

A COGNITIVE PRIMING APPROACH TO THE STUDY
OF ADULT ATTACHMENT

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OF ADULT ATTACHMENT

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In recent years, no single area of research in personality/social psychology has attracted more interest than the application of attachment theory to the study of adult romantic relationships. This research has focused almost exclusively on individual differences. To date the field lacks a set of objective standards for determining whether participants in attachment research are, in fact, attached. The current study explores the validity of a self-report measure of attachment (i.e., the WHOTO). This self-report measure identifies the figures toward whom individuals direct the four behaviors that define attachment (i.e., proximity maintenance, safe haven, separation distress and secure base). Using a lexical decision task, I recorded the relative speed with which participants recognize the names of reported significant people following a subliminally-presented threat or neutral word prime. I hypothesized that participants who direct all four attachment behaviors toward one figure will react faster to the significant person's name after a threat word prime compared with a neutral one. A total of 127 participants took part in Study 1, in which the prime was an attachment-related threat (i.e., the word "separation"), and 69 participants took part in Study 2, in which the prime was an attachment-unrelated threat (i.e., participant's idiosyncratic fear). I found that participants who direct all attachment behaviors toward the significant person were faster to recognize the figure's name after a threatening word compared with a neutral one, whereas the opposite was true for participants who do not direct all attachment behaviors toward the significant person. These results contribute to further validation of the WHOTO as a measure of normative attachment that can be used to distinguish between relationships that have some attachment

components and relationships that qualify as full-blown attachments. In addition, participants who direct all attachment behaviors toward their romantic partner reacted faster to his/her name after a threatening word compared with a neutral one only if they were cohabiting. This finding highlights the importance of physical proximity in adult romantic attachment.

BIOGRAPHICAL SKETCH

Nurit Gur received her bachelor's degree in Psychology and Literature at Haifa University, Israel. She received her master's degree in Developmental Psychology at Haifa University, Israel. Her thesis title was "Characterizing Two Early Interventions." During her master's studies, she worked at the Center for the Study of Child Development with Prof. Avi Sagi-Schwartz, investigating infant attachment. During her Ph.D. studies, she worked at Prof Cindy Hazan's lab, studying adult attachment.

To my love, Yuval and Noam

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INTRODUCTION

Attachments are enduring affectional bonds characterized primarily by a tendency to seek and maintain proximity to specific individuals, especially when one feels stressed or threatened; (Ainsworth, 1972; Bowlby, 1969). This type of bond has been shown to have positive effects on both psychological and physical well being in people of all ages (Uchino, Uno, & Holt, 1999). Whereas infants and children tend to be primarily attached to their parents, Bowlby (1979) theorized that mate relationships are the prototypical adult instantiation of attachment, a claim first tested in 1987 by Hazan and Shaver. Since then, no single area of research in personality/social psychology has attracted more interest than the application of attachment theory to the study of adult romantic relationships (Simpson & Rholes, 1998). Most of this research, however, has focused exclusively on identifying individual differences in attachment styles (Ainsworth, 1989; Kobak, 1999; Levitt, 2005); still missing is a set of criteria for defining attachment in adulthood. Such criteria are important because although numerous studies have been dedicated to the study of attachment in adulthood, the field lacks a set of objective standards for determining whether research participants are, in fact, attached (Hazan, Gur-Yaish, & Campa, 2004). Combining a self-report measure of attachment and a method borrowed from cognitive psychology (Meyer & Schvaneveldt, 1971), the current study explores possible criteria for defining attachment in adulthood.

Behaviors Defining Attachment

Bowlby referred to the attachment bond as a “behavioral system,” a concept he borrowed from ethology to describe behavioral tendencies that characterize virtually every member of a species. These behaviors have predicted outcomes that contribute to the survival of individuals. The four behaviors that define attachment are proximity

seeking, safe haven, separation distress, and secure base (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1988). These components are readily observed in the behavior of infants in relation to their caregivers. Infants tend to desire and maintain relatively *close proximity* to their attachment figures and resist and are *distressed by separations* from them. They also tend *to seek comfort and reassurance* from attachment figures when feeling stressed or threatened, and they use their attachment figure as *a secure base* from which to engage in non-attachment activities, such as exploration and play.

The same biological system is theorized to govern attachments in adulthood (Fraley & Shaver, 2000; Hazan & Shaver, 1987). Therefore, the same behaviors are thought to characterize adult attachment relationships, in an age-appropriate manner. Thus, romantic partners spend most of their time together, they turn to their partner when upset or feeling sad, miss their partner when he or she is away, and trust their partner to support them in any circumstances.

In adults, these attachment-defining behaviors have been investigated with a self-report instrument (WHOTO; Hazan & Zeifman, 1994) in which respondents were asked to name the individual(s) they viewed as primary targets for each of the four behaviors. Although only a handful of studies have addressed normative questions regarding attachment in adulthood, all have used WHOTO-type measures. Thus, the WHOTO scale was used to study the developmental process by which attachment is transferred from parents to peers (Feeney, 2004; Fraley & Davis, 1997; Hazan & Zeifman, 1994; Mayseless, 2004), the structure and content of the attachment network, (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997), attachment in adult twin relationships (Tancredy & Fraley, 2006), attachment and spousal caregiving (Feeney & Hohaus, 2001), and activation of the attachment system in adulthood (Mikulincer, Gillath, & Shaver, 2002). I will address some of these studies in the following sections.

Relationships that Qualify as Full-blown Attachments

When discussing the behaviors defining attachment it is important to distinguish between attachment behaviors and an attachment bond. An attachment bond is a long-lasting emotional bond (Ainsworth, 1973; Bowlby, 1969). From a behavioral aspect, an attachment bond consists of all the behaviors defining attachment (i.e., proximity seeking, safe haven, separation distress, and secure base). Thus, relationships that contain some attachment behaviors, but not all of them, do not qualify as full-blown attachments (FBAs). With an infant, for example, when an attachment figure is unavailable, and the infant is alert, he/she can direct attachment behaviors toward a total stranger. Obviously, his/her relationship with the stranger is not considered an attachment bond. Similarly, many adult relationships have attachment components but do not qualify as FBAs. For example, neither friends who seek each other's advice or guidance, nor an infatuated couple who desire constant proximity with each other, qualify as attached.

Using the WHOTO scale, Hazan and Zeifman (1994) found that relationships that qualify as attachment bonds by virtue of their containing all four defining components tended to be those with either parents or romantic partners, rather than friends. This finding was challenged by other researchers, who report that participants commonly have FBAs with other figures such as friends, siblings, and older adult children (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997).

Part of this dispute is probably due to the studies' different uses of the WHOTO. Participants in Hazan and Zeifman's (1994) study were asked to respond to each WHOTO question by naming a single person. By limiting participants' responses to one figure, Hazan and Zeifman essentially studied the primary target of attachment behaviors. In other studies (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997), participants were allowed to nominate various attachment figures. This way, the

researchers targeted participants' attachment network. More important, most adult attachment researchers do not question whether participants in their studies have FBAs with their partners, instead presuming that they do.

Attachment Hierarchies

For infants, close family members (e.g., the biological parents, older siblings, grandparents, aunts and uncles) are all likely to be attachment figures (Cassidy, 1999).¹ In adulthood, this group of people is extended beyond the familial circle and includes out-of-the-family figures such as the romantic partner, and friends (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997). However, the fact that infants and adults form multiple attachments does not mean that they treat them all equally. Rather, an "attachment hierarchy" is thought to exist. Thus, one person is clearly preferred above all others when the infant or the adult is distressed or seeks comfort (Bowlby labeled this preference as "monotropy").

Cassidy (1999) pointed out three survival advantages of "monotropy" in childhood. First, one caregiver assumes primary responsibility for the infant. As a consequence, this figure is less likely to overlook the infant's needs. Second, it simplifies the infant's response in times of stress (always approach the primary figure if available). This response is rapid and automatic, and does not require complicated judgments about the availability of several possible figures. Last, the infant will most likely become attached to the person who is most bonded to him, thus ensuring an optimal match with the most adequate caregiver. Even though monotropy is thought to exist also in adulthood, we still do not know whether similar survival advantages are applicable during that life period, or whether it is more advantageous in adulthood to direct attachment behaviors toward multiple figures.

¹ By saying that close family members are likely to become the attachment figures of infants I do not exclude other possibilities such as a daycare provider, friends of the family, or whoever else gives care to the infant.

Although “monotropy” is a key concept in attachment theory, few studies have explored it in either childhood or adulthood. Some of the research designed to study this concept has questioned the hierarchical structure of the attachment network. For example, in households where the parents share equal responsibility for the child, children showed preference for the father, or less intense preference for the mother (Colin, 1996). In another study with adults, Takahashi, Ohara, Antonucci, and Akiyama (2002) studied cross-culturally the differences between close relationships in Japan and in the U.S. Participants in that study were asked to rank their relationships with close others. These researchers found that only a few Americans rated one figure as central, and that most of them rated two or more figures as central.

At the same time, most of the research to date suggests that the theorized hierarchical structure of the attachment network does indeed exist. For example, Colin (1985) observed 39 infants in a laboratory procedure that involved separations. In one episode, the mother and an alternative caregiver (who had taken care of the child for at least 20 hours a week) returned to the room after separation and let the child decide from whom to seek comfort. The duration of each relationship, the proportion of time the baby spent with each caregiver each week, the quality of the attachment bond, and the emotional investment in the baby all appeared to influence the baby’s preference for whom to seek comfort from. A hierarchical attachment network was also found to exist in adulthood. For example, in a study with a large and diverse adult community sample (812 participants, age range 16–90), Doherty and Feeney (2004) found that, despite reporting some degree of attachment to several figures, almost all participants reported a clear preference for one attachment figure. Similar findings were obtained by Trinke and Bartholomew (1997).

Thus far I have discussed studies that examined the structure of the attachment network. Another line of research on attachment hierarchies concerns their content.

These studies were consistent in their findings that parents are most commonly the primary attachment figures for children and young adolescents (Fraley & Davis, 1997; Hazan & Zeifman, 1994). Attachment to parents was theorized to continue throughout life (Ainsworth, 1989; Antonucci, Akiyama, & Takahashi, 2004); however, parents' relative position in the attachment hierarchy changes. In a developmental shift that starts in adolescence, the romantic partner is thought to replace the parents at the top of the attachment hierarchy (Allen & Land, 1999).

Reorganization of the Attachment Hierarchy

The hierarchy of attachment figures is not a rigid, unchangeable structure; rather it is a dynamic one (Bowlby, 1979). Major events across the lifespan can result in reorganization of the attachment hierarchy. For example, the passing away of a parent or the dissolution of a marriage or romantic relationship are thought to change the relative position of attachment figures in the hierarchy (Fraley & Shaver, 1999). The shift to parenthood is another life event that may result in changes in the attachment hierarchy. This shift may enhance the relationship with the parents (and, as a consequence, elevate their position in the attachment hierarchy) and lessen the importance of friends (and, as a consequence, reduce their position in the attachment hierarchy) (Doherty & Feeney, 2004).

In addition to life events that may alter the attachment hierarchy, there are normative developmental changes in this structure. One of the most important normative processes of reorganization of the attachment hierarchy is thought to occur during adolescence and early adulthood, when peers are theorized to eventually replace parents as the primary attachment figure (Allen & Land, 1999).²

² Another developmental change that only recently have researchers begun to address occurs in the elderly, in which a normative role reversal is thought to occur. In this shift, children become the source of security for their older parents (Ainsworth, 1989; Doherty & Feeney, 2004).

Hazan and Zeifman (1994) studied the developmental process by which the attachment hierarchy is reorganized and by which romantic partners replace parents at the top of the hierarchy. Using the WHOTO, Hazan and Zeifman (1994) found that attachments are transferred from parents to peers, component by component, in a sequence that begins with proximity seeking, followed by safe haven, and finally separation distress and secure base. Fraley and Davis (1997) extended this work with a sample of young adults, confirming Hazan and Zeifman's conclusion that attachment is transferred from parents to peers in an ordered manner.

We still do not have a normative timetable of the process by which attachment is transferred from parents to romantic partners; however, the research so far suggests that it begins in early childhood and ends in early adulthood. Thus, although Hazan and Zeifman (1994) found that children as young as six sought proximity to peers over parents, half of the adolescence-age participants in their study continued to use their parents as a secure base from which to engage in exploratory behavior. Similarly, both Fraley and Davis (1997) and Trinke and Bartholomew (1997) found that college-aged students still used their mother as their secure base.

Thus far, I have outlined the normative process by which attachment is transferred from parents to a romantic partner. In the next section, I discuss factors that facilitate attachment between romantic partners and outline the importance of physical proximity.

Factors that Facilitate Attachment between Romantic Partners

Little research has been dedicated to the study of the factors that facilitate attachment formation in humans. However, animal researchers have found three factors that speed the attachment process in a variety of nonhuman mammalian species: close physical proximity, sexual contact, and shared stressful experiences (Carter, 1998). Some evidence exists that the same three factors may foster attachment

in humans, as well (Brennan, Wu, & Loev, 1998; Gur-Yaish, Campa, Bradshaw, & Hazan, 2004; Hazan & Diamond, 2000; Zeifman & Hazan, 1997). For example, Gur-Yaish, Campa, Bradshaw, and Hazan (2004) investigated longitudinally whether sexual relationships and physical proximity foster attachment between romantic partners. The researchers found that sexual relationships predicted a greater number of attachment behaviors toward the partner only at the beginning of a relationship, whereas sleeping in the same bed with a romantic partner predicted a greater number of attachment behaviors toward the partner regardless of relationship phase. These findings are in line with the theoretical suggestion that physical proximity plays an important role not only for the formation of attachment between romantic partners, but also for its maintenance (Hazan, Gur-Yaish, & Campa, 2004). According to this view, adult partners become attached to each other at the physiological level, co-regulating each other in a manner similar to that in which mother-infant dyads co-regulate each other. In one of the first attempts to assess the co-regulation aspects of adult attachment, Sbarra, Ferrer, and Hazan (2004) studied changes in the heart rates of couples in a laboratory gazing task. In this study, couples were instructed to maintain eye contact without talking or touching while their heart rates were recorded. Based on WHOTO scores, participants were classified as either attached or not attached. The researchers found significant correlations in rates of change for the couples that were classified as attached, but not for the ones who were classified as not attached.

Although preliminary, these results suggest that attachment between romantic partners functions as a co-regulator. Another line of research that demonstrates the co-regulation processes between romantic partners concerns the reactions of adults to bereavement (Hofer, 1984). Hofer suggested that physiological symptoms in response to the death of a long-term spouse may be a result of biological dysregulation. Thus, sleep disturbance, cardiovascular changes, or weakness of the immune system are not

a simple response to the stress imposed by the death of a loved one, but rather indicate an absence of hidden physiological regulators. Taken together, these results highlight the importance of the attachment bond in adulthood to the physiological maintenance of the partners. This notion ties to Bowlby's (1973) fundamental assumption that the attachment bond is a psychobiological system.

Activation of the Attachment System

Real or perceived physical or psychological threats automatically activate the behavioral system designed to motivate proximity-seeking toward an attachment figure (Bowlby, 1973). A few factors contribute to activation of the attachment system. One of these is the individual's state. For example, when a child or adult is tired or ill, the attachment system is more easily activated. Another set of factors concerns environmental threats, which can be real or perceived. For infants, the presence of a stranger is a good example of a perceived threat. Another kind of threat concerns the availability of attachment figures. Their absence, departure, or psychological unavailability are all hypothesized to activate the attachment system of those who are attached to them. Activation of the attachment system in infants is easily accomplished by briefly separating babies from their caregivers (Ainsworth et al., 1978). Indeed, this was the basis of the strange-situation paradigm.

Attachment figures are internalized in a process that begins in infancy. As the child grows older, his representations become more sophisticated and allow him to tolerate longer separations from his primary caregiver. Thus, whereas a nine-month-old cries whenever his mother is out of his sight, a three-year-old can tolerate a working-day separation. However, research about adults' long separations suggests that even they have difficulties separating from their attachment figures for long periods. For example, most commuters in Gerstel and Gross's (1982) study reported calling each other daily or almost every day, but not finding such contact very

satisfying. In another study, using natural observations of romantic partners at an airport, Fraley and Shaver (1998) found that contact seeking and contact maintenance behaviors were much more likely to be expressed by individuals—whether male or female—who were separating from their partners than by individuals who were traveling together.

Another way to investigate activation of the attachment system in adulthood is to use the internal (mental) representations of attachment figures. Following Baldwin and his colleagues (Baldwin, 1994; Baldwin, Keelan, Fehr, Enns, & KohRangarajoo, 1996), Mikulincer et al. (2002) used a lexical decision task to investigate activation of the attachment system in adulthood. In this task, participants were subliminally primed with a threat word. Then they were asked to decide as quickly as possible whether a string of letters represented a word or a nonword. Some of the strings of letters were attachment-related words. This procedure was based on the notion that thoughts can become active and thus influence mental processes before they reach conscious awareness (Wegner & Smart, 1997). Thus, faster reaction time to attachment issues after a threat word prime provides evidence for the stress-attachment link. In their first attempt to use this method to study normative aspects of attachment, Mikulincer, Birnbaum, Woddis, and Nachmias (2000) assessed accessibility of proximity-related thoughts after subliminally priming subjects with a threat word prime versus a neutral one. They found that priming with a threat word (such as failure, illness, or death) led to faster recognition of proximity-related thoughts (such as closeness and love), but not to positive words that had no attachment connotations (such as brightness and honesty).

More relevant to the current study is Mikulincer et al.'s (2002) examination of the link between activation of the attachment system and the availability of mental representation of attachment figures. The researchers used an abbreviated version of

the WHOTO to obtain names of participants' attachment figures. Using a lexical decision task, Mikulincer et al. (2002) presented negative words such as "failure" or "separation" or neutral words (such as "hat") to subjects on a computer screen. Right after a word was presented, subjects had to decide, as quickly as possible, whether or not a string of letters was a word. Among the words were also the names of subjects' attachment figures. Mikulincer et al. (2002) found that subjects responded more quickly to the names of attachment figures after a threat word was presented than after a neutral word was presented. A threat word prime had no significant effect on reaction time for names of other close persons who were not named as attachment figures.³

The Current Studies

Findings from Mikulincer et al.'s (2002) study are important because they are the first to show the link between activation of the attachment system and "mentally" approaching attachment figures. However, by averaging reaction times for the figures obtained from the WHOTO, Mikulincer et al. ignored the relative importance of each of these figures. In particular, Mikulincer et al. did not investigate whether participants in their study had FBAs with some of their attachment figures, with all of them, or with none. These questions are particularly important to the criteria of attachments in adulthood. The current study is designed to target this question: I hypothesized that by using a lexical decision task I could differentiate between relationships that have some attachment components and relationships that qualify as FBAs according to the WHOTO scale. By using a lexical decision task, I wished to further validate the ability of the WHOTO to distinguish between FBA and relationships that merely have

³ Mikulincer et al. (2002) referred to these figures as attachment figures, even though not all attachment behaviors were directed toward them. When presenting Mikulincer et al.'s (2002) results, I use the same terminology they used. Later, when I present the results for the current studies, I refer to these figures as significant people.

attachment components. In doing so, I wished to further test its ability to serve as the criterion for attachment in adulthood.

The second aim of the current study concerns the criteria for attachment in romantic couples. Similar to the general criteria concerning attachment in adulthood, I hypothesized that FBA is an integral part of an attachment bond between romantic couples. At the same time, physical proximity is theorized to play an important role in adult romantic relationships (Diamond & Hicks, 2004; Hazan et al., 2004). Thus, I also explored the need for physical proximity as it relates to attachment between romantic partners.

Although my main interest is normative, it is important to consider individual differences in attachment style as well. When participants are asked on the WHOTO to name the individuals they feel they can count on, or the individuals they turn to for comfort or reassurance when needed, their responses may be affected by their attachment style. Ainsworth et al. (1978) identified three basic patterns of attachment that infants display in relation to their primary caregivers in times of stress. Thus, a *secure* infant is easily soothed by his/her attachment figure. In contrast, an *ambivalent* infant is not easily soothed, usually showing signs of anger and distress in the presence of his/her attachment figure. Finally, an avoidant infant actively avoids the attachment figure in times of stress. In 1987, Hazan and Shaver demonstrated that these individual differences in attachment style are also applicable to the way adults relate to romantic partners. Individuals with an *avoidant* attachment style try to avoid getting too close to a partner, have difficulties depending on romantic partners, and prefer to rely on themselves rather than on others. Individuals with an *ambivalent* attachment style need frequent reassurance that they are loved, worry constantly about being abandoned, and usually feel that their needs are not being met in their relationships. Individuals with a *secure* attachment style find it easy to establish closeness with a partner, turn to their

partner when they need comfort or support, and generally feel well cared for by their partner.

Some researchers (e.g., Trinke & Bortholomew, 1997) have argued that the WHOTO is biased toward attachment security (e.g., participants who are more avoidant may want to direct attachment behaviors toward their attachment figure but will not actually do so). Other theorists (e.g., Mikulincer, Shaver, & Pereg, 2003) have suggested that activation of the attachment system is a normative process that applies to all individuals. According to Mikulincer and Shaver's (2002) model, signs of threat activate the attachment system in all individuals, regardless of attachment style. In addition, the second step in which individuals seek either a physical or mental proximity to the attachment figure is also applicable to all individuals. Where individuals differ is in the way they perceive the availability of attachment figures (the third step in the model). By controlling for individual differences in attachment style, I wish to further explore the usefulness of the WHOTO as a measure of normative attachment in adulthood.

STUDY 1

Method

Participants. A total of 139 participants were recruited through announcements in human development courses at Cornell University, by posting informational fliers around campus, and by recruiting participants via the SUSAN website. Of the 139, 127 participated in the lexical decision task. The information below concerns only these participants. The majority of the sample consisted of undergraduate students (83%, 105 participants); of the remaining participants, 15 were graduate students (12%), 5 were administrative assistants (4%), and two did not reveal their status. Participants chose to receive either course credit for their participation or \$5. Of the 127 participants, 34 were males (27%) and 93 were females (73%). Their mean age was 22 (SD=6.65), ranging from 18 to 59. Fifty-two percent were Caucasian, 34% Asian, 4% Black, 3% Hispanic, and 5% other. Four participants did not report their racial/ethnic identification.

The vast majority of the sample was heterosexual (122 participants, 96%), 1 participant indicated that she is gay, 2 participants indicated that they are bisexual, and 2 did not disclose their sexual orientation.

Materials

Demographic questions. Participants were asked to indicate their sex, sexual orientation, religious and racial/ethnic affiliation, and current year in school.

Relationship status. Participants were asked to indicate their relationship status by checking one of the following categories: not seeing anyone, seeing one or more persons casually, dating more than one person, exclusively dating one person in the area, involved in an exclusive long-distance relationship, cohabiting with a partner, or married, and for each category, how long.

Attachment status (WHOTO). Participants were asked to identify whom they view as the primary target for each of the four behaviors that define attachment: proximity maintenance (e.g., person(s) “it is important for you to see or talk to on a (nearly) daily basis”), safe haven (person(s) “you most want to talk to when you’re worried about something”), separation distress (person(s) “you miss the most when they are away”), and secure base (person(s) “you know would do just about anything for you”). Participants were asked to list individuals in order of importance for each component. The WHOTO has been shown to have good internal consistency (Fraley & Davis, 1997), test-retest reliability (Trinke & Bartholomew, 1997), and external validity (Mikulincer, Gillath, & Shaver, 2002).

List of significant people. Participants were asked to provide the first names of up to four people they mentioned on the WHOTO and to specify the relationships they have with these people (e.g., mother, partner, friend). Participants were instructed to list these people in order of significance.

List of close people. Participants were asked to provide the first names of four people with whom they are somewhat close, but whom they did not mention on the WHOTO.

Attachment style. I measured attachment style using a short version of the Fraley, Waller, and Brennan (2000) self-report measure. This measure was derived from an item-response analysis of 14 self-report inventories of adult attachment (Fraley, Waller, & Brennan, 2000). All of these inventories are reduced to two orthogonal dimensions: attachment anxiety (fear of separation and abandonment) and attachment avoidance (discomfort with intimacy and closeness). Items include statements such as “I’m the type who needs a lot of reassurance that I am loved,” and “I’m the type who tries to avoid getting too close to a partner.” Responses were recorded using a 1–7 scale ranging from “Not at all like me” to “Exactly like me.”

Procedure

The first part of the current study involved completing a questionnaire composed of the measures described above (see Appendix A for a copy of all measures and questions). Participants received the questionnaire via email and were instructed to fill it out at least two days prior to the lab visit and to bring it with them. The second part involved a visit to our campus lab for a computer task. The lab visit took place at least two days after the participants completed the questionnaires to ensure that they would not be thinking about issues related to their attachment relationships at the time of the lab visit (at least not as a result of completing a questionnaire related to attachment issues). Upon participants' arrival at the lab, the study was described, and participants signed the consent form. Then they were asked to list as many green vegetables as possible. This task was used as a distraction and filler activity, which provided time for the research assistant to prepare the computer task for the participants.

Participants were then told that they would perform a computerized lexical decision task.⁴ The task was based on the apparatus and procedure used by Mikulincer et al. (2002). It was run on a Pentium IBM-PC, with an SVGA color monitor, and was programmed using Superlab software (Christopher, 2001). The primes and target words were displayed in upper-case black letters on a white background in the center of the monitor. Participants first completed 10 practice trials and then completed 288 experimental trials. The words and nonwords in the practice trials were different from those in the experimental trials. Each trial of the task consisted of a 20-millisecond presentation of one of two primes (threat word, neutral word) followed, after a pause

⁴ The lexical decision task was initially used to investigate the nature of semantic memory or the organization of general world knowledge. Meyer and Schvaneveldt (1971) used this method to show that lexical decision responses are made more quickly when the current word is related to the previous word. The effect is known as "semantic priming" and is often cited as evidence for the associative strength between concepts in semantic memory. Concepts that are more closely related will produce greater priming than concepts less closely related.

of 500 ms, by the presentation of one of 24 target letter strings for 1,000 ms (half of the time a word target was presented, and the other half a nonword target was presented). Participants judged as quickly as possible whether the letter string was a word or not by pressing *1* on the keyboard number pad if they thought the string was a word or *0* if they thought it was a nonword. Participants were explicitly told that names counted as words. Although the participants were not expected to consciously process the prime, they might detect a flash of light. Therefore, they were instructed to ignore this flash. To avoid after-image of the primes, they were masked with an XXXXXXXX pattern immediately after their presentation for 500 milliseconds. The threat-related word prime was the word *SEPARATION*, which was presented in 144 of the trials. The neutral word was the word *BASEBALL*, which was also presented in 144 trials. The target words were uniquely constructed for each participant in accordance with the first names of persons identified as the participants' most significant people, the first names of persons identified by the participants as close persons, and neutral words (i.e., COACH, TEACHER, BOTTLE, and ROAD). The target nonwords were constructed to look like a word (e.g., NETWXRK, ALXBRT). Specifically, each participant's target word list contained five categories: (a) *names of significant people*: four names of people listed by the participant after completing the WHOTO scale (in the case of participants who provided fewer than four names as significant people or close others ($N=18$), neutral names, i.e. names that were not presented as significant person or close person, replaced the missing figures); (b) *names of close persons*: four names of participant's close-relationship partners who were *not mentioned on the WHOTO scale*; (c) *4 neutral words*; and (d) *12 nonwords*. Each category was presented six times after a threat prime and six times after a nonthreat prime. Thus, there were 48 pairs of primes and target letter strings (2 X 24),

which were presented six times for a total of 288 trials. The different kinds of trials were randomly ordered for each participant.

Results and Discussion

Replication of Mikulincer et al. (2002) results.

First I tried to replicate the results of Mikulincer et al. (2002). These researchers found that subjects responded more quickly to the names of attachment figures after a threat word was presented than after a neutral word was presented. A threat word prime had no significant effect on reaction time for names of other close persons who were not named as attachment figures.

I ran a Mixed Model Analysis. The within-subject factors were *target stimuli* (attachment figures,⁵ close others, words, and nonwords) and *word prime* (threat, no threat). The random factor was participant. For the dependent variable I used only correct reaction times. This analysis yielded a significant main effect for type of target stimuli, $F(3, 33,406)=196.25, p=.0001$. To further investigate the origin of the main effect I ran several pairwise comparisons. All pairwise comparisons were significant at the .001 level or less, indicating that participants responded with faster reaction times to names of attachment figures ($M=524.80$) than to names of close persons ($M=534.62$), than to words ($M=552.78$), and finally than to nonwords ($M=558.65$). There was no main effect of word prime, $F(1, 33,393)=.697, ns$, and no interaction between word prime and type of target stimuli, $F(3, 33,393)=.870, ns$.

As can be deduced from the above results, the current study only partially replicated the results of Mikulincer et al. (2002). As in Mikulincer et al.'s study,

⁵ To simplify the comparison between the results from Mikulincer et al.'s (2002) study and the results of this study, I use Mikulincer et al.'s terminology and refer to figures gathered from the WHOTO as attachment figures, even though we do not know whether they qualify as attachment figures. Later, when I discuss only the results of this study, I refer to these figures as "significant people."

participants in the current study reacted faster to their attachment figures' names than to close others' names, words, and nonwords (see Figure 1).

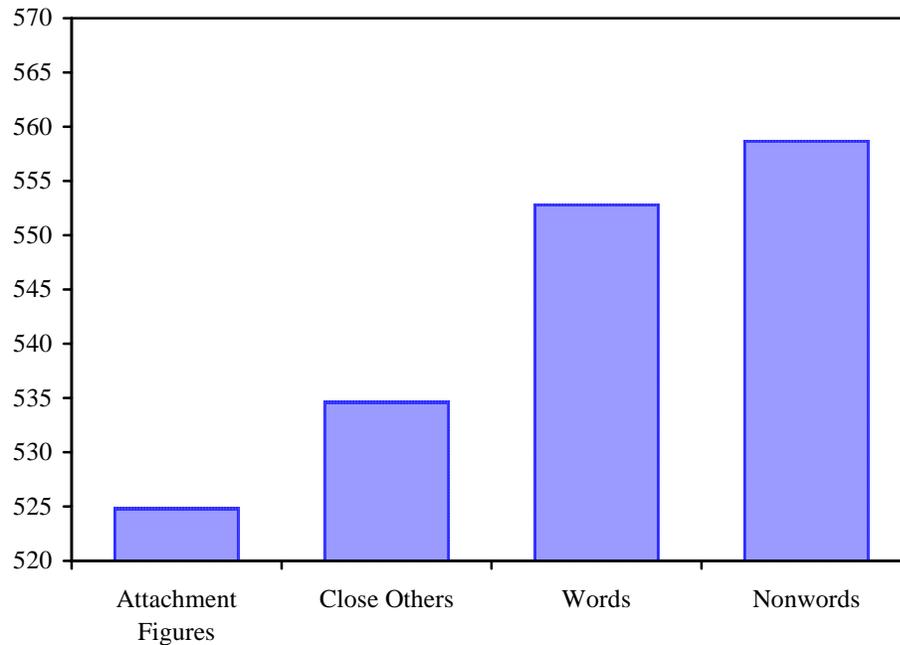


Figure 1. Reaction time (in milliseconds) by target stimuli.

However, in contrast to Mikulincer et al.'s results, participants in the current study were also faster in recognizing their close others' names than words and nonwords, and also faster in recognizing words than nonwords. Most important, I did not find a significant interaction between target stimuli and word prime. Thus, in the current study, participants did not react faster to their attachment figures' names after a threat word compared with a neutral word.

Several differences between the current study and Mikulincer et al.'s (2002) study may explain why their results were not replicated. First, I made changes in the questionnaire, using a different technique to obtain the names of attachment figures and close others. Mikulincer et al. used only six WHOTO questions to obtain

attachment figures' names, and participants were allowed to provide only one name for each question. I used 12 WHOTO questions, and participants were allowed to provide as many names as they wished. Furthermore, I did not gather participants' attachment figures' names from these questions. Instead, after participants had filled out the WHOTO, they were asked to rank the four most important people they mentioned on the WHOTO. As one can see, this method was more open than that of Mikulincer et al. By not limiting the participants to one name and by asking open questions, I essentially altered Mikulincer et al.'s measure. I implemented these changes because I believe that the longer format of the WHOTO more fully captures the complexity of the attachment network. Consequently, this kind of method may result in more variance than using a shorter format.

Regarding close others, I asked participants to provide the first names of four individuals who are close to them but whom they did not mention in any of their answers to the WHOTO. My goal was to make a clear distinction between the attachment figures category and the close others category. In contrast to the method used in the current study, Mikulincer et al. (2002) derived the close others list by asking participants to write down the first names of their father, mother, brothers, sisters, best friend, current romantic partner, grandfathers, and grandmothers without considering the actual attachment functions they serve (i.e., Mikulincer et al. considered these figures as close others as long as they did not appear in the six WHOTO questions).

The variation between Mikulincer et al.'s (2002) method and the method used in the current study for obtaining the names of attachment figures and close others may explain the differences in the nature of the names in the attachment figures' and close others' lists. In Mikulincer et al.'s study, 34% of the attachment figure names were of friends, 23% were of romantic partners, and 22% were the name of the

participant's mother. In the current study, 21% mentioned their mothers as one of their attachment figures, 13% mentioned their romantic partner, and only 18% mentioned a friend as an attachment figure. As for close others in this sample, 70% mentioned a friend.⁶ As can be seen, friend is the largest category for attachment figures in Mikulincer et al.'s study, whereas mother is the largest category in this sample. The parity in percentages for mother and friend in the two studies may be related to differences in the guidelines given to participants for creating the two lists. The names that were elicited for attachment figures in Mikulincer et al.'s study most closely resemble the names for close others in the current study, and vice versa—the current study's attachment figures' names resemble Mikulincer et al.'s close others list.

The results of the current study may be attributable in part to the changes made to the procedure. First, the participants in Mikulincer et al.'s (2002) study filled out a questionnaire and completed a lexical decision task in the same session.⁷ The current study was divided into two sessions. Participants in the current study filled out the questionnaire at home and came to the lab for the computer task. I arranged for the participants to have a minimum two-day break between filling out the questionnaire and visiting the lab. I divided the study into two sessions to ensure that attachment issues were not present in a participant's mind (at least, not as a result of having just filled out a questionnaire regarding attachment issues). In Mikulincer et al.'s study, dealing with attachment issues prior to the lexical decision task may have made attachment concepts more accessible for the computer task.

Another difference between the two procedures was the target stimuli used. I used only attachment figures, close others, words, and nonwords. In contrast, Mikulincer et al. (2002) did not use words but used names of known and unknown

⁶ Mikulincer et al. did not specify the percentages for the close others category.

⁷ Mikulincer et al. used a filter task between the questionnaire and the lexical decision task. In this filter task, participants filled out a 20-item paper-and-pencil questionnaire concerning leisure activities and lifestyle.

persons.⁸ As a result, all of the words in Mikulincer et al.'s study were names of people. Names of people are all tied more closely to the social realm. It is possible that this also made attachment issues more accessible, thus increasing the likelihood that attachment figure names would be recognized.

Finally, regarding the procedure, each target stimulus in the Mikulincer et al. (2002) study was presented only twice, whereas each target stimulus in the current study was presented six times. As a result, the current study consisted of 288 trials, whereas the Mikulincer et al. study consisted of 192 trials. I lengthened the procedure because I was mainly interested in differences between figures mentioned in the WHOTO. Therefore, two data points for each figure were insufficient to satisfy the main goal of the current study. However, this longer format may have created a tiredness effect in the current study.

Another difference between the current study and that of Mikulincer et al. (2002) concerns the samples. Although the age range in Mikulincer et al.'s study was more limited (19–30) than in the current study (18–58), the median age in the current study was lower (20 in the current study, 23 in Mikulincer et al.'s).⁹ This divergence may have also affected the differences, described earlier, in the names in the attachment figures category (i.e., the main category of attachment figure in this sample was “mother,” whereas the main category in Mikulincer et al.'s study was “friend”). The older sample in Mikulincer et al.'s study may have had more time to progress in the process of transferring attachment behaviors from parents to peers.

The last main difference between Mikulincer et al.'s (2002) study and the current study concerns the meaning of the threat prime in the two different languages, Hebrew and English. The Hebrew word for separation used in Mikulincer et al.'s

⁸ I did not use names of known and unknown persons because it was impossible to gather a list like this in the English language (Mikulincer et al.'s study was conducted in Hebrew).

⁹ Mikulincer et al., did not report the age mean, therefore I could compare only the median.

study is “*preida*.” This term is used primarily in interpersonal contexts to indicate distance between relationship partners or the breakup of a relationship. A different word, “*hafrada*,” is used in Hebrew to characterize, for example, a wall or barrier “separating” pieces of property. In English, on the other hand, the word “separation” has many meanings (i.e., the act of dividing or disconnecting, coming apart, the state of lacking unity, and the distance between things [*WordNet* ® 2.0, © 2003 Princeton University]). These meanings are not restricted to the social context, as in Hebrew. Therefore, the word “separation” for English speakers may not automatically activate the attachment system because immediate associations for this word are not necessarily interpersonal.

In conclusion, differences in the procedure, in the sample, and in the language in which the studies were conducted may explain the inability of this study to replicate Mikulincer et al.’s (2002) results. Two main categories of differences emerged: first, the Mikulincer et al. procedure and the language in which the study was conducted made attachment-related issues more accessible, contributing to a greater effect. The second major difference is related to the different goals of the two studies. Mikulincer et al. were interested in demonstrating activation of the attachment system in adulthood. I used activation of the attachment system in adulthood to explore differences between specific figures mentioned in the WHOTO. Thus, the current study was longer, and the questionnaire used here was more open. These differences may have overshadowed the effect found by Mikulincer et al. At the same time, they enabled us to more closely compare reaction times to specific figures that were mentioned in the WHOTO. In the next section, I present the main findings of the studies concerning these figures.

The current study had two main hypotheses. One hypothesis concerned differences between figures toward whom the participants direct all four attachment

behaviors and figures toward whom the participants do *not* direct all attachment behaviors. The second hypothesis concerned the way in which physical proximity influences attachment between romantic partners. I will address the two hypotheses in each study separately. In some cases, I begin with analyses concerning data from the questionnaires only. These analyses provided additional information that appeared to complete the picture that emerged from the analysis of the lexical decision task.

Bowlby (1982) theorized that the attachment system is activated under two conditions of the environment: the first is a real or perceived threat. The second is the availability of the attachment figure. I tested this second kind of threat in Study 1. Thus, to activate the attachment system in Study 1, I used the threat word prime “*separation*” for all participants.

Hypothesis 1.

For the first hypothesis, I made a distinction between relationships which have all attachment components (i.e., FBAs) and relationships that have some attachment components. In particular, I hypothesized that people who direct all four attachment behaviors toward one figure will react differently to her/his name than people who do not direct all attachment behaviors toward one figure.

Before analyzing data concerning this hypothesis, I was interested in mapping participants’ significant-people networks. As mentioned above, I do not define these people as attachment figures but rather as significant people because not all attachment behaviors were directed toward them. At the same time it is important to note that *all* relationships with figures presented in this section contained some attachment components (i.e., they were mentioned in the WHOTO).

I analyzed data from the questionnaires only to provide a better understanding of which figures qualify as attachment figures and how these figures are “mentally” organized (i.e., whether participants treat their significant people equally or whether

relationships with these people are structured more hierarchically). Thus, I ran frequencies of figures for each position in the significant people list. Table 1 represents the results of this analysis.

Table 1. *Study 1. Position in the Significant People List as a Function of Figure (percentages)*

	First Position	Second Position	Third Position	Fourth Position
Mother	49	26	7	3
Partner	26	6	9	10
Father	8	38	16	9
Other Family Member	9	13	35	35
Friend	6	14	28	25
Others	2	2	1	5
Missing*	----	1	4	13

* Some people did not mention four people in the significant people list; hence the missing data.

As one can see in Table 1, the parents (and especially the mother) occupy the top of the list (first or second positions). At the same time, a quarter of participants identified the partner as the most significant person. Friends and other family members were mentioned at lower levels of the list.

To test whether participants turn to a particular person as a function of the person's position in the list, I composed an attachment score based on whether the person was listed first in each of the 12 WHOTO questions. Then I ran a General Linear Model for Repeated Measures, comparing attachment scores for each position in the significant people list. As expected, this analysis was significant, $F(3,98)=75.31, p=.0001$. All pairwise comparisons were significant at the .05 level or lower, except the difference between position three and position four in the list. Thus, participants directed significantly more attachment behaviors toward the first person in the significant people list ($M=7.05, SD=.33$), next toward the second person ($M=2.25, SD=.25$) and, finally, to the third ($M=1.38, SD=.19$) and fourth ($M=1.04, SD=.17$) people (see Figure 2).

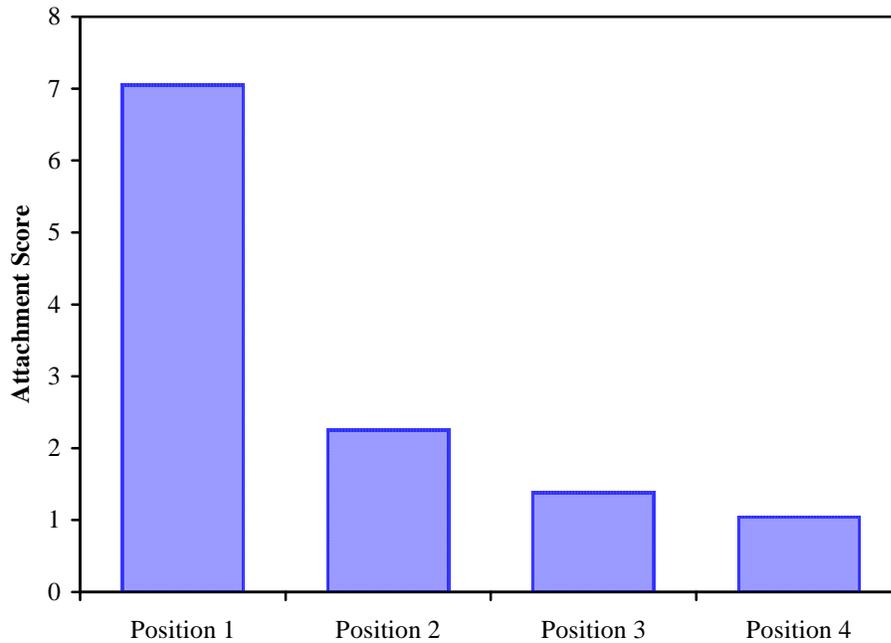


Figure 2. Study 1. Person's attachment score as a function of her/his position in the significant people list.

These results support previous findings regarding the content and structure of the significant people network in adulthood (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997). First, for most of the participants, the parents or the partner function as the most significant figure. Second, it appears that these figures are organized in a hierarchical structure.

Next, after analyzing the structure and the content of the significant-people network, I tested frequencies of FBAs. Two questions in the WHOTO assessed each attachment behavior (with the exception of three questions targeting secure base behaviors). To be fully attached, a participant must direct at least one behavior from each category to the person mentioned in the WHOTO (i.e., the person will be first on at least one question concerning secure base behaviors, separation distress, safe haven, and proximity seeking). A total of 44% (56) had at least one full blown attachment,

and of those, 84% (47) were with the person mentioned first in the list of significant people. To complete the picture regarding FBA, I ran frequencies of FBAs as a function of figure. Forty three percent of the participants who mentioned their partner in their significant people list had FBAs with her or him. Eighteen percent had FBAs with their mother, 5% with a friend, 3% with other family members, and 2% with their father. Thus, almost one-half of the relationships with a partner were classified as FBAs, and almost one-fifth of the relationships with the mother were classified as FBAs. Relationships with the father, friends, and other family members met the criteria for FBA rarely. The findings that most FBAs are with the romantic partner, followed by FBAs with the mother and, finally, with fathers, friends, and other family members are similar to those reported by Doherty and Feeney (2004). However, the percentages of FBAs in this sample were much lower than those obtained by Doherty and Feeney (2004) and Trinke and Bartholomew (1997). This is probably due to differences in the criteria I used to define an FBA. I followed Hazan and Zeifman's (1994) criteria, counting only those instances in which the attachment figure was the primary target of the attachment behavior (i.e., the attachment figure was mentioned first). In their criteria for FBA, Doherty and Feeney ignored the relative position of the attachment figure in each response (i.e., the attachment figure could be mentioned second, third, or fourth in the question).

Another explanation for the lower percentages of FBAs in this sample may be a developmental one. Although the age range in the current study was broad (18–58), the participants consisted mainly of young students ($M=22$, $SD=6.65$), whereas Doherty and Feeney (2004) used an older, more diverse sample (age range 16–90, $M=34.86$, $SD=18.55$). It is possible that the younger participants in the current study were in the process of transferring their attachment behaviors from their parents to their peers, and thus did not direct all attachment behaviors toward one figure.

Next, after examining frequencies of FBAs, I tested the main hypothesis that participants who direct all four attachment behaviors toward one person will react differently to the person's name than participants who do not direct all attachment behaviors toward one person. To test the hypothesis that FBA will affect reaction time to a significant person name after a threat word prime compared with a neutral word prime, I performed a Mixed-Model Analysis. There was one between-subject factor, *FBA*, and I controlled for *significant people position* (i.e., whether the figure was ranked first, second, third, or fourth), *sex*, *age*, and *attachment avoidance* and *attachment anxiety*.¹⁰ There was one within-subject factor: *prime* (threat or nonthreat). The random factor was *participant*. The dependent variable was *correct reaction times*.

As expected, participants who have FBAs with the person mentioned in the WHOTO were faster to recognize that person's name after a threat word ($M=507.55$, $SD=9.47$) compared with a neutral word ($M=521.89$, $SD=9.46$); however, while there was no difference for participants who did not turn to the significant person for all attachment functions ($M=522.38$, $SD=4.99$; $M=523.81$, $SD=4.99$ after threat and neutral prime, respectively), this analysis was not significant, $F(1,3233)=1.88$, *ns*.

However, this analysis was approaching significance when analyzing data only for those participants who reported their mother or father as their most significant person. Similar to the analysis with all significant people, I performed a Mixed-Model Analysis only for those participants who mentioned their mother or father first in the list of significant people. There was one between-subject factor, *FBA*, and I controlled for *sex*, *age*, and *attachment avoidance* and *attachment anxiety*. There was one within-

¹⁰ As mentioned in the introduction, some researchers (e.g., Trinke and Bortholomew, 1997) have argued that the WHOTO is biased toward attachment security (e.g., participants who are more avoidant may want to direct attachment behaviors toward their attachment figure but will not actually do so). By controlling for individual differences in attachment style, I wished to further explore the usefulness of the WHOTO as a measure of normative attachment in adulthood.

subject factor: *prime* (threat or nonthreat). The random factor was *participant*. The dependent variable was *correct reaction times*.

This analysis revealed an approaching-significance effect for the interaction between FBA and prime $F(1, 692)=3.36, p=.067$. Pairwise comparison was approaching significance for participants who directed all attachment behaviors toward their parents ($p=.099$). These participants were faster to recognize the parent name after a threat word prime ($M=507.03, SD=13.33$) compared with a neutral word prime ($M=526.49, SD=13.28$), whereas participants who did not have FBAs with their parents were faster to recognize the parent's name after a neutral word prime ($M=518.36, SD=8.46$) compared with a threat word prime ($M=524.62, SD=8.50$) (see Figure 3).

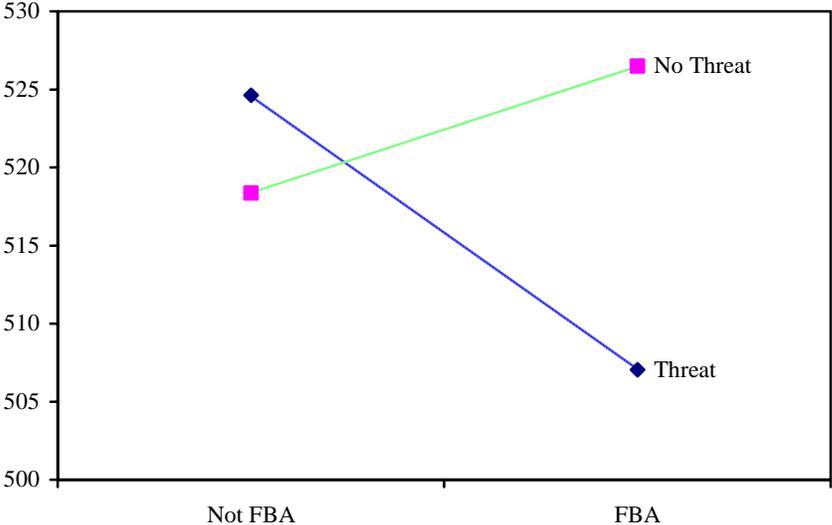


Figure 3. Study 1. Mean reaction time (in milliseconds) by FBA score for the parents as the most significant people.

A methodological explanation may exist for the presence of the effect only for parents as the most significant people and not for all significant people, regardless of their relative position in the list. In the current study, I confronted a challenge met by

most researchers who study attachment beyond infancy: attachment behaviors in adulthood do not overwhelm other behavioral systems as easily as they do in infancy (Weiss, 1982). This, of course, makes observation of activation of the attachment system much more difficult. Thus, it is possible that the prime I used, which was the same prime for all participants in Study 1, was not threatening enough to activate the attachment system in most participants. It is also possible that for some people the prime did not reach their subliminal threshold.

As for the results concerning the parents as the most significant people, as expected, participants who turned to the parent for all attachment functions were faster to recognize the parent's name after a threat word prime compared with a neutral one, whereas participants who did not direct all attachment behaviors toward a parent were slightly faster to recognize the parent's name after a neutral word prime compared with a threat one. Thus, the lexical decision task makes a distinction between relationships that qualify as FBAs and relationships that have some attachment components.

The finding that participants who have FBAs with the parent react faster to her/his name after a threat word prime compared with a neutral one further validates three key assumptions of attachment theory. First, in the course of normative development the attachment figure is internalized. Thus, adults can think about their attachment figures, expect certain reactions from them, and plan strategies for stress reduction. Second, through repeated use, the attachment system begins to function automatically. This finding is in line with the current research in social psychology, suggesting that much of social processing, such as perception, evaluation, and even behavior, is largely automated (Chartrand & Bargh, 1999). Finally, the attachment system is operating beneath the level of conscious awareness (Bowlby, 1980).

The fact that these results did not significantly depend on a person’s score in either attachment avoidance dimension nor in attachment anxiety dimension suggests that the basic mechanisms of the attachment bond are similar for all people, regardless of individual differences in attachment style.

Interesting findings emerged regarding differences in characteristics of participants who directed all attachment behaviors toward their parents and participants who did not direct all attachment behaviors toward their parents. T-test results revealed that the first group was younger ($M=19.80, SD=1.11$) than the second group ($M=21.04, SD=2.76$), $t(65)=2.65, p=.01$, and higher in avoidant score ($M=29.15, SD=8.43$) compared with the second group ($M=24.63, SD=8.57$), $t(65)=1.94, p=.057$. In addition, participants who had FBAs with their parents were less likely to be involved in romantic relationships (15%) compared with participants who did not have FBAs with their parents (58%), $\chi^2(1)=10.69, p=.001$ (see Figure 4).

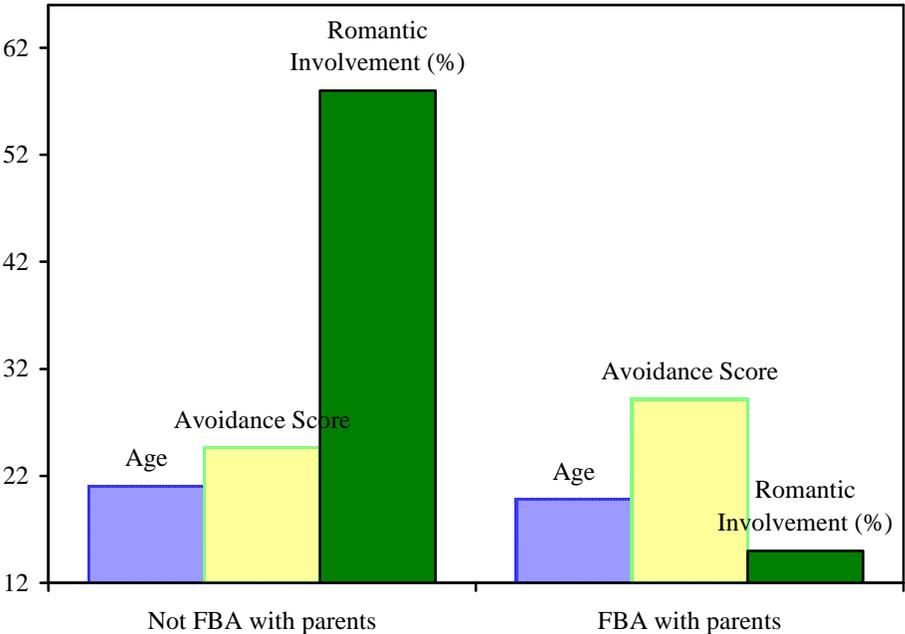


Figure 4. Study 1. Participants’ characteristics by FBA score for the parents.

These findings may reflect the process of transferring attachment relationships from parents to romantic partners; whereas the younger participants were still primarily attached to their parents, older participants were engaged more in romantic relationships; hence they had begun to transfer their attachment behaviors to their peers.

At first glance, the findings that participants who had FBAs with their parents were more avoidant compared with participants who did not have FBAs with their parents may seem to contradict Hazan & Zeifman's (1994) findings. These researchers found that when children and adolescents were classified as insecurely attached to their parents, they were more likely to list peers rather than parents as their primary attachment figures. However, Hazan & Zeifman (1994) measured attachment style in relation to the parents, whereas I measured attachment style in relation to romantic partner (i.e., general feelings about partners). Thus, findings that participants who try to avoid closeness with romantic partners are more likely to be primarily attached to their parents are reasonable. This finding suggests that monotropy should be evaluated in its developmental context; whereas it is more advantageous to direct all attachment behavior toward the parent in infancy, it is may be less advantageous to do so in early adulthood.

Hypothesis 2.

The second hypothesis concerned a factor that facilitates attachment formation in romantic couples. Specifically, I hypothesized that participants who have FBAs with their partners and are in close proximity with them will react differently to their partner's name compared with participants who have FBAs with their partners but do not have close proximity with them.

Similar to the way I analyzed data concerning hypothesis 1, I started with data analyses of information gathered only from the questionnaires. A total of 54% of the

participants in Study 1 were involved in romantic relationships (69 participants). These participants were older ($M=24.06$, $SD=8.89$) compared with participants who were not involved in romantic relationships ($M=20.05$, $SD=1.56$), $t(72)=3.65$, $p=.0001$. Not surprisingly, these participants were also less avoidant ($M=19.93$, $SD=8.01$) compared with participants who were not involved in romantic relationships ($M=27.89$, $SD=8.80$), $t(123)=5.29$, $p=.0001$ (see Figure 5).

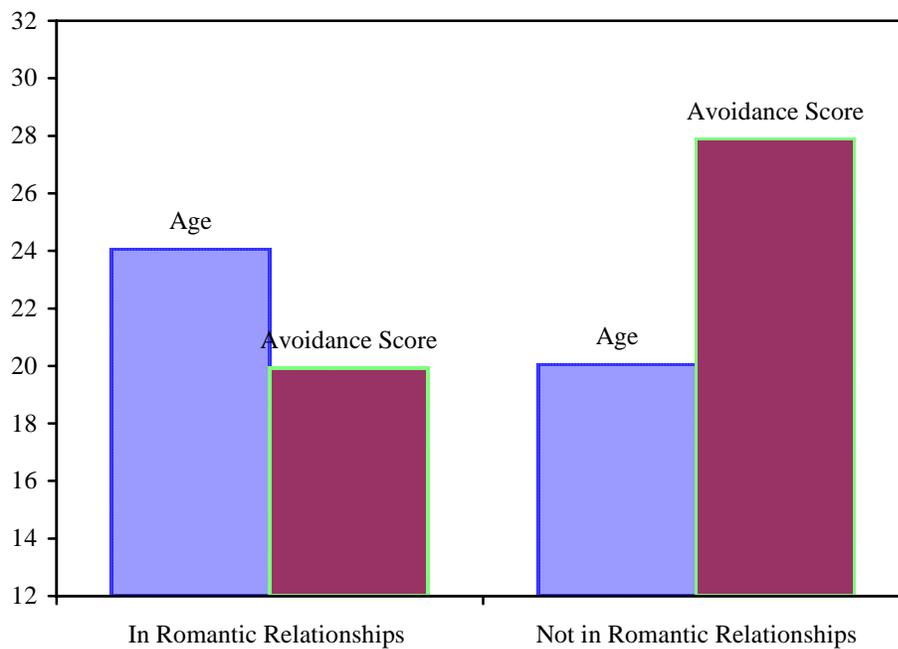


Figure 5. Study 1. Participants' characteristics by romantic involvement.

Among those who were involved in romantic relationships, 46% ranked their partner first in the list of significant people, whereas 54% ranked someone else first in the list of significant people (42% ranked their mother first, 3% ranked their father first, and 9% ranked another family member as the most significant person in their life). Twelve percent of the participants who were involved in romantic relationships did not rank their partner in the list of significant people in their life. Table 2 presents

relationships and personal characteristics of participants who were involved in romantic relationships but did not rank their partner in the significant people list, participants whose partner is in the list but not ranked first, and participants whose partner is listed as the most significant person in their life.

Table 2. Study 1. Relationships and Personal Characteristics by the Position of the Partner in the Significant People List

	Partner is not part of the significant people list N=8		Partner is not the first in the significant people list N=29		Partner is the first in the significant people list N=32		F	p
	M	SD	M	SD	M	SD		
Age	21.63	3.15	23.17	1.65	25.52	1.60	.85	ns
Relationships Length*	11.88	23.91	22.78	13.01	65.00	12.35	3.61	.033
Avoidant Score**	28.23	2.55	20.97	1.34	16.81	1.27	9.13	.0001
Anxiety Score	10.25	1.59	13.68	.85	12.44	.79	.42	ns
		%		%		%	χ^2	p
Long Distance		75		41		22	8.39	.015
Living Together		0		14		53	15.08	.001
Married		0		3		28	9.00	.011
FBA's		0		17		72	17.48	.0001

* Scheffe post hoc tests revealed that the only approaching-significance difference ($p=.071$) was between participants who had their partner first in the significant people list and participants who had the partner in the significant people list, but not first.

** All Scheffe post hoc tests were significant at the .035 level or less, other than the difference between participants who had the partner first in the significant people list and participants who had the partner in the significant people list, but not first, which was approaching significant ($p=.087$).

As expected, participants who ranked the partner first in the significant people list were in longer-term and more committed relationships (i.e., more likely to be married). In addition, the relationships of participants who ranked the partner first in the significant people list were of closer physical proximity (i.e., less likely to be engaged in long-distance relationships and more likely to live with their partner) compared with participants who had a romantic partner but did not rank him or her first in the significant people list. Most relevant to this study is the overlap between position of the partner in the significant people list and FBA status. As shown in Table 2, the majority of the relationships with partners that were mentioned as the most significant person were classified as FBAs, whereas a minority of relationships with partners who were not the most significant persons were classified as FBAs.

Similar to attachment to the parent, I predicted that only participants who direct all attachment behaviors toward the partner will react faster to her/his name after a threat word prime compared with a neutral one. In contrast to attachment to the parent, I also examined the influence of physical proximity on reaction times to the partner's name. To test the hypothesis that participants who have FBAs with their partners and are in close proximity to them will react differently to the partner's name compared with participants who have FBAs with the partner but do not have close proximity with them, I analyzed data only for those participants who have FBAs with their partners.¹¹

Twenty-nine participants had FBAs with their romantic partners. For 22 (76%) of these, the partner was also reported as the most significant person. The majority of this group were in geographically close relationships (72%) and were women (73%). Their ages ranged from 19 to 59 ($M=26.05$, $SD=10.36$). Of these, 55% lived with their partner, and 32% were married. The average length of their relationships was 72 months ($SD=11.79$), with a range between 2 and 502 months. I used "cohabiting" as a measure of physical proximity. To test the hypothesis that participants who are living together will react faster to the attachment figure's name in after a threat word prime compared with a neutral one, I performed a mixed-model analysis. There was one between-subjects factor, *cohabiting* (yes/no). I controlled for *marital status*, *long distance status*, *age*, *sex*, *relationship length*, and attachment *avoidance* and

¹¹ Similar relationship components that distinguish between relationships of participants who named the partner as the most significant person in their life and participants who did not name the partner as the most significant person in their life distinguish between participants who had FBAs with their partner and participants who did not have FBAs with their partner. Thus, participants who had FBAs with the partner were more likely to be engaged in geographically close relationships ($\chi^2=3.08$, $p=.079$), more likely to live with the partner, ($\chi^2=3.73$, $p=.053$) and to be married ($\chi^2=3.03$, $p=.082$). As expected, participants who had FBAs with the partner had longer relationships ($M=62.75$, $SD=103.88$) compared with participants who did not have FBAs with the partner ($M=33.90$, $SD=39.91$); however, this difference was not significant. The fact that similar relationship components distinguish between relationships of participants who named the partner as the most significant person and participants who did not name the partner as the most significant person, and between participants who had FBAs with the partner and participants who did not have FBAs with the partner is not surprising because of the large overlap between these two categories.

attachment *anxiety*. There was one within-subject factor: *prime* (threat or nonthreat), and the random factor was *participant*. The dependent variable was *correct reaction times*.

The only significant effect was the interaction between *cohabiting* and *prime* $F(1,299)=6.10, p=.014$. Pairwise comparison was significant for participants who lived with the partner ($p=.032$). Participants who lived with the partner reacted faster to her/his name after a threat word prime ($M=517.23, SD=22.86$) compared with a neutral one ($M=548.57, SD=22.82$), whereas participants who did not live with the partner were faster to recognize his/her name after a neutral word prime ($M=490.25, SD=20.20$) compared with a threat one ($M=506.21, SD=20.13$) (see Figure 6).

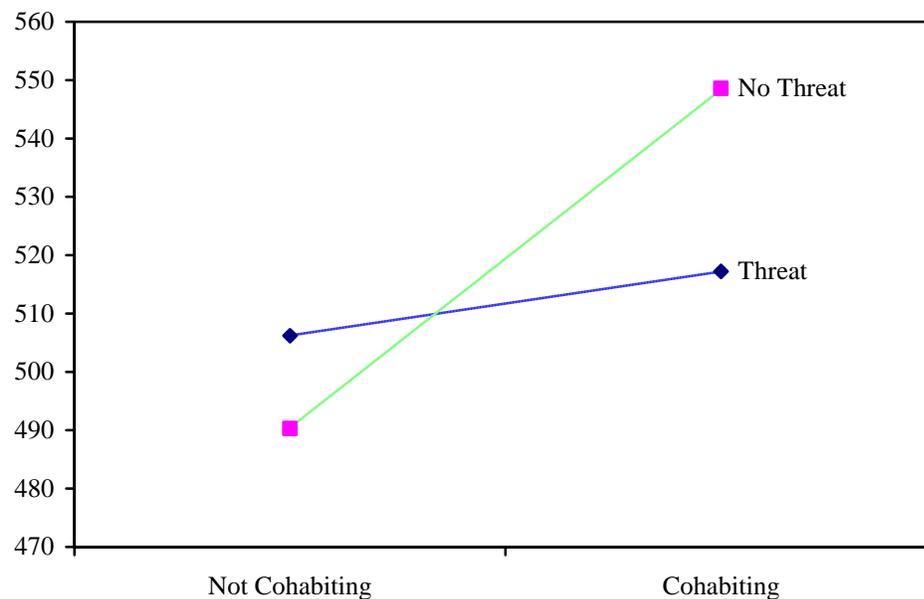


Figure 6. Study 1. Mean reaction time (in milliseconds) by cohabiting status for participants who have FBAs with their partners.

Participants who had FBAs with the partner and who lived with her/him were faster to recognize her/his name after a threat word prime compared with a neutral one. These results may suggest that unlike attachment to a parent, which relies only on

mental perception (i.e., their answers on the WHOTO), attachment to a romantic partner is also dependent on actual physical proximity. Thus, physical co-regulation is needed to establish an attachment relationship with a romantic partner.

STUDY 2

Study 2 was an attempt to replicate the findings of Study 1 while priming with a different threat-related word. Whereas Study 1 used an attachment-relevant threat word prime (*separation*), Study 2 used an attachment-unrelated threat word prime (*the participant's idiosyncratic fear*).¹²

Method

Participants. A total of 73 were recruited by making announcements in human development courses at Cornell University, by posting informational fliers around campus, and by recruiting participants via the SUSAN website. Of those, 69 participated in the lexical decision task; the information below concerns only these participants. The vast majority of the sample consisted of undergraduate students (99%, 68 participants), and 1 was a graduate student. Participants chose to receive either course credit for their participation or \$5. Of the 69 participants, 9 were males (13%) and 60 were females (87%). Their mean age was 20 ($SD=1.22$), ranging from 18 to 23. Of these, 58% were Caucasian, 29% Asian, 6% Black, and 4% other. Two participants did not report their race/ethnicity.

The vast majority of the sample was heterosexual (67 participants, 97%), 1 participant indicated that she is gay, and 1 participant indicated that she is bisexual.

Procedure. Participants completed the same questionnaire described in Study 1, with an additional measure of their idiosyncratic fear. Participants were asked to choose from a list of 15 common fears (e.g., heights, snakes) the item that frightens them the most, and to indicate, using a 0 (“not at all”) to 3 (“extremely”) scale, how much it frightens them (See Appendix B for the complete list of fears).

¹² Mikulincer et al. (2002) used the word *failure* as an attachment-unrelated prime. I preferred to use participants' idiosyncratic fears because priming each participant with his/her own fear increases the chances of activating his/her attachment system.

After a minimum of two days they performed a 288-trial lexical decision task similar to the one described in Study 1. This task was constructed according to a within-subject 2 X 4 factorial design defined by word prime (participant's idiosyncratic fear, neutral) and type of target stimuli (names of significant people, names of close persons, words and nonwords).

Hypothesis 1.

I hypothesized that participants who direct all four attachment behaviors toward one person will react differently to his/her name than people who do not direct all four attachment behaviors toward one person.

Similar to the approach I used in Study 1, I began by analyzing data from the questionnaires only. In order to map the significant others network in Study 2, I ran frequencies of figures at each one of the four positions of the significant people list. Table 3 represents position in the significant people list as a function of figure.

Table 3. *Study 2. Position in the Significant People List as a Function of Figure (percentages)*

	First Position	Second Position	Third Position	Fourth Position
Mother	49	29	12	0
Partner	33	7	16	6
Father	12	39	13	4
Other Family Member	2	8	29	35
Friend	3	13	26	46
Others	1	4	1	6
Missing*	---	---	3	3

* Some people did not mention four people as significant people; hence the missing data.

Similar to the findings for Study 1, the parents (and especially the mother) occupy the top of the significant people list (first or second positions) for participants in the current study. At the same time, one-third of the participants identified the partner as the most significant person in their lives. Friends and other family members were mentioned at lower levels of the list.

To test whether participants turn to a person as a function of the person's position in the significant people list, I composed an attachment score based on whether the person was listed first in each of the 12 WHOTO questions. Then, I ran a General Linear Model for Repeated Measures, comparing attachment scores for each position in the significant people list. As expected, this analysis was significant, $F(3,58)=117.62, p=.0001$. All pairwise comparisons were significant at the .002 level or lower, except the difference between position two and position three on the list. Thus, participants directed a significantly greater number of attachment behaviors toward the most significant people in their lives ($M=7.02, SD=.35$), then to the persons listed second in the significant people list ($M=2.30, SD=.28$), next to their third ($M=1.71, SD=.30$), and finally to their fourth-most ($M=.61, SD=.14$) significant people (see Figure 7).

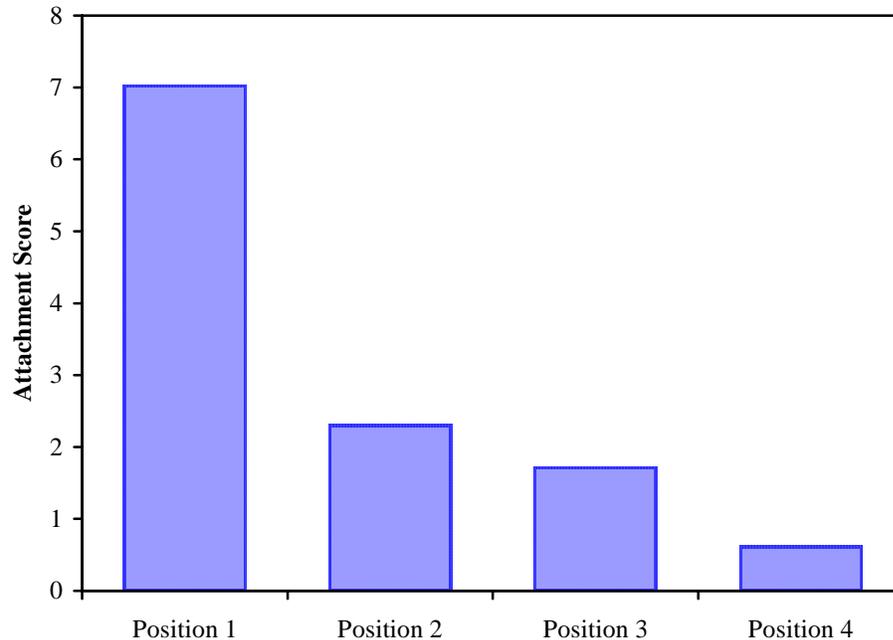


Figure 7. Study 2. Person's attachment score as a function of his/her position in the significant people list.

These findings further validate findings from Study 1 regarding the content and structure of significant people networks in adulthood. First, for most of the participants, the parents or the partner is listed as the most significant person. Second, it appears that the list represent a hierarchical structure, with a most significant person at the top.

After performing the General Linear Model for Repeated Measures, I tested the frequencies of FBAs. I created an FBA score according to the same method used in Study 1 (i.e., to have an FBA with a significant person, that person must have been listed first on at least one question concerning each of the four attachment behaviors: secure base, separation distress, safe haven, and proximity seeking). A total of 51% (36) had at least one full-blown attachment, and of those, 82% were with the person listed as most significant. Next, I was interested in frequencies of FBAs as a function of the figure. Forty-one percent of participants who mentioned a romantic partner in the list of significant people had FBAs with their partner, 21% who mentioned the mother in the list of significant people had FBAs with her, 6% had FBAs with the father, 4% with a friend, and none with other family members. Thus, two-fifths of the participants' relationships with partners were classified as FBAs, and more than one-fifth of the relationships with the mother were classified as FBAs. Relationships with the father, friends, and other family members met the criteria for FBA rarely. The findings that most FBAs were with a romantic partner, followed by FBAs with the mother and, finally, with the father, friend, and other family members are similar to the findings obtained in Study 1 and by Doherty and Feeney (2004). In the current study, I found percentages of FBAs similar to those found in Study 1. As mentioned above, these percentages were much lower than those obtained by Doherty and Feeney (2004) and Trinke and Bartholomew (1997). I suggest similar explanations to the one

given for the results of Study 1: first, the criterion I used for FBA is stricter than the one used by Doherty and Feeney (2004) and Trinke and Bartholomew (1997).

Second, the developmental explanation suggested for Study 1 is even more applicable to this sample because this sample was younger and narrower in its age range than the sample for Study 1 ($M=20$, $SD=1.22$, ranging from 18–23). It is possible that the participants in the current study were in the process of transferring their attachment behaviors from their parents to their peers, and thus did not direct all attachment behaviors toward one figure.

In the next section, I present analyses concerning the lexical decision task. I predicted that participants who direct all four attachment behavior toward one figure will react faster to her/his name after a threat word prime compared with a neutral one, whereas this effect will not be apparent for participants who do not direct all four attachment behaviors toward one figure.

Preliminary analysis suggested that participants who rated their fear as very frightening or lower (scores 1 and 2 in this scale) did not exhibit significant differences in reaction times for trials where the prime was threat or non-threat. Therefore, the analysis for Study 2 includes only those participants who rated their fear as extremely frightening. Table 4 presents frequencies of the fear categories.

Table 4. Study 2. Frequencies of Fear Categories

	Frequencies	%
Snakes and Spiders	8	28.5
Death	4	19
Public Speaking	3	14
Small Close Places	2	9.5
Flying	2	9.5
Heights	1	5
Failing	1	5

As one can see from Table 4, the fear most commonly rated as extremely frightening was that of snakes and spiders, followed by the fear of death. At the same time, participants' fears varied across the fear categories.

To test the hypothesis that FBA will affect reaction time to the significant person's name after a threat word prime compared with a neutral one, I performed a Mixed-Model Analysis. There was one between-subject factor, *FBA* score, and I controlled for *significant person's position* (i.e., whether the person was ranked in first, second, third, or fourth position), *sex*, *age*, and *attachment avoidance* and *attachment anxiety*. There was one within-subject factor: *prime* (threat or nonthreat). The random factor was *participant*. The only effect approaching significance was the interaction between *FBA* score and *prime*, $F(1, 894)=3.61, p=.058$. Pairwise comparison was approaching significance for participants who turned to the significant person for all attachment needs ($p=.076$). Thus, participants who directed all attachment behaviors toward that person were faster to recognize his or her name after a threat word prime ($M=491.97, SD=17.20$) compared with a neutral one ($M=522.59, SD=17.28$), whereas the opposite was true for participants who did not turn to the significant person for all attachment functions ($M=511.04, SD=12.86, M=506.63, SD=12.87$ for threat word prime and neutral word prime, respectively; see Figure 8).

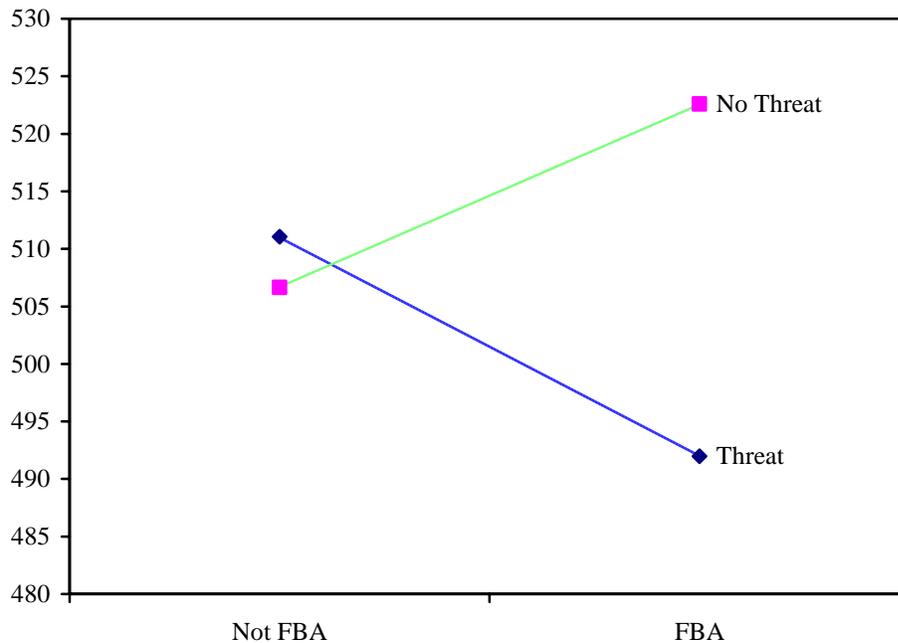


Figure 8. Study 2. Mean reaction time (in milliseconds) by FBA with the significant person.

The same model was significant for the most significant person. Thus, I performed a Mixed-Model Analysis with one between-subject factor, *FBA* score, in which I controlled for *sex*, *age*, and *attachment avoidance* and *attachment anxiety*. There was one within-subject factor: *prime* (threat or nonthreat). The random factor was *participant*. The dependent variable was *correct reaction times*.

This analysis revealed an approaching significance main effect for *sex*, $F(1,12)=4.32, p=.058$ ¹³ and *FBA* score $F(1, 12)=3.56, p=.084$. Most important, the interaction between *FBA* score and *prime* was significant, $F(1, 202)=6.71, p=.010$. Pairwise comparison was approaching significance for participants who turned to the most significant person in their life for all attachment needs ($p=.059$), and for participants who did not turn to the most significant person in their life for all

¹³ Women were faster to recognize the attachment figure's name, regardless of the word prime (i.e., a threatening or a neutral prime).

attachment needs ($p=.079$). Thus, participants who directed all attachment behaviors toward the most significant person in their life were faster to recognize her/his name after a threat word prime ($M=485.94$, $SD=18.21$) compared with a neutral word prime ($M=518.28$ $SD=18.39$), whereas the opposite was true for participants who did not turn to the most significant person in their life for all attachment functions ($M=561.48$, $SD=14.82$, $M=535.83$, $SD=14.58$ reaction times after a threat word prime and after a neutral word prime, respectively; see Figure 9).

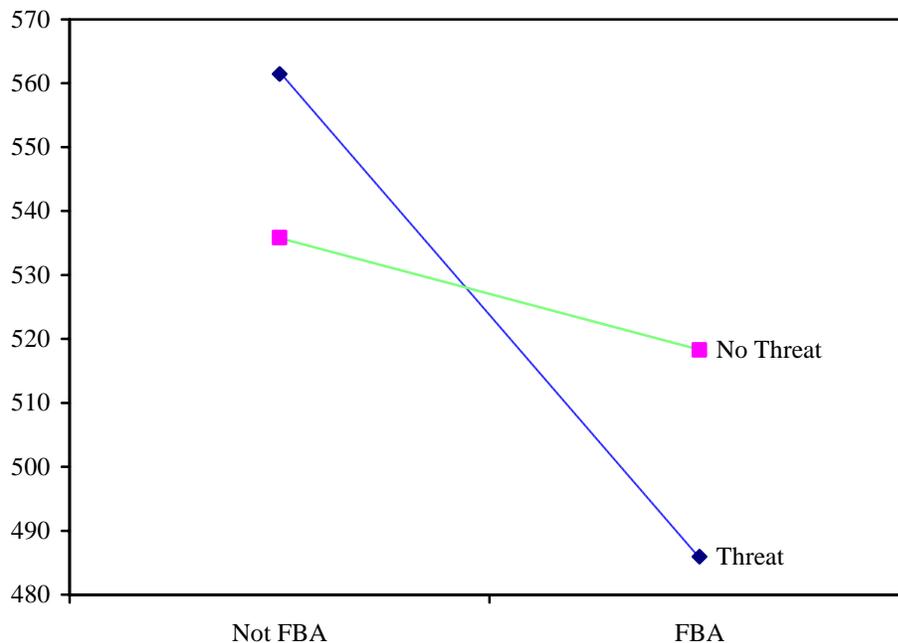


Figure 9. Study 2. Mean reaction time (in milliseconds) by FBA with the most significant person.

As one can see, the results from Study 2 replicated the results from Study 1. Thus, participants who reported that they direct all four attachment behaviors toward the most significant person in their life were faster to recognize her/his name after a threat word prime compared with a neutral one. This finding further validates the theoretical assumption that in adulthood the attachment system is internalized,

automatic, and unconscious (Bowlby, 1980). Interesting findings emerged regarding people who did not direct all four attachment behaviors toward the most significant person in their life; they were faster to recognize the most significant person's name after a neutral word prime compared with a threat word prime. This trend was apparent already in Study 1, but approaching significance in Study 2. This finding highlights the possibility of deactivation of the attachment system for people who do not turn to the most significant person in their life for all attachment functions. Research and theory regarding deactivation of the attachment system have so far dealt only with individuals with avoidant attachment style.¹⁴ To my knowledge, this is the first time that there is evidence for deactivation strategies regardless of attachment style. Further research is needed to specify this mechanism.

Hypothesis 2.

Hypothesis 2 concerns the effect of physical proximity on the formation of the attachment bond with the romantic partner. I could not test this hypothesis in Study 2 since only one participant both ranked his fear as extremely frightening and was living with his partner.

¹⁴ For example, Fraley, Davis, and Shaver (1998) suggested a model in which avoidant individuals who do not see proximity seeking as a viable option to reduce their distress use deactivation strategies in which they distance themselves from threat and attachment-related cues.

CONCLUSIONS AND FUTURE DIRECTIONS

The current set of studies had two main objectives. The first was to distinguish between relationships that qualify as FBAs and relationships that have attachment components but do not qualify as FBAs. The first hypothesis, that participants will react faster to the significant person's name after a threat word compared with a non threat word only if they direct all four attachment behaviors toward this figure, was supported for the parent as the most significant person in a participant's life when the threat was related to attachment (i.e., separation), was approaching significance for all significant people in a participant's life when the threat was unrelated to attachment (e.g., spiders), and was significant for the most significant person in a participant's life when the threat was unrelated to attachment issues. Taken together, these results support some of the basic theoretical assumptions of attachment theory—that in the course of normative development the attachment system is internalized, automatic, and operates beneath conscious awareness (Bowlby, 1980).

In addition, these results imply that the FBA category, as gathered from the WHOTO, is appropriate for distinguishing between relationships that qualify as attachment bonds and relationships that have attachment components but do not qualify as attachment bonds. This distinction is particularly apparent for the most significant people in a participant's life. Since there was considerable overlap between positions in the list of significant people and FBA, one can decide whether FBA is a good enough criterion for an attachment bond in adulthood, or whether position in the list of significant people is an additional needed criterion for attachment in adulthood. As mentioned above, the criteria I used for FBA were inherently biased toward the most significant person in a participant's life (i.e., counting directing attachment behaviors toward a particular figure only if this figure was mentioned as the primary

target of this behavior). Other researchers (i.e., Doherty & Feeney, 2004; Trinke & Bortholomew, 1997) used looser criteria, by which the attachment figure is not necessarily the primary target of the attachment behaviors. Results from the current study suggest that the stricter criteria better capture the FBA notion.

It is important to address the low frequencies of FBAs in the current studies; 44% of the participants in Study 1 and 51% of the participants in Study 2 had at least one FBA. One explanation for the low frequencies, as I suggested previously, is a developmental one: the mostly-young adults in both Study 1 and Study 2 may have been in the process of transferring their attachment behaviors from their parents to their peers, and thus did not direct all attachment behaviors toward one figure. I had some evidence for this process in Study 1, with the participants whose parents were the most significant people in their life, but who did not direct all four attachment behaviors toward them. I found that these participants were older and more involved in romantic relationships compared with participants who had FBAs with their parents. Moreover, participants that had FBAs with their parents were higher in the avoidance dimension in comparison with participants who did not have FBAs with their parents. This finding can be also evaluated in its developmental context: It is possible that directing all attachment behaviors toward the parents in that age range is not the most advantageous strategy. Future studies may test these developmental suggestions longitudinally, or in a cross-sectional study with substantially younger or substantially older participants.

Although a developmental explanation is in place, it is also possible that in adulthood, at least some individuals do not direct all four attachment behaviors toward one figure; rather, they divide their attachment needs between two or more figures. Thus, it is reasonable to encounter a woman who uses her spouse as a secure base, is distressed when he is away, and needs his presence constantly, but who, however,

usually approaches her mother or best friend when needing comfort or advice. Other researchers (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997) found evidence of participants who did not direct all four attachment behaviors toward one figure. More research is needed to study the characteristics of these individuals.

In addition to the faster reaction times of participants who had FBAs with the significant person after a threat word prime compared with a neutral word prime, I found some evidence of a deactivation process for participants who did not direct all four attachment behaviors toward one significant person. Although preliminary, this finding is very interesting and promising for future research. To my knowledge, this is the first time research ties deactivation to normative processes. The deactivation processes may be a cognitive way to facilitate reorganization of the attachment hierarchy. Hence, people who do not direct all attachment behaviors to significant others in their life also do not mentally approach them in times of stress; rather, they use other strategies to reduce this stress. If this is the case, I hypothesize that deactivation processes take place in other times in life when attachment hierarchies are thought to be reorganized (e.g., passing away of an attachment figure, dissolution of attachment relationships).

The second objective of the current studies was to explore the validity of the need for physical proximity as one of the criteria for attachment between romantic partners. I found that participants who had FBAs with the partner reacted faster to his/her name after a threat word prime compared with a neutral one only if they cohabit. The finding that only participants who were living with their partner were faster to recognize the partner's name after a threat word prime, compared with a neutral one, whereas this effect for the parent was dependent only on mental perception of this bond (as measured on the WHOTO scale), may illustrate one of the differences between these two bonds. Following Bowlby (1969), I suggest that

because relationships with the mother are internalized implicitly at a very young age, they are embedded in the hardware of the system. At the same time, it is possible that attachment with a partner is an ongoing process that needs continuous refueling. Thus, even though Hazan, Gur-Yaish, and Campa (2004) suggested that physical proximity is necessary to the formation of the attachment bond, it is possible that a constant physical proximity is also necessary to the maintenance of that bond.

One might think that cohabitation is a proxy for some non-attachment variable, such as relationship length or commitment. However, in the analysis of the interaction between word prime and cohabiting status, I controlled for both relationship length and marital status. Therefore, I suggest that cohabitation is a proxy for the physiological aspects of the bond between romantic partners. Future research that more closely addresses these aspects of the bond between romantic partners might further explore the suggestion that physiological contact is essential to the maintenance of the attachment bond. In the introduction, I pointed out the lack of criteria for attachment in romantic partners. Results from Study 1 suggest that these criteria must include at least two components: first, the bond must qualify as an FBA, and second, the partners must have some kind of physical relationship with each other.

This suggestion that intimate physiological relationships are essential to the attachment bond between adults is also relevant to the debate regarding who is qualified to be an attachment figure. Similar to Hazan and Zeifman's (1994) findings, in the current studies I found that the attachment figure is most often the mother or the romantic partner. However, other researchers argue that friends and other family members can qualify as attachment figures as well (Doherty & Feeney, 2004; Trinke and Bortholomew, 1997). Findings from the current study that physical proximity is essential to attachment between romantic partners, combined with the anthropological findings that physical proximity is restricted in all cultures to parent-child

relationships and adult romantic relationships (Eibl-Eibesfeldt, 1989), leads to the conclusion that parents or the romantic partner are most likely to be the attachment figures.

The results of the current study also contribute to further validation of the WHOTO as a measure of normative attachment. Furthermore, I suggest that it can be used to distinguish between attachments and relationships that have some attachment components. Although most researchers who have studied normative attachment have used WHOTO-type measures (e.g., Farley & Davis; Mayseless, 2004; Mikulincer, Gilath, & Shaver, 2002), this measure is still not a widely accepted criterion for attachment in adulthood. In addition, I did not find any bias toward security when using the WHOTO. Thus, the results from the current studies rebut criticism concerning that point (Trinke & Bortholomew, 1997).

The WHOTO version used in the current study targeted additional behaviors that are related to attachment, but did not directly test FBA. Thus, this version of the WHOTO asks general questions about attachment (e.g., who do you contact in case of emergency, who can you not imagine your life without) and a question about sharing of positive affect (i.e., with whom are you most likely to share good news). Results from the current studies suggest that these components are not necessary to the definition of attachment in adulthood.

Although attachment style was not a major focus of the current study, it is worth noting that I obtained significant results concerning only the avoidant dimension. First, individuals who directed all attachment behaviors toward the parent were higher in the avoidant dimension. Second, individuals who were not involved in romantic relationships were more avoidant than individuals who were involved in romantic relationships. And finally, among those who were involved in romantic relationships, those who ranked the partner as the most significant person in their life

were less avoidant than those who were involved in romantic relationships but did not rank their partner as the most significant person in their life. These findings suggest that the avoidant dimension is more significant than the anxiety dimension to the study of romantic relationships.

A methodological conclusion is also in place; as mentioned above, activation of the attachment system in adulthood is more challenging than activation of the attachment system in infancy (Weiss, 1982). This problem is also evident when using priming methods to activate the attachment system, and especially when using the same prime for all participants, as was done in Study 1. I suggested that the use of the same prime, which has several meanings in English, may not have sufficiently activated the attachment system in Study 1. For future research I suggest the use of a tailor-made prime for each participant. This prime should be tailored in both content and duration. Using participants' idiosyncratic fears in Study 2 is an example of tailoring the content of the prime for each participant. In future studies one should also find the subliminal threshold for each participant and tailor the duration of the appearance of the prime, based on this threshold.

In the current studies, I found evidence of a stress-attachment link. However, we still do not know whether mentally approaching the attachment figure is enough to reduce stress or whether this mental approach is just one step along the way to the physical approach to the attachment figure. As mentioned at the beginning of this work, attachment is defined in terms of behavioral tendencies to seek and maintain proximity to the attachment figure. If mental proximity is enough, many interesting theoretical and empirical approaches to research and treatment are opened.

Limitations

One obvious limitation concerns the samples of the two studies; the majority of the participants in these studies were women. Thus, to ensure the generalizability of the results of these studies, one should include more males in the sample.

Another limitation concerns the way I measured the structure of the significant people network. I asked participants to list the names of figures they mentioned in the WHOTO in order of significance. This technique biases the results toward a hierarchical structure. However, my conclusion that the significant people network is organized in a hierarchical structure was based on the number of attachment behaviors directed toward these figures. This analysis suggested that the number of attachment behaviors directed toward a figure is dependent on the figure's position in the list. Thus, participants direct more attachment behaviors toward the person ranked as most significant, followed by the persons ranked second, third, and fourth. A similar approach was employed by other researchers (Doherty & Feeney, 2004; Tancredy & Fraley, 2006; Trinke & Bartholomew, 1997). In future studies concerning the structure of the attachment network in adulthood, I suggest combining information gathered from the WHOTO with a method allowing more flexibility in capturing the structure of the attachment network. The convoy model proposed by Antonucci and her colleagues (Antonucci & Akiyama, 1987; Kahn & Antonucci, 1980) might be a good measure to combine with the WHOTO to assess the attachment network in adulthood. This method consists of three concentric circles. Participants are asked to sort the names of the people who are most important to them into three groups, from their "innermost" to "outermost" social circle.

An additional limitation concerns the measure of attachment avoidance and attachment anxiety. I studied participants' feelings regarding romantic partners, but not regarding attachment issues in general or feelings regarding particular figures (as

parents or a specific romantic partner). Previous research suggests an overlap between general attachment style and more specific ones (Baldwin et al., 1996; Cozzarelli, Hoekstra, & Bylsma, 2000). However, in future research I suggest assessing attachment anxiety and attachment avoidance both in general and in specific relationships.

APPENDIX A. QUESTIONNAIRE

ID # _____

Please **do not** put your name on this questionnaire.

Background Information

Age: _____ Years (*You must be at least 18 years of age to participate.*)

Sex: ___ Male ___ Female

Sexual Orientation: ___ Heterosexual ___ Gay/Lesbian
___ Bisexual ___ Other (*please specify* _____)

Racial/Ethnic Identification: _____

Religious Affiliation: _____

Major: _____

Year in school: ___ Fr ___ So ___ Jr ___ Sr ___ Gr

Have you ever been involved in an exclusive relationship? ___ Yes ___ No

If yes, how many? _____

How long was the longest? _____

What is your current relationship status?

(Please check all that apply.)

- ___ Not seeing anyone
- ___ Seeing one or more persons casually
- ___ Seeing one person exclusively (*For how long?* _____)
(*Is it long-distance?* ___ Yes ___ No)
- ___ Living with a partner (*For how long?* _____)
- ___ Married (*For how long?* _____)
- ___ Other (*Specify:* _____)

Important People in Your Life

Below you are asked to list people who are significant in your life. Rather than providing their names, answer instead with a term that defines how they are related to you (for example, mother, boyfriend, sister, best friend). If you write in more than one person, *list them in order of significance*, starting with the most significant. Please do not use terms that refer to more than one person (for example, parents or family).

1. Person(s) you make sure to see or talk to frequently.

A.	B.	C.	D.	E.
----	----	----	----	----

2. Person(s) you seek out when worried or upset.

A.	B.	C.	D.	E.
----	----	----	----	----

3. Person(s) you miss when they are away.

A.	B.	C.	D.	E.
----	----	----	----	----

4. Person(s) you know would do just about anything for you.

A.	B.	C.	D.	E.
----	----	----	----	----

5. Person(s) you immediately think of contacting when something bad happens.

A.	B.	C.	D.	E.
----	----	----	----	----

6. Person(s) you know always wants the best for you.

A.	B.	C.	D.	E.
----	----	----	----	----

7. Person(s) who should be contacted in case of an emergency involving you.

A.	B.	C.	D.	E.
----	----	----	----	----

8. Person(s) whose absence makes you feel like something is not quite right.

A.	B.	C.	D.	E.
----	----	----	----	----

9. Person(s) you know will always be there for you.

A.	B.	C.	D.	E.
----	----	----	----	----

10. Person(s) you are most likely to tell when something good happens to you.

A.	B.	C.	D.	E.
----	----	----	----	----

11. Person(s) you always know how to get in touch with.

A.	B.	C.	D.	E.
----	----	----	----	----

12. Person(s) you can hardly imagine your life without.

A.	B.	C.	D.	E.
----	----	----	----	----

For the next part, please provide the first names of *up to five people* that you mentioned in this section and say how each is related to you (for example, mother, boyfriend, sister, best friend). Again please list them in the *order of their significance* to you.

First Name:				
Relationship:	Relationship:	Relationship:	Relationship:	Relationship:

For the next part, please provide the first names of five people that you are *somewhat close to but who were not mentioned above*.

First Name:				
-------------	-------------	-------------	-------------	-------------

Feelings about Partners

The following statements describe the way some people feel about romantic relationship partners. Please indicate how you generally feel by circling the number that corresponds to how much you agree or disagree with each.

	Not at all like me	1	2	A little like me	3	4	A lot like me	5	6	Exactly like me	7
1. I'm the type who tells a partner just about everything.	1	2	3	4	5	6	7				
2. I'm the type who needs a lot of reassurance that I am loved.	1	2	3	4	5	6	7				
3. I'm the type who tries to avoid getting too close to a partner.	1	2	3	4	5	6	7				
4. I'm the type who finds it easy to establish closeness with a partner.	1	2	3	4	5	6	7				
5. I'm the type who turns to a partner when I need comfort or support.	1	2	3	4	5	6	7				
6. I'm the type who worries about being without a partner.	1	2	3	4	5	6	7				
7. I'm the type who prefers not to show a partner how I feel deep down.	1	2	3	4	5	6	7				
8. I'm the type who generally feels well cared for by a partner.	1	2	3	4	5	6	7				
9. I'm the type who often wants more than a partner is willing or able to give.	1	2	3	4	5	6	7				
10. I'm the type who finds it difficult to really depend on a partner.	1	2	3	4	5	6	7				
11. I'm the type who resents it when a partner spends time away from me.	1	2	3	4	5	6	7				
12. I'm the type who is very comfortable being close to a partner.	1	2	3	4	5	6	7				

APPENDIX B

Common Fears

Below is a list of common fears. Please choose the one that frightens you the most:

-
1. Flying
 2. Being in small closed spaces.
 3. Bridges
 4. Public speaking
 5. Snakes
 6. Spiders
 7. Death
 8. Heights
 9. Lightening
 10. Dogs
 11. Cats
 12. Bees / Wasps
 13. Needles
 14. Clowns
 15. Other (please specify_____)

Using the following scale, indicate how much it frightens you.

0	1	2	3
not at all	a little bit	very much	extremely

REFERENCES

- Ainsworth, M. D. (1972). Attachment and dependency: A comparison. In J. L. Gewirtz (Ed.), *Attachment and dependency* (pp. 97-139). Washington, DC: Winston.
- Ainsworth, M. D. (1973). The development of infant-mother attachment. In B. M. Caldwell & H. N. Ricciuti (Eds.), *Review of child development research* (Vol. 3, pp. 1-94). Chicago: University of Chicago Press.
- Ainsworth, M. D. (1989). Attachments beyond infancy. *American Psychologist*, *44*, 709-716.
- Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Oxford: Lawrence Erlbaum.
- Allen, J. P., & Land, D. (1999). Attachment in adolescence. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 319-335). New York: Guilford Press.
- Antonucci, T. C., & Akiyama, H. (1987). Social networks in adult life and a preliminary examination of the convoy model. *Journal of Gerontology*, *42*, 519-527.
- Antonucci, T. C., Akiyama, H., & Takahashi, K. (2004). Attachment and close relationships across the life span. *Attachment and Human Development*, *6*, 353-370.
- Baldwin, M. W. (1994). Primed relational schemas as a source of self-evaluative reactions. *Journal of Social and Clinical Psychology*, *13*, 380-403.
- Baldwin, M. W., Keelan, J. P. R., Fehr, B., Enns, V., & KohRangarajoo, E. (1996). Social-cognitive conceptualization of attachment working models: Availability and accessibility effects. *Journal of Personality and Social Psychology*, *71*, 94-109.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1, Attachment*. New York: Basic Books.
- Bowlby, J. (1973). *Attachment and loss: Vol. 2., Separation: Anxiety and anger* (Vol. 2). New York: Basic Books.
- Bowlby, J. (1979). *The making and breaking of affectional bonds*. London: Tavistock Publication.
- Bowlby, J. (1980). *Attachment and loss: Vol. 3., Loss: Sadness and depression*. New York: Basic Books.
- Bowlby, J. (1988). *A secure base: Clinical applications of attachment theory*. London: Routledge.

- Brennan, K. A., Wu, S., & Loew, J. (1998). Adult romantic attachment and individual differences in attitudes toward physical contact in the context of adult romantic relationships. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 394-428). New York: Guilford Press.
- Carter, C. S. (1998). Neuroendocrine perspectives on social attachment and love. *Psychoneuroendocrinology*, *23*, 779-818.
- Cassidy, J. (1999). The nature of the child's ties. In J. Cassidy & S. P.R. (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 3-20). New York: Guilford Press.
- Colin, V. L. (1985). *hierarchies and patterns of infants' attachment to parents and day caregivers: an exploration*. University of Virginia, Baltimore.
- Colin, V. L. (1996). *Human Attachment*. New York: The McGraw-Hill Companies, Inc.
- Cozzarelli, C., Hoekstra, S. J., & Bylsma, W. H. (2000). General versus specific mental models of attachment: Are they associated with different outcomes? *Personality and Social Psychology Bulletin*, *26*, 605-618.
- Diamond, L. M., & Hicks, A. M. (2004). *Psychobiological Perspectives on Attachment: Implication for Health over the Lifespan*. New York: Guilford Press.
- Doherty, N. A., & Feeney, J. A. (2004). The composition of attachment networks throughout the adult years. *Personal Relationships*, *11*, 469-488.
- Eibl-Eibesfeldt, I. (1989). *Human ethology*. Hawthorne: Aldine de Gruyter.
- Feeney, J. A. (2004). Transfer of Attachment from Parents to Romantic Partners: Effects of Individual and Relationship Variables. *Journal of Family Studies*, *10*, 220-238.
- Feeney, J. A., & Hohaus, L. (2001). Attachment and spousal caregiving. *Personal Relationships*, *8* (2001), 21-39., *8*, 21-39.
- Fraley, R. C., & Davis, K. E. (1997). Attachment formation and transfer in young adults' close friendships and romantic relationships. *Personal Relationships*, *4*, 131-144.
- Fraley, R. C., Davis, K. E., & Shaver, P. R. (1998). Dismissing-avoidance and the defensive organization of emotion, cognition, and behavior. In S. J.A. & R. W.S. (Eds.), *Attachment theory and close relationships* (pp. 249-279). New York: Guilford Press.
- Fraley, R. C., & Shaver, P. R. (1998). Airport separations: A naturalistic study of adult attachment dynamics in separating couples. *Journal of Personality and Social Psychology*, *75*, 1198-1212.

- Fraley, R. C., & Shaver, P. R. (1999). Loss and bereavement: Attachment theory and recent controversies concerning “grief work” and the nature of detachment. In J. Cassidy & S. P.R. (Eds.), *Handbook of attachment: Theory, research, and clinical applications*. (pp. 735-759). New York: Guilford Press.
- Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of general psychology, 4*, 132-154.
- Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology, 78*, 350-365.
- Gerstel, N., & Gross, H. E. (1982). Commuter marriages: A review. *Marriage and Family Review, 5*, 71-93.
- Gur-Yaish, N., Campa, M., Bradshaw, C. P., & Hazan, C. (2004). *Factors that foster or inhibit attachment formation*. Paper presented at the The International Association for Relationship Research Conference, Madison, Wisconsin.
- Hazan, C., & Diamond, L. M. (2000). The place of attachment in human mating. *Review of General Psychology., 4*, 186-204.
- Hazan, C., Gur-Yaish, N., & Campa, M. (2004). What Does It Mean to Be Attached? In W. S. Rholes & J. A. Simpson (Eds.), *Adult attachment: Theory, research, and clinical implications* (pp. 55-85). New York: Guilford Publications.
- Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*, 511-524.
- Hazan, C., & Zeifman, D. (1994). Sex and the psychological tether. *Advances in Personal Relationships, 5*, 151-177.
- Hofer, M. A. (1984). Relationships as regulators: A psychobiologic perspective on bereavement. *Psychosomatic Medicine, 46*, 183-197.
- Kahn, R. L., & Antonucci, T. C. (1980). Convoys over the life course: Attachment, roles, and social support. In B. P.B. & O. Brim (Eds.), *Life-Span Development and Behavior* (Vol. 3). New York: Academic Press.
- Kobak, R. R. (1999). The emotional dynamics of disruptions in attachment relationships: Implications for theory, research, and clinical intervention. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 21-43). New York: Guilford Press.
- Levitt, M. J. (2005). Social Relations in Childhood and Adolescence: The Convoy Model Perspective. *Human Development, 48*, 28-47.
- Mayselless, O. (2004). Home Leaving to Military Service: Attachment Concerns, Transfer of Attachment Functions From Parents to Peers, and Adjustment. *Journal of Adolescent Research, 19*, 533-558.

- Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology*, 90, 227-234.
- Mikulincer, M., Birnbaum, G., Woddis, D., & Nachmias, O. (2000). Stress and accessibility of proximity-related thoughts: Exploring the normative and intraindividual components of attachment theory. *Journal of Personality and Social Psychology*, 78, 509-523.
- Mikulincer, M., Gillath, O., & Shaver, P. R. (2002). Activation of the attachment system in adulthood: Threat-related primes increase the accessibility of mental representations of attachment figures. *Journal of Personality and Social Psychology*, 83, 881-895.
- Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion*, 27, 77-102.
- Sbarra, D. A., Ferrer, E., & Hazan, C. (2004). *Changes in heart rate as a function of couple attachment status: Evidence from a laboratory gazing task*. Paper presented at the Society for Psychophysiological Research annual meeting, Santa Fe, NM.
- Simpson, J. A., & Rholes, W. S. (1998). *Attachment theory and close relationships*. New York: Guilford Press.
- Takahashi, K., Ohara, N., Antonucci, T. C., & Akiyama, H. (2002). Commonalities and differences in close relationships among the Americans and Japanese: A comparison by the individualism/collectivism concept. *International Journal of Behavioral Development*, 26(5).
- Tancredy, C. M., & Fraley, R. C. (2006). The nature of adult twin relationships: An attachment-theoretical perspective. *Journal of Personality and Social Psychology*, 90, 78-93.
- Trinke, S. J., & Bartholomew, K. (1997). Hierarchies of attachment relationships in young adulthood. *Journal of Social and Personal Relationships*, 14.
- Uchino, B. N., Uno, D., & Holt, L., J. (1999). Social support, physiological processes, and health. *Current Directions in Psychological Science*, 8.
- Wegner, D. M., & Smart, L. (1997). Deep cognitive activation: A new approach to the unconscious. *Journal of Consulting and Clinical Psychology*, 65, 984-995.
- WordNet ® 2.0, © 2003 Princeton University.
- Zeifman, D., & Hazan, C. (1997). Attachment: The bond in pair-bonds. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 237-263). Hillsdale: Lawrence Erlbaum Associates.