he or she approaches relationships. Internal working models of attachment describe the cognitive and emotional residue of previous dyadic attachment experiences. Internal working models affect new and ongoing relationships, as these expectations shape both perceptions and behavioral tendencies.

Secure attachment—Secure attachment produces a balance between closeness and autonomy (Bartholomew, 1990; Feeney & Noller, 1996). A secure attachment working model involves seeing others as trustworthy and altruistic (Feeney & Noller, 1990). At the dyadic level, there is trust in the caregiver and a willingness to depend on him or her. "Attachment figures are one's most trusted companions" (Ainsworth et al., 1978, p. 20).

In a stressful situation, the fear system of a securely attached person is partially damped. Thus, in traditional distress attachment theory, a securely attached style involves a lower level of fear in a given situation and thus lower activation of the attachment system than other attachment styles under the same conditions because of this damping effect. Ainsworth (1978) noted that when a child feels secure, "his attachment behaviors may be at a low level of activation" (p. 22). This makes sense because traditionally conceived attachment behaviors are fear- and distance-reducing behaviors. Thus, to be secure in the traditional view means to have a minimally activated attachment system because a secure person has less need to seek proximity or felt security.

The biological-psychological model of attachment proposed here differs from the traditional view in that attachment is seen as variable, associated with varying levels of consolidation of brain neurons. This model also includes the possibility of activating the attachment system without high levels of distress. This model considers that hugs, touches, glances, and other supportive behaviors of a caregiver may nurture nondistress attachment. Nondistress interactions provide ongoing oxytocin production that modulates the fear system (arrow 4 in Figure 1).

Avoidant and disorganized attachment—The goal of avoidant attachment is said to be maintaining distance and preventing others from getting too close (Feeney & Noller, 1996). "Individuals with this style passively avoid close relationships; they place much value on independence and assert that relationships are relatively unimportant" (Bartholomew, 1990, p. 164). There is "discomfort with psychological intimacy and the desire to maintain psychological independence" (Rholes & Simpson, 2004, p. 4). Avoidant attachment is a "secondary attachment strategy" that a person uses when the "primary" secure-base script of secure attachment does not work (Mikulincer & Shaver, 2007). There are at least two views of avoidant attachment, what we may think of as the "deactivated" and "basal" views of avoidance. Bartholomew notes that avoidant attachment may reflect "either fear of intimacy or a lack of interest or motivation to become intimate with others" (p. 149). In the deactivated view of avoidant attachment, the attachment system in the brain is "deactivated" or repressed. The person's reported preference for independence is a sham: The person "really wants" to be close and to depend, but this desire is repressed because of previous hurtful experiences (Bowlby, 1980; Mikulincer & Shaver, 2007).

The deactivating view of attachment avoidance raises two questions: (1) Where do the attachment circuits come from before they are suppressed and (2) what is the source of the suppression? Is every brain born with full attachment circuits, or are these circuits created and consolidated in response to interaction experiences that do not occur for all persons? Attachment researchers answer the first question implicitly: All human children develop attachments normally in their families. It has been assumed that attachment is a biological

system that exists in all humans. Attachment researchers have answered the second question by describing how children learn from dismissing parents that attachment behaviors will not be met with caregiving because of parent hostility or disinterest. These children then learn to suppress (deactivate) their attachment systems in order to avoid the frustration of expressed but unmet needs.

The basal view of avoidant attachment proposes that the attachment system has to be built in the brain out of experience, and thus persons who never have the required experiences will never build an attachment system at all. Consider the infant who receives only custodial care—a bottle for feeding, a quick change of diaper, and limited or nonexistent holding. Such can be the plight of children from overcrowded and understaffed orphanages (O'Connor, 2005; Zeanah et al., 2005). Children who never have a consistent caregiver and resulting nurturing experience may never consolidate attachment neurons, and thus they may have a very low or effectively zero level of attachment potential.

The standard procedure for measuring attachment in young children is the Strange Situation (Ainsworth et al., 1978), where the child's reaction to separation from a caregiver is assessed. The Strange Situation procedure is designed to detect deactivated avoidant relationships, but it has no procedure to detect basal avoidant relationships (Carlson & Earls, 1999; Chisholm, 2000; Chisholm, Carter, Ames, & Morrison, 1995; O'Connor, 2005; Zeanah et al., 2005). Thus, in Zeanah et al.'s study of institutionalized children, 78% did not fit into any of the three most common attachment styles (secure, avoidant, or anxious) and were instead classified as having a "disorganized" attachment style. Because attachment styles are designed to measure the *organization* of attachment behaviors (Sroufe & Waters, 1977), the existence of a "disorganized" style suggests that some children may never have formed an attachment system at all. From the point of view of the attachment model proposed in this paper, basal avoidance represents the lowest level of attachment. Because an attachment system has not been consolidated in the brain, the psychological experience of trust is missing and the individual does not exhibit openness and does not depend on others for nurturance.

Anxious attachment—Anxious attachment expresses a desire for proximity to and felt security from a caregiver while at the same time it is associated with a fear of rejection and abandonment by that caregiver (Feeney & Noller, 1996). It involves "a strong need for care and attention from attachment figures coupled with a deep, pervasive uncertainty about the capacity or willingness of attachment figures to respond to such needs" (Rholes & Simpson, 2004, p. 4). Anxiously attached individuals have a "hyperactivation strategy" (Mikulincer & Shaver, 2007). Anticipating the caregiver's inconsistency of caregiving, they tend to be very forceful in making demands for nurturance because of expected resistance.

Levels of trust, openness, and depending may vary greatly among anxiously attached persons. Some may have relatively high levels of trust and depending because they recognize that, although nurturance from the caregiver is not automatic, they are able to activate that nurturance with high intensity efforts. Other anxiously attached persons may have quite low levels of trust and depending, as they recognize that the caregiver's commitment to them is low, so that efforts to activate nurturance from the caregiver are anticipated to have a low probability of success.

Caregiving Styles

The traditional model of caregiving has been constructed in juxtaposition with the traditional model of attachment largely as a result of empirical investigations of the characteristics of the mothers of children whose attachment styles have been measured. Thus mothers of children classified with secure attachment have been classified as "secure" caregivers,

mothers of avoidant children have been classified as “rejecting” or “dismissing” caregivers, and mothers of anxious children are “uncertain” or “preoccupied” caregivers (Bartholomew, 1990; George & Solomon, 1999; Main, Kaplan, & Cassidy, 1985; Main & Solomon, 1986; Rothbard & Shaver, 1994).

Secure caregiving—Attachment researchers have long identified sensitivity and responsiveness as the primary characteristics of “good” care-givers, those who produce securely attached children (Ainsworth et al., 1978; George & Solomon, 1999). The traditional discussion of caregiving sees the goal of caregiving as protection (George & Solomon, 1999; Heard & Lake, 1997; J. Solomon & George, 1996) or security (Bowlby, 1969/1982; Bretherton, 1980; Sroufe & Waters, 1977) as well as support and comfort directed toward the partner’s exploration (Mikulincer & Shaver, 2007). In the caregiving model proposed in this paper, secure caregiving derives from caring toward a partner, conceived as an emotional cherishment of the partner and a commitment to the satisfaction of the partner’s needs. From this motivation, one can derive empathy, the intention to know the partner’s needs (“sensitivity”), and responsibility, the intention to help meet those needs (“responsiveness”). High levels of caring, empathy, and responsibility produce nurturance, the quality of which depends on the accuracy of empathy and the competence of responsibility to develop and implement nurturant strategies. Secure mothers are flexible, positive, and realistic about their children (George & Solomon, 1999).

Uncertain caregiving—Uncertain mothers (whose children are anxiously attached) are insensitive to children’s cues, exhibiting “cognitive *disconnection*” (George & Solomon, 1999, p. 661, italics in original). The mother’s own fear is seen to degrade her empathic ability. Mothers may be “so focused on their own vulnerability that they lack the mental resources necessary to attend compassionately to others’ needs for help and care” (Mikulincer & Shaver, 2007, p. 329). These mothers tend to be highly active, but ineffective. It could be that uncertain mothers have low levels of empathy (they are insensitive to the child’s cues, they do not “attend compassionately”) or that they have high but inaccurate empathy, overinterpreting the child’s cues and thus producing high levels of inappropriate or misdirected nurturance.

Rejecting and abdicated caregiving—Rejecting caregiving (by mothers whose children are avoidantly attached) are described in terms of “cognitive *deactivation*” (George & Solomon, 1999, p. 661, italics in original). “The mothers dismissed or devalued their children’s attachment needs, thus deactivating their caregiving system; they never, however, abandoned their role in providing care and protection.” Abdicated caregiving (by mothers whose children are described as disorganized) describes parents with extremely low levels of empathy and responsibility. These parents have a disabled caregiving system (George & Solomon, 1999). These parents see themselves as helpless. These mothers either have no organized caregiving system or have a caregiving system that has been suppressed or disabled. Parenting behaviors appear to be motivated by a desire to follow social norms, by attachment needs to be cared for by the child, or by fear (George & Solomon, 1999; Main & Hesse, 1990). This pattern may also account for the still culturally common script of the incompetent and disengaged father who has little time or physical contact with the child and thus does not develop deep emotional caring, perhaps considering himself to be incompetent or availing himself of a perceived cultural permission to abdicate caregiving responsibility or both. The parents who exhibit these patterns either do not seem to care or (which may be the same thing) are motivated by other things besides caregiving (George & Solomon, 1999).

Discussion

Many of Bowlby's ideas have been supported by neurobiological research. Research in mammals has demonstrated that attachment is often associated with fear, that fear activates the attachment system under certain conditions, and that the attachment system down-regulates fear. This research, along with human studies, has shown that bonded partners can reduce fear in both the short term and the long term and that actual or threatened loss of a partner can increase fear, distress, and pain.

No theoretical system, however, can answer all relevant questions in its early development. Strategic decisions to avoid certain questions can keep attention focused on questions where early progress can be demonstrated. For example, Bowlby found it expedient to deflect attention from parents feeding children because that was where Freudian theory held sway at the time (Karen, 1994). Similarly, to distinguish attachment theory from drive theory (Bowlby, 1969/1982) and dependency theory (Ainsworth, 1972), attention was focused on the *organization* of attachment (in particular, its organization jointly with fear) rather than the *level* of attachment. Although these decisions nurtured the early development of attachment theory, they have also placed certain limitations on further development of the attachment-caregiving theoretical system.

Recent neurobiological and psychological research has provided a basis for extending attachment theory. Panksepp's analysis of the attachment system in the brain, while respectful of Bowlby's formulation, expands on it in ways contemporary attachment researchers have not (Panksepp, 1998; Panksepp, Nelson, & Bekkedal, 1999). Research has shown that, just as bonded partners can reduce fear, persons who are not bonded partners can also reduce fear. And it has shown that, both in the presence of fear and in the absence of fear, attachment has the effect of increasing calm and comfort.

Part of the reason for the lack of interest in nondistress low intensity attachment may be its strong similarities to affiliation, and Bowlby had decided on functional grounds to declare that affiliation was a different system from attachment. For Bowlby, "An 'attachment interaction' is one in which one person is threatened or distressed and seeks comfort and support from the other. An affiliation interaction is one in which both people are in a good mood, do not feel threatened, and have the goals of enjoying their time together or advancing common interests" (Mikulincer & Shaver, 2007, p. 19; see the related discussion in Weiss, 1998). The neurobiological evidence, however, suggests that affiliation, like caregiving and attachment, is regulated by oxytocin (Young, Lim, Gingrich, & Insel, 2001). Serious consideration needs to be given to the question of whether affiliation, instead of being a separate system, may be better understood as a manifestation of (nondistress) attachment.

In this paper, I have looked to expand attachment-caregiving theory in the light of the biological research. I have presented models of the evolution and neurobiology of attachment as it interacts with other systems, noting both those places where neurobiological evidence supports current attachment theory and places where there is a discrepancy. I have proposed a psychological model of attachment and caregiving that accommodates varying levels of fear and distress.

One of the hallmarks of successful theoretical development is that it not only accounts for what is known but it also suggests some new and surprising predictions. The new dyadic psychological model of attachment-caregiving proposed here suggests a number of ideas that fall outside the boundaries of most contemporary attachment-caregiving theory.

First of all, the model proposed here conceptualizes varying levels of attachment. Attachment researchers have frequently conceptualized high and low levels of *activation* of the attachment system, but many have argued against conceptualizing low levels of attachment (Ainsworth, 1972; Ainsworth et al., 1978; Cassidy, 1999; Main, 1999; Mikulincer & Shaver, 2007; Sroufe & Waters, 1977; Weiss, 1982). This conceptualization works when applied to demonstrably strong attachment relationships. It appears, however, to be based on an assumption that a preexisting attachment bond necessarily exists in certain relationships. There is now significant evidence from studies of institutionalized children (Chisholm, 2000; Chisholm et al., 1995; Zeanah et al., 2005) that under some circumstances attachment circuits simply do not form. Such children do not have a *deactivated* attachment system (Mikulincer & Shaver, 2007); they have little or no attachment system at all. By focusing on levels of caregiving and attachment, the proposed model is a candidate as a “core organizing principle” (Reis et al., 2004) for families in particular and for personal relationships in general.

The model also describes direct parallels between the psychological components of the caregiving and attachment systems. In the model proposed here, attachment elements of trust, openness, and depending match up with the caregiving elements of caring, empathy, and responsibility. This model shows that openness is a response within ego to a caregiver’s empathy and that depending is a response to the caregiver’s responsibility.

Third, the model proposed here includes both attachment in the context of fear and distress and attachment that does not involve fear or distress. It is attachment behavior when a frightened child seeks nurturance from the parent, and it is also attachment behavior when a hungry child or a bored child seeks nurturance from the parent. The neurobiological data now coming available, however, show that, although the fear and attachment systems are mutually connected, they also stand on their own, and it is time to begin understanding the attachment system in its own right.

Ultimately, the boundary around attachment and caregiving will be determined empirically by attachment researchers working with neuroscientists. This empirical work will eventually verify the conditions under which the neurons of the attachment system are activated. Until this test is possible, we will be limited to speculating about what will be found.

Future Directions

Dynamics of attachment and caregiving relationships—The new models of caregiving and attachment proposed here suggest a number of new directions for future research on family and other personal relationships. The vast majority of attachment studies have focused on trait-level attachment, that is, on the organization of attachment conceptualized as an enduring working model of relationships. This has been a very productive line of research. Recognizing the attachment system as embodied in a neural attachment circuit that may be activated toward a particular partner in a particular environment suggests the importance of also studying state-level (contextual) attachment and caregiving.

Research on dyadic attachment has documented how attachment relationships differ across a person’s relationship partners (Brumbaugh & Fraley, 2007; Cozzarelli, Hoekstra, & Bylsma, 2000), but more research on the dynamic interplay of attachment and caregiving in adult relationships is needed. A recommended focus of this research will be on variations in trust and caring across relationships and across time within relationships. Such studies will complement studies of relational turbulence (Knobloch, Miller, & Carpenter, 2007; D. H. Solomon & Knobloch, 2004) that focus on the cognitive problems of relational uncertainty by adding a focus on the emotional issue of trust. An approach based on levels of attachment

and care-giving variables in addition to types of working model will support a focus on the positive elements of attachment and caregiving (trust and caring) as well as traditional fear-based negative elements (anxiety and avoidance). Research on attachment in adults has largely focused on romantic relationships. There is an important opportunity to expand this research to look at trust, openness, and depending among friends, acquaintances, and strangers. How is affiliation quantitatively different from attachment and caregiving? Longitudinal studies might examine the dynamic neurochemical, emotional, and cognitive changes that precede as well as those that follow changes in trust and caring.

Attachment-caregiving balance—Studies of the balance between caregiving and attachment would also be useful. These would extend life course studies of how caregiving and attachment roles differ from childhood attachment to adult caregiving toward a parent (Rossi & Rossi, 1990). These studies could include investigations of parent-child balance during childhood: Is caregiving really unilateral (only the parent does caregiving, the traditional assumption); is it ever mutual (parent and child nurture each other at the same time); is it cyclical (sometimes the child nurtures, sometimes the parent)? Studies of adult relationships might focus on the match or mismatch between ego's attachment and alter's caregiving. For example, how does a person's caregiving react to a partner who is too trusting, too open, and too demanding (e.g., Dailey, Pfiester, Jin, Beck, & Clark, 2009; Roland, 1988)?

Research instruments—To carry out these investigations, we will need new instruments for measuring attachment and caregiving. In addition to instruments for distress attachment that are common today to measure working model styles (Bartholomew & Horowitz, 1991) and dimensions (Brennan, Clark, & Shaver, 1998), we will need more work on dyadic attachment and caregiving in specific ongoing relationships (e.g., Cozzarelli et al., 2000; Kunce & Shaver, 1994). We will need measures of levels of trust, openness, and depending for the attachment system and levels of caring, empathy, and responsibility for the caregiving system. To support longitudinal studies, we will need reliable state-level measures that are sensitive to both short-term and long-term changes in caring and trust.

The history of attachment has shown great resiliency and flexibility (dare we say sensitivity and responsiveness?) as the early ideas of attachment have evolved and been enhanced and validated. The model presented here is intended as just such an enhancement of current attachment theory. By showing how the neurobiological underpinnings of attachment and caregiving have broader connections than were guessed at in the early formulation of the theory, this effort validates extensions of attachment research into a more extensive analysis of nondistress, including secure base, attachment phenomena.

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Figure 1.
A Simplified Model of Distress Attachment

Figure 2.
A Model of the Caregiving System.