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ATTACHMENT WORKING MODELS: ASSESSING NONCONSIOUS AND SELF-REPORTED COMPONENTS OF ATTACHMENT SECURITY

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by

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ATTACHMENT WORKING MODELS: ASSESSING NONCONSIOUS AND SELF-REPORTED COMPONENTS OF ATTACHMENT SECURITY

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Despite the fact that attachment working models explain why attachment security in early childhood has predictive power for later adult emotional and relational functioning, little is known about such models. For this reason the current study aimed to explore the content, structure and processes of attachment working models, specifically their affective content, impact on memory processes and semantic associations. The study incorporated four cognitive paradigms: a Chinese characters affective judgments task, a lexical decision task, a free-recall and cued-recognition memory task and a word categorization task based on the Implicit Attitudes Task (Greenwald, McGhee and Schwartz, 1998). Participants also self-reported their attachment status using scales from the Inventory of Parental and Peer Attachment (Armsden and Greenberg, 1987, 1989), the Parental Bonding Instrument (Parker, Tupling and Brown, 1979), the Attachment Style Questionnaire (Feeney, Noller and Hanrahan,1994) and a newly developed instrument, the Parental Attachment Scale (Fouladi, Moller & McCarthy, 2005). The

sample consisted of undergraduate students at a southwestern university. For three of the four tasks, the hypotheses for tasks responses and associations between task performance and self-reported attachment security were not met. For the fourth word categorization task, the results did support hypotheses about task response, and evidence was therefore provided for the idea that working models of attachment security incorporate semantic associations with both positive attachment and pleasant words. Implications of the study as well as study limitations and directions for future research are discussed.

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Chapter I

INTRODUCTION

Although pioneering attachment theorist Bowlby claimed that attachment relationships are characteristic of human experience throughout the lifetime (1979), attachment theory in its original focus sought to explain the mother-infant relationship, not adult relationships. Nonetheless, researchers in adult attachment use the theory to explore and explain patterns of emotional and relational functioning in adults. Their rationale for doing so comes from the assumption, central to attachment theory, that experiences as an infant in relationships with primary caregivers are the foundation for relational templates, or attachment working models (Bowlby, 1969) that persist throughout the lifespan and which govern expectations and perceptions of, inferences about and responses to, events in the closest human relationships—those between children and parents, romantic partners, and best friends.

Attachment working models are the theoretical basis for researchers working in adult attachment, the bridge that ties together theory and empirical findings about infants and young children with research on intimate adult relationships. And yet, the concept of attachment working models remains vague. Attachment researchers, the current author included, have a tendency to simply assume the existence of these models and start reasoning from there. Not much help comes from attachment theorists either. While Bowlby started thinking about attachment working models relatively early in his

theorizing (1969), his conception of these mental models remained under-developed and is also based on what was then very modern but are now outdated ideas from artificial intelligence and information processing research. Subsequent attachment researchers have sought to extend Bowlby's ideas and have drawn on a variety of sources by which to do so. However, although some important directions have emerged, there appears to be no wide-spread agreement between working model theorists about many important issues of attachment working models, such as their development, content, structure, processes and degree of stability. This lack of concordance may be in part because the theorists differ in the extent, for example, that they choose to draw on findings and theory from cognitive psychology on mental representation of general concepts. However, the lack of a clear theoretical framework for attachment working models may also be due to the tendency for attachment researchers, when drawing on cognitive psychology, to think about these models in terms of schemas (c.f. Bretherton & Munholland, 1999; Collins & Read, 1994) rather than in terms of parallel distributed processing networks, the approach that is now dominant in cognitive psychology (Smith, 1996; although see Main, 1999), possibly partly because of problems with schema theory (Augoustinos & Walker 1995). In addition, it can be argued that working model theorists have also been limited by a failure to consider some key questions, for example the degree to which working models are shaped by environmental forces both familial (Cook, 2000) and societal (Bretherton, 1985).

Whatever the reasons, a more tightly specified theory of working models seems overdue. However, it must also be acknowledged that current methods for assessing

attachment in adults are unlikely to be useful in exploring detailed hypotheses about working model functioning, content and structure. Almost all adult attachment researchers use one of two main methodologies: self-report instruments and semi-structured interviews, predominantly the Adult Attachment Interview (AAI, Main & Goldwyn, 1998) (a notable exception is the recently-developed Adult Attachment Projective, George & West, 2001). The difficulty with self-report instruments is that one assumption about working models is that they operate at least partly unconsciously (Bowlby, 1973), which limits individuals' ability to accurately self-report them. Another assumption is that for some individuals, working models may function to limit access to certain kinds of distressing information (Bowlby, 1973), thus again limiting such individual's ability or motivation to accurately report their attachment working models. By contrast, the AAI scoring protocol was developed to assess unconscious and defensive responding, not just the conscious self-report of attachment experiences. For the AAI, the problem instead is one of inference: the AAI was developed from a theoretical understanding of attachment and by looking for congruities between mothers' descriptions of their childhoods and the attachment security status of their infants. In other words, the scoring of the AAI, which explicitly seeks to assess an adult's "state of mind" with respect to their own attachment experiences (Hesse, 1999), was originally based on what seemed to explain infant attachment functioning. This means that the assumptions about attachment working models that are inherent in the AAI, for example that security of attachment is associated with open and coherent communication about attachment experiences (Hesse, 1999; Main & Goldwn, 1998), remain largely untested

except *through* the AAI's ability to predict infant attachment. In addition, while the scoring of the AAI does imply certain understandings of attachment working models, the AAI is an assessment instrument, not a theory of attachment working models. Unsurprisingly therefore, the implicit assumptions about working models in the AAI scoring do not provide complete answers to questions about working model structure, content or process. Moreover, the instrument does not provide a means to answer such questions.

One potential solution to the methodology problem is to borrow experimental paradigms from cognitive psychology (Shaver, Collins & Clark, 1996). This approach has two advantages. First, it allows studies to be set up that explore tightly focused questions about attachment working models, such as the extent to which working models impact memory processes such as recall and recognition. Second, these paradigms are often conducive to exploring the effects of non-conscious cognition, through mechanisms such as subliminal priming, and this permits exploration of ideas about implicit and explicit attachment working models, and defensive exclusion of attachment material.

The proposed study therefore aimed to use four different experimental paradigms borrowed from cognitive psychology, as well as self-report instruments, to explore different aspects of the content, structure and processes of college students' attachment working models of their mothers. An affective judgments task was used to explore the emotional content of maternal attachment working models; a recall/recognition task was used to examine whether maternal attachment working models affect memory for attachment-related material; a lexical decision task and a categorization task were used to

explore the structure of respondents' attachment working models of their maternal relationship. In each case, the focus was on individual differences, and the relationship between task responses and self-reported attachment security or insecurity.

It is hoped that the proposed study furthers the understanding of attachment working models and thus aids in clarifying the theoretical conceptualization of this construct. Such clarification seems highly important because of the implications for social and therapeutic intervention. There is considerable evidence in the attachment literature that insecure attachment working models are associated with poor outcomes for children (Matas, Arend & Sroufe, 1978), for parent-child relationships (Kobak, Cole, Ferenz-Gillies, Fleming & Gamble, 1993; van IJzendoorn, 1995), for adult romantic relationships (Owens, Crowell, Pan, Treboux, O'Connor & Waters, 1995) and for individual psychological functioning (McCarthy, Moller & Fouladi, 2000; Moller, McCarthy & Fouladi, 2002). It is also clear that the idea that psychological difficulties are often rooted in problematic relationships with primary caregivers during childhood is common to many psychological theorists (i.e., Freud, 1949/1964; Kohut, 1977; Mahler, 1963; Winnicott, 1965). There is however less agreement between different therapeutic camps as to how the impact of negative early relational experiences can best be ameliorated.

A better understanding of the cognitive mechanisms that link early childhood and adult relational functioning might make it easier to make a cogent argument about best interventions, and might make it easier to create familial and societal conditions conducive to secure attachment working models in children and adults. As a practicing

clinician, and someone who worked actively to change social policy around childcare (Rutter & O'Connor, 1999), Bowlby appears to have been committed to the idea that attachment theory should have pragmatic effects on human lives, not just remain an academic discipline pursued in universities. Although the hypotheses of this study were, on the whole, not met in the findings, nonetheless it does shed light on what methodologies might profitably be used to explore attachment working models and thus takes one step toward pursuing this goal.

CHAPTER II

LITERATURE REVIEW

Close attachments "characterize human beings from the cradle to the grave."

Bowlby, 1979, p. 129

As this quotation suggests, Bowlby believed that attachments are common to human experience in adulthood as well as childhood; Bowlby's rationale for this claim was his belief that human beings of any age have an evolutionarily dictated predisposition to form attachment relationships (Bowlby, 1969; see also Belsky, 1999; Simpson, 1999). But Bowlby did more than point out parallels between the infant-mother relationship and that between romantic partners; he believed that the strong emotional bonds that an adult experiences with another who is sensed as a source of security and who provides a secure base anchoring exploration (Bowlby, 1979; 1988), are shaped by that adult's experience *as an infant* in functionally-identical relationships with primary caregivers. The link that Bowlby proposed between experiences as a very young child and relationship functioning decades later was a cognitive one: he suggested that early childhood attachment experiences lead to the formation of expectations, rules and strategies for relationship and emotional functioning. Bowlby termed these expectations, rules and strategies "attachment working models" (1969) and it is these mental templates or cognitive models that all attachment researchers use to explain and predict continuity between early relational experiences and later relational and psychological functioning. However, although Bowlby first used the term "working model" in the very first book in

his classic trilogy "Attachment and Loss," (1969, 1973, 1988) and continued to elaborate the concept in later writings, drawing in new ideas from a variety of contemporary sources as he did so, the concept remains under-elaborated. Subsequent attachment researchers have worked to extend and clarify the theory of attachment working models (i.e. Bretherton, 1985, 1997; Bretherton & Munholland, 1999; Collins & Read, 1994; Crittenden, 1990; Feeney & Noller, 1996; Fraley & Shaver, 2000; Main, Kaplan & Cassidy, 1985; Owens, Crowell, Pan, Treboux, O'Connor & Waters, 1995; Pietromonaco & Barrett, 2000; Shaver, Collins & Clark, 1996; Stern, 1998, 1994) and have called on a variety of literatures to do so. Nonetheless, there has been little research explicitly exploring the formation, functioning and content of attachment working models (Miller & Noirot, 1999; Shaver, Collins & Clark, 1996) and, to quote one article, "Many unanswered questions about the nature and structure of working models remain" (Pietromonaco & Barrett, 2000, p 155).

This literature review aims firstly to delineate the theory of attachment working models as proposed by Bowlby, along with some key extensions or revisions suggested by subsequent attachment researchers. The second aim is to provide a brief summary of research findings that support the idea that early experiences in relationships with caregivers impact on later relationship functioning, and that the mechanism connecting these relationships is attachment working models. Thirdly, it will be argued that while the research reviewed provides supportive evidence for working models, the chief current methodologies used to study adult attachment (self-report instruments and semi-structured interviews) are insufficient for the job of more properly understanding the

content, structure and processes of attachment working models. One potential answer to this problem is to use experimental paradigms borrowed from cognitive psychology, and that is what the proposed study aims to do. The final, and longest, section of this literature review will thus present four different experimental paradigms, together with research that suggests these paradigms can shed new light on attachment working models.

Theory of Attachment Working Models. Bowlby's thinking on attachment working models was influenced by a variety of contemporary thinkers including an artificial intelligence pioneer Craik, Piaget and early information processing research (Bretherton & Munholland, 1999). Bowlby drew together these different ideas to develop a formulation of how attachment working models develop from infants' actual experiences with primary caregivers, what their function, content, structure and processes are, and the degree to which they are stable. Each of these areas—working model development, function, content, structure, process and stability—will now be considered in turn.

Development: Making a link to Piaget's theorizing, just then available in English, about the way that infants in the sensory-motor period learn about objects in their environment by acting on them, Bowlby proposed that infants construct rudimentary understandings about the maternal object through their repeated interactions with her (Bowlby, 1969). Over time, interactional patterns emerge, and these patterns or understandings are generalized into relational or attachment working models.

The theorist who has probably worked hardest to provide a detailed explication of the emergence of attachment working models is Stern (1994, 1998). Stern's complex and detailed stage model for the development of attachment working models draws on findings from developmental and cognitive psychology as well as neurobiology, and suggests that the first building blocks of mental representations are "emerging moments" which comprise aggregated collections of sensations, goals, emotions and actions stored within an organizing time-place-cause framework. Bretherton (1990) has also extended Bowlby's original formulation to argue strongly for the role of communication, both verbal and non-verbal, as being critical in the development of working models, and she has suggested (1999) that while Bowlby tended to focus on the role of parental *mis*communication in hindering the formation of secure attachment working models, that it is also necessary to consider the positive role of parents in facilitating children to construct and revise working models through dialogue about attachment-related events.

Function: The function of attachment working models was, Bowlby believed, to help individuals regulate, predict and interpret the attachment-related thoughts, feelings and behaviors of themselves and their attachment figures (1969). Subsequent researchers (for example, McCarthy, Moller & Fouladi, 2000; Shaver, Collins & Clark, 1996) have also argued that an important function of attachment working models is as an emotion regulation system, with differential attachment security related to differential emotional functioning and coping strategies.

Content: Bowlby argued that attachment working models are dyadic, containing information about both the self and the attachment figure:

"*In the working model of the world that anyone builds, a key feature is his notion of who his attachment figures are, where they may be found, and how they may be expected to respond. Similarly, in the working model of the self that anyone builds, a key feature is how acceptable or unacceptable he himself is in the eyes of his attachment figures*."

Bowlby, 1973, p. 203

Other attachment researchers have argued that working models must necessarily also contain autobiographical memories of experiences in attachment relationships, affective responses to attachment-related events, attachment-related goals and needs, attitudes and expectations for self and others in attachment relationships, and strategies and plans to achieve attachment-related goals and needs (c.f. Collins & Read, 1994).

Structure: Bowlby suggested that multiple attachment working models may exist and he suggested that this was more likely in insecurely attached persons (1973). Other researchers however have argued that for all individuals, attachment working models must necessarily be both multiple and linked into complex hierarchies, with different attachment relationships, and different kinds of experiences in different relationships, and different levels of knowledge (specific to one relationship versus more general), represented in different places within the structure (Bretherton, 1999; Collins & Read, 1994, Crittenden, 1990; Main, 1991; Owens, Crowell, Pan, Treboux, O'Connor & Waters, 1995).

Processes: Bowlby held that working models operate both within and without conscious awareness, and he also suggested that contradictory elements of working models may be contained in different memory systems, specifically in episodic and semantic memory (Bowlby, 1980). Others have argued for a wider understanding of the impact of attachment working models on cognition, suggesting that the models affect: attention; memory processes such as encoding and retrieval; attribution and inference drawing; affect; and behavior (c.f. Bretherton, 1999; Main, Kaplan & Cassidy, 1985), and have also suggested that the earliest attachment-related information may be stored in pre-verbal form in procedural memory (Crittenden, 1990; Fraley, 2002).

Bowlby also postulated that difficult early relationships would lead to rigidity of internal working models through what he termed "defensive exclusion" of material (Bowlby, 1980). Specifically, he suggested that two kinds of experience in particular lead to defensive exclusion: 1) parental failure to respond to or rejection of a child's intensely-felt attachment needs and 2) parental disavowal of information about the parent that the child knows to be true (i.e. that mommy is "quite all right" when in reality mom is chronically depressed). In either instance, Bowlby suggested the child will defensively respond by excluding the intense needs or disturbing information from awareness and that this exclusion may interfere with the updating of working models as relevant new information may be ignored.

Bowlby's ideas about defensive exclusion have been extended by several researchers. Bretherton (1997) for example suggested that defensive exclusion may additionally result from a child's cognitive inability to understand a parental behavior or

utterance (for example understanding a severely ill parent's apathetic behavior as rejection although the parent does not intend, cannot help, their behavior), or from consequent fantastical understandings constructed in an individual's representational system, or even from simple self-deception. Bretherton also pointed out that defensive exclusion probably runs the gamut from conscious avoidance to unconscious repression. Crittenden (1990) also stressed that what may be excluded or disavowed is not the memory of an event but the affect associated with it.

Stability and change: Bowlby argued that a sign of healthy development was flexibility of working models in response to environmental as well as developmental changes; nonetheless he believed that the degree of possible change was constrained (Bretherton & Munholland, 1999). For example, Bowlby suggested that working models become more complex with cognitive and emotional maturation but he argued that this typically leads to changes in attachment strategies, such as going looking for mom rather than simply crying for her, but not in primary attachment goals. In addition, he held that model change is complicated by two factors. First, the actual properties of attachment working model functioning make these models resistant to change since Piagetian assimilation processes lead new experiences to be interpreted in the light of prior understandings, and habitual or repeated thought processes to become automatic/unconscious and thus unrecognized. Second, Bowlby proposed that defensively excluded information would (as argued earlier) interfere with the updating of working models as relevant information may be ignored, leading to persistence of attachment working models particularly for those who are insecurely attached.

Other researchers have suggested that since attachment working models are relational in nature, change in working models may be complicated by other factors too. For example, change is often posited on changes in the working models of attachment partners (Cook, 2002). Further, change in overall model structure may be difficult if attachment working models are indeed structured hierarchically (from more abstract or general to more specific) and contain representations of a range of attachment experiences and relationships, because change will be required at many levels and in many areas of the working model hierarchy (Bretherton, 1999). In addition, change may be difficult if the earliest attachment working models are in pre-verbal, non-conscious procedural memory (Crittenden, 1990; Fraley, 2002) since these early systems are difficult to access. Suggested forces for stability of working models also include the idea that individuals with a particular kind of attachment working model may seek out environments that match the expectations and goals of those working models, and further, that individuals may create relational environments that further confirm their working models by, for example, acting in a hostile manner because fearful of rejection, thus eliciting rejection (Feeney & Noller, 1996; Fraley, 2002).

This brief review of theory of attachment working models is clearly not comprehensive; nonetheless it illustrates the range of ideas about these representational constructs and concurrently the lack of a comprehensive and tightly specified theory of attachment working models. Such a theory would be useful in part because it would generate specific hypotheses that could then be empirically tested. As the following review of the literature will suggest, the research findings thus far tend to provide support

for the general idea that the influence of attachment working models developed in infancy and early childhood persists across the lifespan, but provide little evidence about the specific content, structure and processes of working models.

Empirical Evidence for Attachment Working Models: The clearest evidence that attachment working models developed in infancy persist over time comes from studies which examine continuity between attachment assessed in infancy and at a later age. Fraley (2002) recently conducted a meta-analysis of all such studies thus far (24 studies and 27 samples); the gap between the two assessments ranged from 1 month to 20 years. Unsurprisingly, congruence was lower for the longer time gaps; for example for the oldest group (average age at second assessment 19 years, five different studies), the test-re-test coefficient was .27. Looking across the studies, Fraley concluded that: "the continuity between early attachment security and attachment security at any point later in the life course will be equivalent to a correlation of approximately .39" (p 135). Fraley's analysis additionally suggests that the degree to which attachment working models formed during infancy do continue to exert an influence on later relational functioning will be constrained by the extent to which individuals are able to influence their social/relational environments; for individuals in high-risk environments such as those characterized by poverty or other environmental stressors, stability will be less likely since such individuals will have less ability to impact their environment.

The correspondence between infant attachment security and attachment security measured later in life may provide the best evidence for continuity of attachment working models but correspondence between maternal attachment security assessed when mothers

are pregnant, and the later attachment security of infants, also indicates that the influence of working models of one relationship (the mother's relationship with her own parents) transfers into new relationships (the mother's relationship with her infant). Numerous studies have been conducted comparing infant and maternal attachment status and the evidence is strong that such transfer does indeed occur. A 1995 meta-analysis of the studies then available (14 studies conducted in six countries, 18 samples, 854 dyads) found that parents' attachment security predicted with 75% accuracy the attachment security of as yet unborn infants (van IJzendoorn, 1995).

Transfers between marital and parental attachment working models have also been assessed through studies using both the AAI and a semi-structured interview modeled closely after the AAI that inquires about participant's romantic relationship, the Current Relationship Interview (CRI, Crowell & Owens, 1996). One such study found a 64% overall concordance between AAI and romantic relationship security designations (Owens, Crowell, Pan, Treboux, O'Connor & Waters, 1995). However, the authors also pointed out that the correspondence between within-dyad romantic partners' attachment status as assessed by the AAI was low, and yet the correspondence between partners' attachment status as assessed by the CRI was 78%. The authors interpreted this finding as indicating that working models of current relationships are not merely representations of early experience but are affected by the partner's relationship characteristics.

Another source of evidence for the ongoing impact of attachment working models comes from studies that explore later emotional and behavioral correlates of attachment security. Studies have related secure attachment to enthusiastic and persistent problem

solving in toddlerhood (Matas, Arend & Sroufe, 1978), high levels of ego resiliency and curiosity in school-aged youths (Arend, Gove & Sroufe, 1979) and less angry, more focused discussion by teens during problem-solving discussion with their mothers (Kobak, Cole, Ferenz-Gillies, Fleming & Gamble, 1993). Studies using self-report methodologies have also provided suggestive correlational evidence of the influence of (conscious) attachment working models on psychological functioning (e.g. McCarthy, Moller & Fouladi, 2001; for a review, see Shaver & Mikulincer, in press).

Assessment of Attachment Working Models: The research reviewed suggests that working models developed in infancy persist and impact later relational and emotional functioning. Nonetheless, the research findings thus far say little specific about attachment working models, about their development, content, processes, structure and stability. One reason for this is that the methodologies being used to study attachment are not well suited to exploring hypotheses about attachment working models.

Attachment has typically been assessed in one of three ways: observation, clinical interview and self-report. Observation is most typically used to assess attachment security in infants; this is done through the Strange Situation paradigm, a series of structured separations between primary caregiver and infant (Ainsworth, Blehar, Waters & Wall, 1978). For adults, the two chief methodologies have been clinical interview; usually the AAI (Main & Goldwyn, 1998), and self-report. There are however some important differences between the two methodologies. Central to the AAI classification coding system is the assessment of *adults' unconscious processes for regulating emotion* during discussions of attachment-related experiences during childhood, such as separations from

attachment figures and what happened when they were upset, sick, or hurt (Main & Goldwyn, 1998). Security of attachment is assessed by analyzing *how* people talk about their relationships with their parents during childhood, not the content of their speech. In contrast, the self-report measures of adult attachment, rely on adults' *conscious appraisals* of their relationships.

Given that attachment working models are thought to function at least partly unconsciously, the fact that self-report instruments assess explicit but not implicit knowledge about attachment working models is problematic. For example, in the AAI it is not uncommon for those with the insecure attachment pattern termed Dismissing (Avoidant)[1] to respond with idealizing statements when asked about their parents in a general way: "He was the best father in the world." Yet, when probed about paternal responses to injury, or for specific memories, the same individuals may describe a father who beat his child severely, or was cold and rejecting. This type of responding suggests that some insecurely attached individuals are likely to self-report their attachment relationships to be secure. By contrast, those who are Secure may describe abusive parents in the AAI but will do so coherently and openly in a manner that suggests resolution rather than defensive insecurity; and yet on self-report instruments such individuals may end up classified as insecure (Jacobvitz, Curran & Moller, 2002).

[1] The terms used to designate the four empirically established attachment patterns vary whether it is infants (assessed by the Strange Situation) or adults (assessed by the AAI) being discussed. Secure infants and adults are referred to as "secure." Individuals who respond to attachment distress by shutting down their emotional response are termed "avoidant" (infant) or "Dismissing" (adult). Those who respond by alternatively clinging and showing hostility are termed "anxious" or "anxious-ambivalent" (infant) or "Preoccupied" (adult). The fourth category, "D" for infants and "U" for adults, is associated with abuse in infants and unresolved loss through death or trauma for adults. For a fuller discussion of these patterns, see Ainsworth, Blehar, Waters and Wall, 1978; Hesse, 1999; Main and Goldwyn, 1997.

The argument that self-report instruments do not capture unconscious or defensive elements of attachment working models is really an argument about accuracy. The little research that has been done using both the AAI and self-report instruments has found only modest to moderate associations across the two types of measures (e.g. Crowell, Treboux & Waters, 2000; Shaver, Belsky & Brennan, 2000; see also, Jacobvitz, Curran & Moller, 2002). In addition, the limited research that has explored the relationships between, on one hand, observed behavior of romantic partners, and, on the other, self-reported attachment or AAI attachment status, suggests that while there appear to be clear associations between the AAI and observed behavior, the associations between self-reported romantic attachment and the observed behavior of romantic partners is thus far more modest (Jacobvitz, Curran & Moller, 2002). Such findings have led some to conclude that self-report instruments should simply not be used to assess attachment working models (De Haas & Bakermans-Kranenburg, 1995). However there are also problems with using the AAI to assess attachment working models, principally that the AAI was not developed as a tool to investigate attachment working models, except in the broadest sense (Owens, Crowell, Pan, Treboux, O'Connor & Waters, 1995).

The AAI was developed out of a theoretical understanding of attachment theory but validated through associations with infant attachment security as assessed by the Strange Situation. Main and her colleagues began by interviewing mothers whose infants' security had earlier been assessed, and then looked for commonalities across transcripts in each coding class (Hesse, 1999). Subsequently, mothers were interviewed prenatally using this scoring protocol and AAI status was found to predict infant security. As

discussed earlier, such findings suggest the presence and impact of attachment working models. However, the AAI scoring system also, and more specifically, implies understandings about the content, structure and processes of attachment working models. For example, the critical decision regarding attachment security in the AAI revolves around the issue of whether the transcript is "coherent" (Main & Goldwyn, 1998). Coherence is a discourse consideration and does not relate to content of the interview but to relevance of response to questions asked, clear and orderly manner of responding, succinct but not overly so responding, and honest and factually-based answers. The implication of this coding system is that attachment security is linked to discourse coherence *and that this is a reflection of the structural coherence of attachment working models.* As another example, the AAI scales associated with the insecure Dismissing category, such as those for coding idealization of parents, stated lack of memory for childhood, or derogation of attachment figures or attachment-related experiences, imply something about the possible processes associated with attachment working models in this group of insecure individuals. Dismissing individuals are thought to cope with their distress around attachment-related events through suppression and avoidance (Hesse, 1999) and the three Dismissing scales suggest which strategies are used to accomplish this.

Similar assumptions underlie all the AAI coding scales and the point here is not to quibble with these implied understandings but rather to draw attention to the fact that the AAI was not developed to assess working models but to predict infant security, and that any theoretical understandings that underlie the AAI scoring system are accepted into the

system only in so far as they accomplish this aim. For this reason, the AAI does not provide complete or detailed answers to important questions about attachment working models, such as how working models develop, or how different relationships are structured in working models, or how defensive processes, for example, actually work to limit recall of attachment-related experiences. In addition, assumptions implicit in the AAI about attachment working models have yet to be verified through another means than the AAI.

As stated earlier, the most common alternative to the AAI for assessing adult attachment is self-report attachment instruments. Using self-report inventories to assess attachment makes sense, as Crowell, Fraley, and Shaver (1999) point out, because attachment relationships are such an important part of most people's lives that it is logical that they can provide important information about these relationships. However there are also some problems with using attachment self-report instruments (see Fouladi, Moller & McCarthy, 2005, for more details on this point). Firstly, there is an unresolved debate in the self-report literature about how best to assess attachment, (Heiss, Berman & Sperling, 1996; McCarthy, Moller & Fouladi, 2001). At worst this means that some attachment self-report instruments may be criticized for not focusing clearly on attachment (as opposed to other aspects of relationships). At best, there is still the difficulty that there are major theoretical and structural differences between measures. Some instruments seek to assess attachment along a simple secure/insecure dimension, some elect to categorize respondents into attachment "styles" and some use a latent dimensions model. Among these latter, there is variation in the underlying dimensions selected and in the

conceptualization of how attachment styles are thought to map onto the dimensions. There is also the problem that attachment self-report instruments vary in terms of the relationship domain assessed. As discussed there is also the troubling issue of the lack of correspondence between attachment assessed through self-report and through interviews such as the AAI (Crowell, Treboux, & Waters, 2000).

If self-report instruments and the AAI both pose problems for exploring attachment working models, one solution is to use experimental paradigms developed by cognitive psychologists to answer questions about representations of and cognition about everyday objects. This approach has been suggested by several attachment researchers (Crittenden, 1990; Shaver, Collins & Clark, 1996) and is beginning to be used by social psychologists studying relational schemas (Baldwin 1994; Baldwin & Meunier, 1999; Pierce & Lydon, 1998) as well as by attachment researchers (Mikulincer, Birnbaum, Woddis & Nachmias, 2000; Mikulincer, Hirschberger, Nachmias & Gillath, 2001). More specifically, an experimental priming technique has been advocated (e.g. Baldwin, 1992, 1995) and used for studying the content, structure and processes of cognitive representations of relationships.

The principle of priming is based on the idea that knowledge is represented in structures or networks and that if one unit in a structure is activated, this activation spreads along connections in the networks and activates related units. Closer or more related units are faster to access, so that people recognize the word "butter" faster after reading "bread" than "nurse" (Anderson, 1995) and categorize stimulus words more quickly when the word is more closely associated with that category label (Rorsch,

1975). This pattern means that attachment researchers can explore content and structure of attachment working models through categorization tasks (in which the category label is the prime). However, the priming effect is found even if the prime is presented so briefly that participants are unaware of having seen the word (for reviews see Kihlstrom, 1987; Merikle, 1992). If participants are unaware of the prime, participants' are unable to manipulate or defensively alter their responses, which means that subliminal priming paradigms allow attachment researchers to access non-conscious attachment working models, and to answer tightly focused questions about the content, structure and processes associated with such models, thus side-stepping some of the problems associated with both the self-report and interview assessment methodologies.

Testing attachment working models

In this study four different experimental paradigms were used to explore: 1) the affective components of individual's attachment working models; 2) the effects on memory processes of different types of models; 3) the semantic network of associations in participants' attachment working models. One paradigm was a subliminal priming task, one a memory task, one a lexical decision task, and one a categorization task, with the category labels as the primes.

Affective components of attachment working models: Liking judgments task: This task requires respondents to rate the likeability of affectively neutral stimuli (Chinese characters) which have been subliminally primed. The methodology was developed by Murphy and Zajonc (1993) and is posited on Zajonc's (1980) affective primacy hypothesis that positive and negative affects can be evoked with minimal

stimulus input and very little cognitive processing. While there is considerable empirical evidence that attachment security is linked to more positive self-reported affect and psychological functioning (e.g. McCarthy, Moller & Fouladi, 2001; see Miklincer & Florian, 1998, for a review), this paradigm offers the opportunity to explore whether activation of attachment working models impacts mental processes by creating an affective response, even if the models are not consciously activated. Evidence that this might be the case comes from a study in which subliminal priming with positive attachment-related words led to more self-reported support seeking and less self-denigrating coping following exposure to a stressful (unwanted pregnancy) story while priming with negative words lead to less self-reported positive affect and less growth-orientated coping (Pierce & Lydon, 1998). Subliminal priming with positive attachment related words (but not with neutral or positive, non-attachment words) also lead to outgroups being rated as being as likable as the participant's ingroup in a study by Mikulincer and Shaver (2001).

For the Murphy and Zajonc (1993) paradigm, the assumption is that if the attachment working model activated carries a negative affective tag, then the Chinese character that follows the subliminal prime will be negatively rated, and vice versa. This paradigm has been used to explore attachment in two studies thus far. In a seven-study paper, Mikulincer, Hirschberger, Nachmias and Gillath (2001), explored the differential impact of images on liking ratings and found that a secure-base image of an infant and mother created higher liking ratings than a positive but non-attachment wealth image, a neutral image of a polygon or no image. Other attachment-related images (a young

couple hugging and kissing and an old couple sitting companionably close) resulted in equally high ratings but images of a mother or infant alone did not create high liking ratings. Similarly, when the Chinese characters were subliminally primed with names of attachment figures nominated by the subjects, as well as with names of individuals who were friends but not attachment figures, names of acquaintances and strangers, the highest liking ratings were found for the characters primed with the name of individual's attachment figures. In none of the studies were the liking ratings significantly related to self-reported attachment status except when participants were either given false failure feedback or asked to visualize an unwanted separation from a loved one prior to beginning the experimental task. In both cases, under these threat conditions, self-reported attachment anxiety was related to decreased liking ratings.

A study by Banse (1999) used the names and faces of participants' romantic partners and friends as the priming stimuli and found that when the prime was presented subliminally, these images led to higher liking for the Chinese characters. Interestingly, when the primes were presented supraliminally higher liking ratings were associated only with the facial images of romantic partners and friends and there was no effect for the name primes. Again, there was no relationship between self-reported attachment status and responses to the priming study.

A personally-relevant subliminal prime: Both these studies suggest that subliminally presenting attachment-related words or images appears to activate the affective component of attachment working models and that this activation then influences how neutral stimuli are evaluated. However these studies used either general

attachment primes (such as an image of an infant and mother) that appear to elicit a common (positive) affective reaction for all individuals, or, if they used personally relevant primes (nominated attachment figures, romantic partners or friends), the identification process was either problematic or seems to have been geared toward eliciting only positive attachment figures. In the Banse (1999) study, it is not clear that either the friends or the romantic partners nominated by participants would necessarily meet the criterion of being an attachment figure. As Fraley and Shaver (2000) point out, romantic relationships (and by implication friendships) are not attachment relationships unless they are characterized by three elements: a tendency to remain close to attachment figure, use of attachment figure as safe haven when feeling distressed and use of attachment figure as secure base for exploration. In fact Fraley and Shaver suggest that even within a committed romantic relationship, it may take as long as two years for all three elements to emerge. In the Mikulincer et al. (2001) study, participants were asked questions such as: "Who is the person you can always count on?", "Who is the person you count on for advice?" that explicitly sought to identify individuals that provide attachment functions. However, it seems likely that the questions would have guided selection only of positive attachment figures.

In the current study, the aim was to explore differences between insecure as well as secure attachment working models because it was assumed that these different models have different emotional components. It was therefore necessary to use as a priming stimulus an indisputable attachment figure, one that was directly personally relevant for all participants and one that would tap into both secure and insecure working models.

Mothers are perhaps the clearest attachment figures, since Bowlby argued that human infants have an evolutionarily-impelled need to form attachments to their primary caregivers (Bretherton & Munholland, 1999), and the primary caregiver within American culture is traditionally the mother. Further, the cue "MY MOM" has the advantage of being differentially and personally relevant for all participants (I think about my mom, you think about your's). Finally, a substantial minority of individuals can be expected to be insecurely attached to their mothers: a meta-analysis of 584 AAI transcripts found that 42% of participants were classified as insecure and 58% as secure (van IJzendoorn & Bakermans-Kranenburg, 1996).

Further evidence that "MY MOM" has the potential to elicit negative as well as positive affective reactions, comes from studies exploring the impact of the phrase "Mummy and I are one" when used as a subliminal prime. First used by Silverman (1976, 1983), it was long assumed that this phrase had a positive affective content because it tapped into an unconscious wish thought to be common to all persons for symbiotic merger with the primal mother. However subsequent research (Sohlberg, Birgegrad, Czartoryski, Ovefelt & Strombom, 2000) has suggested that while this message may be reassuring to some, for others, such as those who are insecurely and avoidantly attached, the message appears to be aversive.

In sum, the reviewed research suggested that subliminally priming the maternal attachment working model with the phrase "MY MOM" would prime both secure and insecure attachment working models. Since working models incorporate an affective component, such priming elicits both positive and negative affective responses and

should lead to affectively neutral stimuli (Chinese characters) being evaluated in accordance with the emotional valence of the maternal working model. While half the characters were primed with "MY MOM" the second half were subliminally primed with "NOT MY MOM." This prime was chosen since it encompasses all that is not "mother," is assumed to have a neutral affective value for participants, and also because it was used in the IAT, as discussed below.

In the current study, based on the reviewed research, it was assumed that overall participants would respond with higher liking scores to the characters subliminally primed with "MY MOM."

Semantic associations in attachment working models: A lexical decision task: Reaction time differences in lexical decision tasks are commonly used in cognitive psychology to assess the associative links between stimulus words or concepts (Baldwin,1997; Fazio, 2001). This experimental paradigm has been used to assess interpersonal schemas in three studies by Baldwin and colleagues. In the first, supraliminal presentation of statements such as "If I depend on my partner, my partner will…" were followed by presentation in a lexical decision task of words such as "help" or "leave" (Baldwin, Fehr, Keedian, Seidel & Thomson, 1993). Subjects who self-reported their attachment as secure were found to respond faster to the positive outcome words while subjects classified as insecurely attached showed a response bias for the negative outcome words. In the same vein, individuals low in self-esteem were found to respond quicker to words implying social rejection following if/then statements about failure (Baldwin & Sinclair, 1996). In a third study exploring the impact of

experimentally cued attachment working models, Baldwin and Meunier (1999) asked participants to visualize a relationship in which they felt either contingently or non-contingently accepted; during this visualization phase, participants were given repeated computer presentations of distinctive sequences of computer tones. These sequences of notes were played later while participants participated in a lexical decision task in which each word or non-word was preceded with an if/then statement about interpersonal acceptance or rejection following success or failure. The results showed that when a contingent (accepting) attachment working model was cued through the computer tones, individuals self-reporting themselves as secure responded faster to success-acceptance statements, while anxious-ambivalent individuals responded faster to failure-rejection statements, suggesting that while attachment security is associated with expectation of social acceptance, anxious-ambivalent insecurely attached individuals are preoccupied with being socially rejected even within the context of a supportive relationship. This study also suggests that attachment working models include representations of different types of relationship knowledge, both relationship specific (for example contingent, un-contingent) and abstract, a general orientation toward attachment relationships (secure or anxious-ambivalent).

The studies by Baldwin and colleagues provide persuasive evidence that a lexical decision task that incorporates supraliminal primes in the form of either statements or sound cues, has the potential to reveal semantic network associations within attachment working models and that these differences are related to self-reported attachment. More specifically, the findings suggest that attachment security is related to faster responding

to positive attachment cues while attachment insecurity relates to faster responses to negative attachment cues. A lexical decision task study that incorporated subliminal primes found similar associations between attachment security and positive attachment cues and attachment insecurity and negative attachment cues. This study explored how different attachment working models affected reactions to others' needs (Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli, 2001). The experimental design involved three sets of primes presented subliminally: four secure base words (closeness, love, hug, support); four positive affect words (happiness, honesty, luck, success), and four neutral words (office, table, boat, picture). Following the lexical decision task, in which the stimuli consisted of neutral (non-attachment related words), participants were asked to write of a time when they saw a person in trouble and the stories were rated by two experimenters for empathy and personal distress. Analysis of the results showed that story construction varied consistently with the lexical decision task priming condition. Empathy (as rated in participants' stories) was higher for those subliminally primed with secure base than neutral words and personal distress (as rated in participants' stories) was lower for those primed with secure base than neutral words. This finding is consistent with empirical evidence of relationships between a person's attachment security and their responses to others. For example, as reviewed earlier, there is compelling evidence of links between maternal attachment security (assessed prenatally), maternal behavior to the infant, and subsequent attachment security of infants at 12 months (see Hesse, 1999 for a review).

The Mikulincer et al. (2001) study did not explore differential responses to the

lexical decision task itself as a result of subliminal priming, however a study by Mikulincer, Birnbaum, Woddis and Nachmias (2000) which paired attachment-threat and neutral primes with attachment-related and neutral stimuli in a lexical decision task, did find a theoretically logical pattern of results. The chief finding was that subliminally priming attachment-relationship threat words such as "failure," "death" or "illness," lead to faster response times for positive attachment-related words such as "closeness," "love" or "hug." This suggests, as predicted by attachment theory, that stress sets off a desire to seek out comfort from an attachment figure, or, more specifically, that threat-words are semantically associated with positive relationship or attachment words. Somewhat in contrast to the other studies reviewed, the researchers also found that self-reported attachment security was related to responses to the lexical decision task, with anxious-ambivalent individuals tending to respond fast to both positive and negative attachment words irrespective of whether they were primed with an attachment threat word or a neutral word such as "hat". This corresponds with the idea that anxious attachment is associated with a preoccupation with attachment relationships. Self-reported avoidant attachment was however only related to faster responses to negative attachment words when the attachment-threat prime was paired with a condition of cognitive load (doing the lexical decision task at the same time as an auditory memory task). Cognitive load is thought to make it harder to suppress unwanted material (e.g. Wegner & Zanakos, 1994) and thus this study provides suggestive evidence that for avoidant individuals the defensive exclusion of knowledge in attachment working models affects responses to stimuli and stretches cognitive processing capacity. This finding is interesting since it

suggests that while avoidantly-attached individuals may appear to be immune to attachment related threats (and distress) that they are only so because they are defensively excluding, or repressing, their semantic associations between attachment threat and negative attachment outcomes such as "separation" "rejection," or "abandonment." When the cognitive processing capacities of such individuals are taxed however, the underlying semantic associations emerge.

The subliminal priming, lexical decision tasks studies reviewed provide further evidence that a lexical decision task has the ability to reveal associations in attachment semantic networks. However, the studies reviewed do not provide evidence as to how participants' attachment workings models might lead to individual differences in responses to attachment stimuli in an unprimed lexical decision task. It can be argued that priming, whether supra- or subliminal, has the potential to bias responses to the lexical decision task words by priming particular aspects or types of attachment models. While such experimental designs may shed light on general aspects of attachment schemas, such as the semantic associations between stress words like "death" and positive attachment words, they have less ability to reveal individual differences in semantic associations within attachment working models. Given that individual differences were the focus of the current study, it was decided to utilize a simple task design: an unprimed lexical decision task that incorporated positive and negative attachment words and neutral and non-words. Since participants completed this task second, after the affective liking task in which there are no obvious attachment cues, it was hoped that this task would allow participants' idiosyncratic responses to attachment words to be assessed. Given the

majority of securely attached individuals in the population, it was assumed that participants would respond fastest to the positive attachment words overall because of the centrality of attachment relationships and thus the presumable primacy of attachment schemas, for most individuals.

Memory processes in attachment working models: Recall/Recognition tasks: This task was inspired by the fact that attachment working models are theorized to effect memory processes, by influencing not only what is encoded into memory but also how information is stored and retrieved (Collins & Read, 1994; Bretherton, 1999). The assumption that mental models of the world influence memory processes is also central in schema theories of memory (e.g. Taylor & Crocker, 1981; Linville & Carlston, 1994) and one hotly contested debate within memory research is the extent to which such representations create memory biases for representation-consistent versus inconsistent information (for meta-analytic reviews, see: Fyock & Stangor, 1994; Rojahn & Pettigrew 1992; Stangor & McMillan, 1992). For attachment working models, this leads to one potential hypothesis: attachment working models bias memory so that information consistent with the working models is better recalled, meaning that attachment security is associated with better recall of positive attachment stimuli and attachment insecurity with better recall of negative attachment stimuli. However attachment theory suggests an alternate hypothesis: that attachment insecurity may result in "defensive exclusion" (Bowlby, 1980) of emotionally-laden interpersonal events, leading to poorer memory for negative attachment stimuli for insecures.

Although little research has explicitly explored the relationship between attachment security and memory for attachment-related stimuli (Miller & Noirot, 1999), four studies do provide relevant evidence. The first study located explored whether AAI classifications could be related to differences in non-attachment related autobiographical memory (Bakermans-Kranenburg & van IJzendoorn, 1993). Prompted by the fact that Dismissing adults in the AAI often claim a lack of memory for attachment-related incidents in their childhood, this study explored whether participants' self-reported non-attachment autobiographical memory, their ability to answer non-attachment related questions about their childhoods (such as the name of preschool teacher) and their speed of response to such questions, related to their attachment status as categorized with the AAI. The results suggested that not only did AAI classification not relate to differences in non-attachment memory abilities, but that Dismissing adults often appeared to have better memories for non-attachment related topics than other participants. This study thus suggested that while attachment schemas may bias memory they do so specifically rather than generally. Further, the results for Dismissing individuals suggests that attachment insecurity may negatively bias recall for emotionally-threatening attachment-related information.

Two further studies suggest, by contrast, that attachment security is associated with better recall of positive stimuli and attachment insecurity with better recall of negative stimuli. In one study, 3-year-olds' recall for positive and negative events in a puppet show was examined (Belsky, Spritz & Crnic, 1996). The researchers found that children who had been found to be securely attached at 12-months, had better recognition

of the positive events, while insecurely attached children recognized negative events more accurately than positive events. This difference was found despite the fact that researchers detected no differences between the children's visual attention to the negative and positive events. A second study with adults, in which participants first wrote about either rejecting or supportive friendship experiences, then read an attachment-related story and later took a cued-recall test, also found better recall for schema-consistent information (Miller & Noirot, 1999). More specifically, secure attachment was associated with better recall for positive events when participants were primed by writing about a rejecting friendship experience before reading the attachment story. By contrast, fearful attachment was associated with better recall for negative events irrespective of priming condition.

A fourth study suggests by contrast that attachment security may create worse and not better recall for negative attachment stimuli. In this paper, AAIs were administered to diagnosed anxiety patients as well as a matched non-clinical sample, and differences in processing of threatening stimuli in attentional and memory tasks explored (Zeijlmans van Emmichoven, van IJzendoorn, De Ruiter & Brosschot, 2003). The memory tasks consisted of a free-recall and a cued-recognition task, the stimuli consisting of 12 positive (e.g. "happiness"), 12 neutral (e.g. "short") and 12 threatening (e.g. "murder") words that were presented one after the other on a computer screen. Following a distractor task (completing questionnaires), participants were encouraged to write down as many of the words as they could remember; for the recognition task, they were asked to indicate which, from a list of seen and matched but never-seen words, they recognized. The

results suggested that overall attachment insecurity was associated with poorer recall of threatening words, and that the secure participants who were also diagnosed with anxiety disorders recalled more threatening stimuli than their insecure counterparts. This suggests that attachment insecurity is associated with defensive exclusion of threatening stimuli. For the recognition task, task performance was found to be unrelated to clinical or AAI classification; the results suggested only that threatening words were better recognized.

The research reviewed provides evidence for two different hypotheses about the impact of attachment security on recall and recognition: that insecurity results in better or poorer recall of threatening information. However, attachment theory would suggest that while the typical repression and avoidance strategies associated with the Dismissing type of attachment insecurity might lead to defensive exclusion of threatening material, that the main other insecure group, Preoccupied, which is characterized by an anxious vigilance to attachment stimuli, might in fact be characterized by better recall of negative stimuli (Zeijlmans van Emmichoven et al, 2003). Given the lack of clear findings thus and the fact that attachment status was not directly assessed in this study, the simplest and clearest hypothesis was adopted for the current task: that overall participants would show better recall and recognition of positive attachment words. The current memory task was modeled on the Zeijlmans van Emmichoven et al. (2003) task as well as conventional memory tasks, in which the stimuli consist of word lists and recall is tested following a distractor task (Cohen, Kiss & Le Voi, 1993). The difference in the current case was that the words consisted of negative and positive-attachment related words (rather than simple "positive" and "threat" words), and neutral words.

The three experimental paradigms outlined thus far differ from each other in the extent to which participants may be aware of the demand characteristics of the experimental paradigm. In the Chinese-characters affective judgments task, there is no obvious clue to what the experiment is testing since the stimuli are effectively meaningless for non-Chinese character readers, and the prime "My Mom" is presented subliminally. In the lexical decision task, the purported purpose of the task is to make word/nonword decisions but it is at least possible that participants may notice that two-thirds of the words are interpersonal in nature. This of course is even more clear in the recall/recognition task, since participants, in trying to memorize the stimuli, are explicitly required to focus on word meanings. Thus the three tasks thus far outlined therefore provide a continuum between "pure" assessment of implicit attachment working models and a more mixed assessment of implicit attachment working models with some potential effect of explicit models, or defensive responding. The last task to be described is the most obvious of the four since it requires participants to categorize stimulus words: the task (categorization or judgments about semantic associations), the categories and their content (words) are all explicit. As such this task occupies the far-end of the demand characteristics continuum that it is proposed the four experimental tasks provide. However, there is considerable evidence from the stereotype literature and some preliminary evidence from the attachment literature that this task has the ability to uncover implicit semantic associations that differ from those explicitly professed.

Semantic associations in attachment working models: A categorization task: The Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998) was designed to

assess the automatic associations underlying implicit prejudice. The task requires participants to categorize words into paired-category groups and assesses implicit associations on the basis on differences in reaction times to the paired categories. For example, if the category of interest is young/old, participants must categorize stimulus words into either YOUNG/PLEASANT versus OLD/UNPLEASANT categories or OLD/PLEASANT versus YOUNG/UNPLEASANT; quicker responses to the pairing of young and pleasant than to old and pleasant is interpreted to imply patterns of semantic associations or implicit prejudice.

The IAT has been used to investigate a wide range of categories: young/old; Jewish/Christian; Russian/American (Rudman, Greenwald, Mellott & Schwartz, 1999), smokers/vegetarians and omnivores (Swanson, Rudman & Greenwald, 2001), ethnicity (Ottoway, Hayden & Oakes, 2001), gender (Rudman & Kilianski, 2000), and evidence has been found of prejudicial semantic associations in all these categories (see Greenwald & Nosek, 2001, for a review). In fact the popularity of the measure has led one researcher to conclude that: "Few measurement tools have received greater empirical attention than the IAT" (Devine, 2001, p757). Interest in the IAT has lead, perhaps inevitably, to pointed questions being asked (in a special edition of the Journal of Personality and Social Psychology) about the extent to which the IAT can be shown unequivocally to assess implicit prejudice. For example it has been argued that the IAT may in fact assess well-learned environmental associations (Karpinski & Hilton, 2001) or relative preference for one group over another (rather than an explicitly prejudicial preference) (Brendl, Markman & Messner, 2001). In addition, several studies show that contextual

manipulations effect responses to the IAT (for example, Dasgupta & Greenwald, 2001; Wittenbrink, Judd & Park, 2001; Blair, Ma & Lenton, 2001; Lowery, Hardon & Sinclair, 2001; Rudman, Ashmore & Gary, 2001). However, while these studies suggest that the relationship between IAT results and implicit prejudice may be more complex than initially thought, it is remarkable that the considerable empirical literature thus far has not provided any comprehensive grounds for rejecting either the experimental paradigm or the primary assumptions about what it measures. For this reason, the IAT seems like a useful tool for exploring attachment working models.

Two studies, neither published in a journal, have used the IAT to do exactly this. The first, a dissertation study (Aspelmeier, 2000) required participants to categorize relationship words, inanimate object words and pleasant and unpleasant words. The expectation was that participants who self-reported themselves to be securely attached would show faster response times to the relationship word/pleasant pairing than insecurely attached participants. Interestingly, this expectation was confirmed in one data set but results were in the opposite direction in a second data set. A second study by Feldman Barrett, McCabe, Costa, Bevaqua and Bliss (APA poster presentation, 1999) required participants to categorize attachment-related words into self/other categories and found that self-reported attachment status was related to responses to the self/pleasant versus self/unpleasant, other/pleasant versus other/unpleasant categories. Specifically, self-reported security was associated with significantly faster responses to positive-self associations than was found with with self-reported fearful or preoccupied attachment status. Self-reported attachment security was also associated with more positive other

associations than was the case for self-reported fearful, preoccupied or dismissing attachment status. The use of the IAT in this study thus provides evidence that, as Bowlby proposed (1973), attachment working models incorporate models of both the self and the attachment partner's behavior.

Taken together, these two preliminary studies suggest that the IAT has the potential to reveal important information about the structure of semantic networks of associations in attachment working models for secure and insecure individuals. More specifically, it seems likely that due to the content of attachment working models built through actual experiences with their mothers, that for a majority of securely attached participants, responses would be faster to the "MY MOM"/"Pleasant" category than the "MY MOM"/"Unpleasant" category. In addition, within the congruent categories, it was expected that responses would be fastest to positive attachment words.

The findings associated with the experimental paradigms reviewed suggest that cognitive methodologies can shed light on the structure, content and functioning of implicit attachment working models. However, it is important also to assess and contrast participant's explicit attachment working models, that is their conscious or self-reported attachment models.

Explicit assessment of attachment working models: Self-report questionnaires: Despite the problems with self-report attachment instruments outlined earlier, it seemed appropriate to include such instruments in the current study. The research cited showed some evidence that for some tasks and some attachment instruments, there have been

associations between self-reported attachment security and task performance. In addition, including self-report instrument allowed comparison of two different methodologies for assessing attachment working models. Further, including in the current study design, an attachment instrument that aims to capture non-conscious aspects of attachment relationships, allowed comparison of traditional and non-traditional attachment self-report instruments.

Since the focus in this study was on the working model that participants have of their mothers, it was decided to focus on attachment instruments that assess parental attachment. The two published self-report parental attachment instruments (Parental Bonding Instrument, PBI, Parker, Tupling & Brown, 1979; Inventory of Peer and Parental Attachment, IPPA, Armsden & Greenberg, 1987; 1989) included in this study have been widely used and their psychometric strength is delineated in the instrument descriptions in the methodology section. Both instruments were used because the IPPA assesses the current relationship while the PBI asks respondents to retrospect about their parental attachment in the first 16 years of life. The PBI includes two scales but only one clearly assesses attachment, the Care scale, and it was this scale that was included in the research design. The drawback of these instruments however is that their purpose is clear and it is possible therefore that they do not capture defensive reporting of positive parental attachment. For this reason, it was decided to also include in this study the Parental Attachment Scale (PAS, Fouladi, Moller & McCarthy, 2005), a self-report instrument that attempts to assess aspects of unconscious or defensive parental attachment working models. This instrument and its development are described below. In

addition, it was decided to include the Confidence subscale from the Attachment Style Questionnaire (ASA, Feeney, Noller & Hanrahan ,1994) because this scale, when combined with the Care scale from the PBI, can be used to categorize individuals as "earned secure," that is having achieved attachment security despite a history of poor childhood relationships with caregivers (Moller, McCarthy & Fouladi, 2002). The construct of earned attachment security is of interest for the current study because prior research suggests that while "earned secures" may function similarly to those with both childhood and current attachment security, there may still be some carry-over deficits in psychological functioning (Moller, McCarthy & Fouladi, 2002; Paley, Cox, Burchinal & Payne, 1999; Pearson, Cohn, Cowan & Cowan, 1994; Phelps, Belsky & Crnic, 1998.) One potential explanation for this finding is that the attachment working models of earned and continuous secures are subtly different, a hypothesis that the current study design, with the inclusion of the Confidence scale for the ASA, allows to be empirically investigated.

Incorporating both traditional self-report measures of parental attachment as well as a newly-developed measure that aims to capture unconscious elements of parental attachment, allowed two research questions to be explored. First, given the uneven findings about relationships between attachment tasks and established self-report attachment instruments, it was hypothesized that no relationship between task responses and self-reported attachment would be found for the established instruments. However, it was predicted that some relationships would be found for the newly developed PAS, although due to the newness of this instrument no specific predictions could be made.

Pilot-Study: Because this study used a new online design for the subliminally primed tasks, it was decided to run a pilot-test to ensure that the software/hardware and tasks were working as they were assumed to and to provide an opportunity for trouble-shooting. Two tasks were used in this study (the Chinese characters and lexical decision task) and both were subliminally primed with the phrase "MY MOM." The results and sample are described elsewhere (for example, see Moller, McCarthy and Fouladi, manuscript in preparation) but for the purposes of this research, the main import of these findings was that the task methodology broadly appeared to work.

Goals of the current study

The aim of the proposed study was to explore the content, structure and processes associated with attachment working models, both secure and insecure. More specifically, this study aimed to test out theoretical predictions about attachment working models and clarify the nature of these mental structures. With few exceptions (as outlined above), adult attachment researchers have relied on either self-report or interview methodologies and have made inferences about attachment working models on the basis of responses to these instruments. However, as discussed earlier, self-report instruments may only capture explicit (rather than unconscious or defensive) elements of attachment working models and while interview methodologies appear to assess both explicit and implicit elements of these models, the assumptions about these models on which the scoring of such instruments is based has yet to be validated by another assessment methodology. This study has the potential to clarify understanding of attachment working models by using experimental paradigms derived from cognitive psychology that allow tightly

focused questions about the content, structure and process of attachment working models to be asked. Thus it was hoped that this study has the ability to create a better understanding of mental models of primary attachment figures, and therefore to illuminate the ongoing connections between early experiences with caregivers and later relationship and emotional functioning in adulthood.

Summary of Design and Research Questions

In the proposed study, undergraduate college students performed four experimental tasks assessing different aspects of their implicit attachment working models: a subliminally primed affective judgment task, a recall/recognition task, a lexical decision task and a categorization task, the IAT. The stimuli for the tasks consisted of: Chinese characters (affective judgment task); positive and negative attachment words, neutral words and nonwords (lexical decision task); positive and negative attachment words and neutral words (recall/recognition task); positive and negative attachment words and pleasant and unpleasant words (IAT task). Participants also completed a demographic questionnaire, manipulation check items, a mood check-list and several self-report attachment measures to assess their explicit attachment working models. This study design allowed the following research questions to be addressed:

1) What is the affective component of participants' attachment working models of their mothers, and how does this vary by self-reported attachment security? This question is addressed through the Chinese characters affective judgments task and investigation of the associations between task and instrument responses.

2) How do participants' attachment working models of their mothers affect their recall and recognition of information? How does this vary by self-reported attachment? This question is addressed through the free-recall and cued recognition memory tasks and investigation of the associations between task and instrument responses.
3) What are the semantic networks of associations in participants' attachment working models of their mothers and how do these vary by self-reported attachment? This question is addressed through the lexical decision and IAT tasks and investigation of the associations between task and instrument responses.

Specific hypotheses are addressed at the end of Chapter Three.

CHAPTER III

METHODOLOGY

Participants

The participants consisted of 179 undergraduate students (age: M = 21.5, SD = 3.43, range 18 to 51) from the University of Texas at Austin Educational Psychology subject pool. Seventy-four percent of participants were female and 26% were male; 62 % described themselves as seniors, 25% as juniors, 11% as sophomores and 2% as other. According to self-reported racial identity, 58% of participants were Anglo, 25% Asian American, 10% Latino, 1% African American, 2% biracial, 1% multiracial, and 3% other. Eighty-six percent of participants described themselves as having both a mother and a father; of the rest 6% chose the parental description "mother only," 6% "mother and step-father," and 0.6% respectively "father only," "father and step-mother" and "foster parents or unrelated-guardians." Only 3% described themselves as currently living with their parents: the rest visited them only occasionally (52%) or for university vacations (45%).

Additional demographic questions were also asked to establish which participants had childhood experiences that might result in insecure attachment. Eight of the participants (4.5% of the sample) reported having had a parent who died; one person lost their mother and seven their father. Of these individuals, six reported that their parent died before they were 14. Thirty-eight of the participants (23% of the sample) reported that their parents had divorced; of these 14 reported that they did not maintain "regular contact with the non-custodial parent." Mean age for divorce was 8-years-old (range 1-

21; SD = 5.281). Nine of the participants (5.8% of the sample) reported having had a parent who developed a severe illness before they were 14, "such that they were effectively unable to play a parental role." These participants' mean responses to the self-reported attachment instruments are very similar to those of the entire data set (see descriptive data for maternal scales in Table 1 and Table 2).

Procedure

Participants were recruited from undergraduate educational psychology classes over the course of one semester and received course credit for their participation. Participants completed the four experimental tasks, a demographics survey, several manipulation check items, and the instruments described below.

The entire study was conducted online, at times convenient to the study participants. Prior research has shown that responses to online self-report instruments are highly comparable to those collected through traditional paper-and-pencil methodologies (for example, see Fouladi, McCarthy & Moller, 2002; Pasveer & Ellard, 1998; Stanton,1998). To ensure conformity of computer equipment and software (in particular monitor speed), all participants were asked to complete the study in the Educational Psychology PC Lab.

Experimental Tasks

All four experimental tasks were programmed by a computer engineer, and were presented online. The four tasks were created in Flash .5, a software originally developed for animation.

Task 1: Chinese Characters and Liking Ratings: In this task, participants were

presented with 60 Chinese characters which were subliminally primed. The priming of stimuli was conducted in two blocks separated by a mood-check questionnaire (the PANAS). Within the blocks, the characters were presented in random order but the order of the blocks was not randomized; the block primed with "MY MOM" always came first and the block primed with "NOT MY MOM" came second. The presentation of the characters in subliminally primed blocks was done to prevent carry-over effects, with the mood-check being included as a manipulation check that the priming was working. The prime was masked as follows: "XXX" appeared in the center of the screen for 500 milliseconds, "MY MOM" or "NOT MY MOM" for 10 milliseconds and "XXX" for a further 500 milliseconds. The timing of mask and prime, as well as the forward and backward masking using "XXX" follows recommendations by Seamon, Brody and Kauff (1983) and Seamon, Marsh and Brody, (1984). This procedure also follows the practice of researchers exploring responses to subliminal attachment primes, including Banse (1999) who used backward masking (31.5 milliseconds) and an exposure of 10.5 milliseconds for the prime; Mikulincer, Hirschberger, Nachmias and Gillath (2001) who used backward masking for 500 milliseconds and a prime exposure of 10 milliseconds, Pierce and Lydon (1998) who used a forward mask for 100 milliseconds and a prime exposure time of 33 milliseconds, and Mikulincer and Shaver (2001) who used both forward and backward masks of 500 milliseconds each and a prime exposure of 20 milliseconds. Other experimenters have used no mask and shorter exposure times ranging from 20 milliseconds (Mikulincer, Birnbaum, Woddis & Nachmias, 2000; Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli, 2001) to 5 milliseconds (Sohlberg,

Birgegard, Czartoryski, Ovefelt & Strombom, 2000).

This task assumes that for those who not read Chinese characters, these are affectively neutral stimuli; differences in the likeability of each stimulus is then attributable to priming rather than the stimulus. The characters were thus presented in the same font and were established, through pilot-testing with an undergraduate sample of 181, to have a high degree of similarity in terms of liking-ratings. In the pilot, 53 of the 60 characters had mean ratings across all participants of between 3.1 and 3.9 on a six-point liking scale, with a low score of 2.54 and a high score of 4.12 for the remaining seven characters. For a list of the Chinese characters used, please see Appendix 1.

Task 2: Lexical Decision Task: In this task, participants were shown a string of letters and asked to decide as quickly as possible whether the letter string was a word or not. Participants indicated their decision by clicking a "word" or "nonword" button. Of the 120 words, 20 were positive attachment words (for example, "loving," "hug"), 20 negative attachment words (for example, "hate," "separation"), 20 neutral words (for example, "product," "cauliflower") and 60 nonwords matched to the words by length. The positive and negative attachment words were generated based on the attachment literature and pilot-testing in which participants were asked to list words describing a very loving relationship with a mother and an unloving maternal relationship. Words were matched across the three categories by familiarity (Carol, Davies & Richman, 1971). As suggested in the literature (c.f. Robinson & Katayama, 1997), nonwords were created by changing one or two letters of a known word, for example, "direction" became "direstion" and "envelope" enrelape." The words were presented in random order for

each participant. For a list of stimulus words and non-words, see Appendix 3.

Task 3: Recall and Recognition Task: In this task, participants were instructed to try to memorize a presented word list. The 30 words (10 positive attachment, 10 negative attachment, 10 neutral) were presented one at a time, each word being presented for 2 seconds. As before, presentation of the words was randomized. The stimulus words were selected from the list of words used in the lexical decision task and were matched across category for familiarity (Carol, Davies & Richman, 1971). Following the word presentation, there was a 5 minute distractor task, a "fly-swatter" game that required participants to use the computer mouse to try to hit a fly buzzing around the screen. Subjects were then given 5 minutes to try and recall as many words as possible. Following this, participants were provided with a list of 60 words, the 30 stimulus words and 30 semantically similar never-seen words, and asked to indicate if they had seen the word before. Participants were not able to go back and change earlier responses to the free recall section of this task after they had seen the words in the recognition task. For a list of the stimulus words and semantically similar never-seen words, see Appendix 2.

Task 4: Implicit Attitudes Task: This task followed Greenwald, McGhee and Schwartz (1998) and used a five-step process to assess participant's implicit attitudes to the stimulus categories, in this case "MY MOM" and "NOT MY MOM," and "Pleasant" and "Unpleasant." In the first practice step, participants were asked to categorize (by clicking the appropriate button) stimulus words that appeared one-by-one on the computer screen as either "Pleasant" or Unpleasant;" in the second step, the participants in the same way categorized words in the target concept ("MY MOM," "NOT MY

MOM"). Steps 3 and 5 required participants to categorize words into combined categories: "MY MOM/Pleasant" versus "NOT MY MOM/Unpleasant" and "MY MOM/Unpleasant" versus "NOT MY MOM/Pleasant." Step 4 was a repeat of Step 1 but with the response buttons reversed so that "Unpleasant" appeared where "Pleasant" had been and viceversa. The practice steps had 10 trials and the experimental steps had 40 trials. The stimulus words, which were presented in random order within each block, consisted of 40 attachment-related words (20 negative and 20 positive) and 40 pleasant/unpleasant words. The attachment words were those used in Task 3, the Lexical Decision Task, and the pleasant/unpleasant words were from Rudman, Greenwald, Mellot and Schwartz (1999), words that were themselves selected from a list of normed stimuli (Bellezza, Greenwald & Banaji, 1986). See Appendix 4 for a list of these words.

Instrumentation

For a list of items, please see Appendix 5. Additionally, please see Table 1 for descriptive data for the attachment self-report instruments.

Parental Bonding Instrument (PBI). The PBI uses 25 5-point Likert-type items, once for mother and once for father, to assess attachment to each parent separately (Parker et al., 1979). The instrument requests respondents to retrospect about their parental attachment through age 16. Items include: "My mother/father spoke to me with a warm and friendly voice"; "My mother/father was affectionate to me." The questionnaire has been widely used in studies exploring adult psychological functioning (Cox, Enns & Clara, 2000). The instrument's authors reported reviewing the attachment literature to identify the two attachment dimensions most appropriate to measure in the

PBI: parental Care, which assesses levels of parental concern, and psychological control of the child (PBI Care), which measures parental Over-protectiveness. The Over-protectiveness scale was not used in this study.

The authors reported test-retest reliability estimates of .76 for scores derived from the Care scale and .63 for scores from the Overprotection scale; they also reported correlation coefficients of .88 and .74 respectively for split-half reliability, although the authors did not indicate whether the Spearman-Brown Prophecy Formula was applied (Parker et al, 1979). While Parker et al. (1979) did not report separate internal consistency coefficients for each parent, Mackinnon, Henderson, Scott and Duncan-Jones (1989) found Cronbach's alphas to be .92 for the scores on the Maternal Care scale, .88 for scores on the Maternal Overprotection scale. Similar results were found in this study: Cronbach's alpha was .95 for scores on the Maternal Care scale.

In the more than 20 years since its development, the PBI has been used with a wide range of both nonclinical and clinical populations (Mackinnon et al., 1989; Parker, 1993; Sato et al., 1999). Evidence of the validity of scores on the PBI with nonclinical populations is supportive (for a review, see Garbarino, 1998; Lopez & Gover, 1993).

Inventory of Parental and Peer Attachment (IPPA). This 75-item inventory assesses affective and cognitive dimensions of the current attachment of college students and adolescents and is based on Bowlby's conceptualization of attachment theory (Armsden & Greenberg, 1987; 1989). There are 25 items on each of three scales measuring attachment to the mother, father, and peers (peer scores were not used in this study). While an earlier version of the IPPA assessed attachment to parents as a single

construct (Armsden & Greenberg, 1987), the authors later revised the scale to assess attachment to mother and father separately (Armsden & Greenberg, 1989). This revised version of the instrument has been used in several studies of late adolescent attachment (e.g. Brack, Gay, & Matheny, 1993; McCarthy, Brack, Brack, Liu, & Carlson, 1998). Armsden and Greenberg (1987) reported internal consistency (Cronbach's alpha) estimates that ranged from .86 to .91 and test-retest reliability values over a three-week period of .93 for scores on their overall parental attachment scale; internal consistency estimates for scores from the separate mother and father scales have been reported at .89 and .88 respectively (Papini, Roggman & Anderson, 1991). In this study, Cronbach's alpha for scores on the Maternal Attachment scale was .96.

Armsden and Greenberg (1987) provided evidence for the convergent and concurrent validity of scores from the IPPA with significant correlations between IPPA parent attachment scores and measures of family support, conflict and cohesiveness, self-esteem, life satisfaction, depression and anxiety and resentment and alienation. In addition, numerous subsequent studies have provided further evidence of the validity of scores from the IPPA (for a review, see Lopez & Gover, 1993; Crowell, Fraley & Shaver, 1999).

Attachment Style Questionnaire (ASQ). This 40-item measure is rated on a 6-point Likert-type scale and consists of five subscales: Confidence, Discomfort With Closeness, Need for Approval, Preoccupation With Relationships, and Relationships as Secondary (Feeney et al., 1994). In the current study only the Confidence subscale was used (ASQ Con). The authors stated that the Confidence scale corresponds with a secure

attachment, whereas the other scales reflect dimensions of insecure attachment. Items on the Confidence scale include: "I feel confident that other people will be there for me when I need them"; "I find it relatively easy to get close to other people."

This scale was included in the current study as a non-relational index of attachment security. In addition, although several other dimensional attachment style instruments were developed using the Hazan and Shaver instrument as a basis (i.e., Collins & Read, 1990; Simpson, 1990), the ASQ was created using principal components and cluster analysis in an attempt to provide empirically derived attachment styles. Perhaps for this reason, the ASQ's internal reliability and test-retest reliability are higher than that of comparable attachment style questionnaires (Stein, Jacobs, Ferguson, Allen, & Fonagy, 1998). As cited by the authors, internal consistency and test-retest reliability over 10 weeks for scores on the Confidence scale is .80 and .74; internal consistency for this study's sample was .68.

The authors stated that validity of the scale is suggested by an association between high scores on the Confidence scale and (a) high perceived family intimacy and democratic parenting and (b) low levels of family conflict in a sample of 137 college students.

Parental Attachment Scale (PAS). This 46-item scale was developed in order to address some of the problems in current self-report parental attachment instruments (Moller, Fouladi & McCarthy; manuscript submitted for publication). In the first phase of instrument development, an item pool (asked once for mother and once for father) was generated on the basis of a review of the literature on attachment in adulthood as it is

measured both through self-report instruments and the AAI. Items were constructed to assess several dimensions of secure and insecure attachment. Attachment security was conceptualized primarily in terms of the extent to which parents are remembered as functioning as a secure base during periods of distress. In the initial item construction phase, items were therefore written to assess the extent to which parents were sought out and responded effectively when their child was distressed. Items written to address help-seeking from parents included: "When I was upset, I tried to hide it from my mother/father;" "I felt there was no point in telling my mother/father when I was upset." Since some parents may be responsive but become easily overwhelmed themselves, additional items were therefore written to assess the extent to which parents are remembered as responding competently to children seeking comfort. Items included: "My mother/father could make me feel better when I was upset;" "When I had a problem I knew my mother/father would know what to do." These items comprise the final Emotional Responsiveness subscale (PAS ER), a subscale that assesses attachment security.

A second set of items was constructed to assess the extent to which parents are remembered as responding negatively when approached for reassurance; i.e., these items tap into memories of rejection and neglect. In the AAI, rejection is defined specifically in terms of a parent's hostile response to a plea for attention, in particular when the child is upset, ill or hurt. Neglect by contrast is non-personal and may be the result of parents simply being too busy to pay attention. Items written to assess memories of parental rejection included: "I can remember times when I was upset and my mother/father

laughed at me;" "When I was upset, my mother/father was often angry with me." Items written to assess memories of neglect included: "My mother/father was too busy to listen to my problems;" I had to be very upset for my mother/father to pay attention." These items comprise the final subscale labeled Rejecting (PAS R) and assess attachment insecurity.

In order to capture individuals who defensively minimize negative parental attachment experiences through idealization of parents, those who in the AAI are coded as *dismissing*, a third type of item was written. These items included: "My mother/father was the best mother/father in the world," and "My mother/father did a perfect job as my mother/father." These items comprise the final Defensiveness subscale (PAS D).

Lastly, a series of items were written in an attempt to assess the degree to which those who have experienced difficult childhoods have resolved them. As indicated by the AAI coding, the focus here was on forgiveness, a sense that the parent did the best he or she could have in the circumstances and a perception of a shift in the relationship with the parent. Items included: "I understand now that being a parent is a difficult job," "I forgive my mother/father for the mistakes she/he made as a parent," and "My relationship with my mother/father is better now than it was." These items comprise the final Forgiveness scale (PAS F).

Each item in the item pool was asked once for mother and once for father. In each case the item pool was preceded with the following instructions (phrased for the appropriate parent):

> "Each of the following statements asks about your mother/father or the woman/man who acted as your mother/father during your first 16 years. If

> you have one than one person who acted as your mother/father (e.g. a natural mother/father and a step-mother/father), please answer the questions for the one who you feel has most influenced you. Please read each statement and indicate how much you agree with it, using the response scale below: Strongly Disagree (1), Disagree (2), Somewhat Disagree (3) Somewhat Agree (4), Agree (5) Strongly Agree (6)."

Based on exploratory analyses of the initial item pool, 23 items were identified with similar factor patterns and structure across mother and father items (Fouladi, Moller & McCarthy, 2005, manuscript submitted for publication). Scoring of the final PAS subscales was based on unit weighting of the 23 items in accordance with the item groupings identified in the final exploratory analysis, with the remaining items in the item pool considered filler items. Affectively negative items were reverse scored with the effect that high scores on the Emotional Responsiveness scales suggests parents are remembered as being available and effective at providing a secure base; high scores on the Rejection scales indicate that parents are remembered as open and sensitive to pleas for reassurance; and high scores on the Defensiveness and Forgiveness scales mean that respondents are reporting extremely high opinions of parents and a degree of forgiveness of parental mistakes.

The final scale consisting of 23 items (asked once for father and once for mother) and four subscales (Emotional Responsiveness, Rejecting, Defensiveness, Forgiveness) was then examined through confirmatory factor analysis on a second sample (Fouladi, Moller & McCarthy, 2005). In order to establish degree of convergent validity, correlations between factor scores and IPPA and PBI scales were computed for both samples. For both samples, the correlations were lower (and negative) with the PBI scales measuring autonomy from parents, indicating that, as planned, the instrument under

construction assesses a different aspect of the parental relationship. Correlations between both the Defensiveness and particularly the Forgiveness subscale scores and the PBI and IPPA were also lower, which might be expected since neither of the latter instruments distinguishes between "continuous" and "earned" secure, as this scale does, nor seeks to identify the extent to which participants defensively idealize parents. Convergent validity of the instrument is suggested by otherwise high correlations.

Cronbach alphas were computed for each of the scales in the original two samples and were fair (>.80) to good (> .90) with the exception of the Forgiveness subscale which had Cronbach alphas of .64 and .67 for the Maternal scale in the two samples, and .77 for the Paternal scale in both samples. In the current study, the reliability coefficients for the Maternal scales: Emotional Responsiveness l .92, Rejecting .90, Defensiveness .94 and Forgiveness .68.

Positive and Negative Affect Scale (PANAS; Watson, Clark & Tellegen, 1988). The PANAS version used consists of 22 adjectives (13 positive and 9 negative), which the respondent rates on a 5-point scale with regard to how well each describes how s/he feels "AT THIS MOMENT." The PANAS was developed through factor analyses of adjective ratings. The two scales, positive affect and negative affect, are orthogonal. Reliability and validity of each scale, assessed on both student and patient samples, is good (Watson et al., 1988). In the current study, the PANAS was placed between subliminally-primed blocks of highly similar Chinese characters in the affective judgments task as a way to check whether the subliminal priming was affecting participants' moods in the predicted manner.

Manipulation checks. To check the validity of the priming procedure, participants were asked whether they saw anything under the masking "XXXs." In order to ensure that the Chinese characters were indeed affectively neutral, participants were also asked if they could read more than 30 Chinese characters.

Research Hypotheses for Tasks

The design of this study used four experimental tasks to explore three research questions. The Chinese characters affective judgments task was used to explore the affective content of working models. The two memory tasks were used to investigate how working models impact memory processes. The lexical decision and IAT were used to explore the semantic networks of associations in attachment working models. For all tasks, the relationship between task responses and self-reported attachment was also explored. Based on the results of pilot-testing and the research literature reviewed, the following specific predictions were made:

Chinese Characters Task: Participants will show overall significantly higher liking for the Chinese characters when subliminally primed with the phrase "MY MOM" than when primed with "NOT MY MOM".

Lexical Decision Task: In the lexical decision task, participants will respond significantly faster to positive attachment words than to negative attachment words, neutral words and non-words.

Free-Recall and Recognition Task: Participants will recall significantly more positive attachment words than negative attachment words or neutral words in both memory tasks.

Implicit Attitudes Task: Participants will categorize all word types significantly faster when the category choices are "MY MOM/Pleasant" and "NOT MY MOM/Unpleasant" (congruent categories) than when they are "MY MOM/Unpleasant" and "NOT MY MOM/Pleasant" (incongruent categories). Further, it is assumed that participants will respond fastest to positive attachment words within the congruent categories.

Research Hypotheses for Instruments

Hypothesis One: It is expected that there will be no statistically significant relationships between maternal attachment as self-reported in the PBI, IPPA and ASQ and responses to the four experimental tasks.

Hypothesis Two: It is expected that there will be a pattern of statistically significant relationships between maternal attachment as self-reported in the PAS and responses to the four experimental tasks. The precise pattern of results was not predicted.

CHAPTER IV

RESULTS

The analyses proceeded in four steps: first descriptive data for the attachment tasks and instruments was collected; second a series of preliminary analyses and manipulation checks were conducted for each task; third, a multivariate approach to a repeated measures analysis of variance design with follow-up t-tests was used to establish whether participants responded differently to task stimuli; fourth, a series of regressions were conducted to investigate whether participants' task responses were related to their self-reported attachment. Additional analyses are reported in the Appendices.

Descriptive data

Instruments: Descriptive data for the attachment instruments appears in Table 1 (see Table 2 for the subset of participants reporting parental illness, death or divorce). For a number of instruments there is a slight issue of skew that suggests a positive or idealizing response bias, however none of the univariate skew indexes are greater than 3.0, which has been interpreted as a sign of extreme skew (Kline, 1998). In addition, both the PAS Forgiveness Scales and the ASQ Confidence scale have marginal reliability coefficients. Correlations between the instrument scale scores are in Table 3. All but two of these correlations were statistically significant at $p<.05/21$, where an alpha level of .05 was used for the set of 21 correlations analyzed. The lowest correlations were for the ASQ Confidence subscale; this appears sensible given that the other scales all assess maternal attachment while this subscale assesses non-relational confidence in availability of attachment figures, and thus may capture feelings about relationships in general.

Table 1

Descriptive data for maternal attachment scales

Instrument	Scale	Minimum	Maximum	Mean	Std. Deviation	Skew	Kurtosis	Alpha	CI (95%)
PAS Mother	Emotional Responsiveness	26.00	42.00	32.5901	2.9058	.560	.237	.92	.91-.94
PAS Mother	Rejecting	11.00	28.00	17.8889	3.1946	.575	.330	.90	.88-.92
PAS Mother	Defensiveness	7.00	19.00	14.8235	2.5335	-.508	.028	.94	.92-.95
PAS Mother	Forgiveness	12.00	24.00	20.9053	2.5872	-.976	.631	.66	.57-.74
IPPA Mother	--	49.00	125.00	98.2901	18.8974	-.599	-.530	.96	.94-.97
PBI Mother	Care	21.82	60.00	49.2209	9.8285	-.904	-.082	.94	.92-.95
ASQ	Confidence	14.00	48.00	34.9828	5.1537	-.788	1.835	.68	.60-.74

Note: The range of possible scores for each scale are: PAS Emotional Responsiveness (9-54); PAS Rejection (6-36); PAS Defensiveness (4-24); PAS Forgiveness (4-24); IPPA (25-125); PBI Care (12-60); ASQ Confidence (8-48).

Table 2

Descriptive data for maternal attachment scales for sub-group of participants reporting parental death, divorce or severe illness (N=46)

Instrument	Scale	Minimum	Maximum	Mean	Std. Deviation
PAS Mother	Emotional Responsiveness	13.00	54.00	35.7546	9.8552
PAS Mother	Rejecting	10.00	36.00	29.9760	6.2382
PAS Mother	Defensiveness	4.00	24.00	19.3988	5.1464
PAS Mother	Forgiveness	12.00	24.00	20.9053	2.5872
IPPA Mother	--	49.00	125.00	98.2901	18.8974
PBI Mother	Care	21.82	60.00	49.2209	9.8285
ASQ	Confidence	14.00	48.00	34.9828	5.1537

Table 3

Bivariate Correlations for Maternal Attachment Instruments

		PAS Emotional Forgiveness	PAS Rejecting	PAS Defensive-ness	PAS Foregive-ness	IPPA	PBI Care	ASQ Confidence
PAS Mother	Emotional Responsiveness	1.000						
PAS Mother	Rejecting	.699*	1.000					
PAS Mother	Defensiveness	.600*	.765*	1.000				
PAS Mother	Forgiveness	.368*	.531*	.576*	1.000			
IPPA Mother	--	.746*	.704*	.667*	.520*	1.000		
PBI Mother	Care	.696*	.710*	.672*	.384*	.754*	1.000	
ASQ	Confidence	.249*	.187	.246*	.220	.285*	.265*	1.000

Note: All correlations marked with an asterix (*) are statistically significant at $\underline{p} < 05/21$, where an alpha level of .05 was used for the set of 21 correlations.

Tasks: Descriptive data for the attachment tasks appears in Table 4. Again, it should be noted that for a number of tasks there is an issue of both skew and kurtosis. Specifically, the Implicit Attitude Test shows extreme skew (over 3.0) and extreme kurtosis (over 20.0) as defined by Kline (1998) for the response times in incongruent categories.

Within-task correlations are reported in Table 5; these show that for all the tasks, responses to one kind of stimuli in a task were significantly related to responses to other types of stimuli, an unsurprising finding. Cross-task correlations are reported in Table 6. In general, these correlations were low to very low and, given the number of correlations conducted, few of these were statistically significant once a Bonferroni adjustment was made. The major exception to this were the correlations between the lexical decision task and the IAT congruent and incongruent category words, the majority of which were significant. This cross-task correspondence may be indicative of the fact that both tasks are capturing the same elements of attachment schema-based responding. However, it is also possible that the cross-task association is because of the similarity in the tasks, both of which have a response-time dependent variable.

Task-to-instrument correlations are reported in Table 7. Most of these correlations were under .1 and none of these were statistically significant once a Bonferroni adjustment was made for the number of correlations in each set. The highest correlations were found for the IAT congruent words.

Table 4

Descriptive data for attachment tasks

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Chinese Characters Affective Judgments Task (average liking score on 6-point Likert scale)						
Prime = MY MOM	1.20	6.00	3.441	.663	0.133	2.509
Prime = NOT MY MOM	1.00	6.00	3.475	.754	-0.094	2.221
Lexical Decision Task (average response time in milliseconds)						
Positive attachment	624	1728	921	204	1.223	2.090
Negative attachment	611	1712	924	209	1.274	1.929
Neutral words	618	1738	962	202	1.208	2.260
Non-words	682	2128	1168	294	0.897	0.431
Memory Task (average correct score out of 10)						
Recall						
Positive attachment	1	10	2.52	1.52	1.84	5.982
Negative attachment	1	10	2.17	1.48	2.64	10.188
Neutral words	1	10	2.96	1.74	1.23	1.944
Recognition						
Positive attachment	4.5	9	5.61	0.78	1.68	4.126
Negative attachment	4.5	9	5.76	0.82	1.10	1.210
Neutral words	4.5	9	5.60	0.83	2.05	5.946
Implicit Attitude Test for Attachment Words (average response time in milliseconds)						
IAT Congruent words						
Pleasant words	308	2440	1154	345	1.199	1.875
Unpleasant words	260	2500	1113	323	1.601	3.713
Positive attachment	284	2660	1021	304	1.981	6.525
Negative attachment	256	2964	1243	376	1.430	3.417
IAT Incongruent words						
Pleasant words	440	10008	1780	994	3.857	28.421
Unpleasant words	344	9092	1614	837	4.725	39.193
Positive attachment	364	9140	1663	816	4.967	43.255
Negative attachment	312	9168	1815	896	3.778	27.538

Table 5

Within-task bivariate correlations within attachment tasks

Chinese Characters Affective Judgments Task		
	Prime = My Mom	Prime = Not My Mom
Prime = My MOM	1.00	
Prime = Not My Mom	.865*	1.00

Lexical Decision Task	Positive attachment	Negative attachment	Neutral words	Non-words
Positive attachment words	1.00			
Negative attachment words	.769*	1.00		
Neutral Words	.789*	.796*	1.00	
Non-words	.660*	.652*	.665*	1.00

Free Recall Task	Positive words	Negative words	Neutral words
Positive attachment words	1.00		
Negative attachment words	.644*	1.00	
Neutral words	.489*	.543*	1.00

Cued Recognition Task	Positive words	Negative words	Neutral words
Positive attachment words	1.00		
Negative attachment words	.522*	1.00	
Neutral words	.545*	.559*	1.00

Implicit Attitudes Test				
	Pleasant words	Unpleasant words	Positive words	Negative words
IAT Congruent Words				
Pleasant words	1.00			
Unpleasant words	.695*	1.00		
Positive attachment	.687*	.737*	1.00	
Negative attachment	.665*	.677*	.603*	1.00
IAT Incongruent Words				
Pleasant words	1.00			
Unpleasant words	.795*	1.00		
Positive attachment	.746*	.809*	1.00	
Negative attachment	.815*	.815*	.754*	1.00

Note: Correlations marked with an asterix (*) are statistically significant at $p < .01$, with a Bonferroni adjustment for each set of correlations: $p<.01/6$, where an alpha level of .01 was used for the set of 6 correlations for, respectively, the Lexical Decision task, IAT congruent words and IAT incongruent words; $p <.01/3$, where an alpha level of .01 was used for the set of three correlations for each of the two memory tasks.

Table 6
Between task bivariate correlations for attachment tasks

Chinese Characters Affective Judgments Task				
Lexical Decision Task	*Positive attachment words*	*Negative attachment words*	*Neutral words*	*Non-words*
Prime = My MOM	.023	.005	-.085	.003
Prime = Not My Mom	.016	.013	-.053	.048
Free Recall Task	*Positive attachment words*	*Negative attachment words*	*Neutral words*	
Prime = My MOM	-.052	.010	.014	
Prime = Not My Mom	-.077	-.094	-.130	
Cued Recognition Task	*Positive attachment words*	*Negative attachment words*	*Neutral words*	
Prime = My MOM	-.057	.087	.031	
Prime = Not My Mom	.029	.074	.066	
IAT Congruent Words	*Pleasant words*	*Unpleasant words*	*Positive attachment words*	*Negative attachment words*
Prime = My MOM	-.147	-.109	-.069	.038
Prime = Not My Mom	-.150	-.070	-.079	.018
IAT Incongruent words	*Pleasant words*	*Unpleasant words*	*Positive attachment words*	*Negative attachment words*
Prime = My MOM	.056	.170	**.219**	.129
Prime = Not My Mom	.002	.141	.183	.154

Lexical Decision Task

Free Recall Task	Positive attachment	Negative attachment	Neutral words
Positive attachment words	-.041	-.122	.000
Negative attachment words	-.065	-.096	-.011
Neutral Words	-.085	-.045	-.009
Non-words	-.033	-.141	-.069

Table 6 continued

Lexical Decision Task(cont)

Cued Recognition Task	Positive attachment	Negative attachment	Neutral words
Positive attachment words	-.054	.042	-.010
Negative attachment words	-.033	.076	.067
Neutral Words	-.037	.067	-.001
Non-words	-.030	.043	-.069

IAT Congruent Words	Pleasant words	Unpleasant words	Positive attachment	Negative attachment
Positive attachment words	**.319**	**.452**	**.328**	**.401**
Negative attachment words	**.436**	**.534**	**.386**	**.476**
Neutral Words	**.434**	**.506**	**.344**	**.425**
Non-words	**.259**	**.405**	.209	**.337**

IAT Incongruent Words	Pleasant words	Unpleasant words	Positive attachment	Negative attachment
Positive attachment words	.192	**.244**	**.302**	.232
Negative attachment words	.235	**.316**	**.308**	**.272**
Neutral Words	.230	**.307**	**.337**	**.317**
Non-words	**.250**	**.344**	**.277**	**.342**

Free Recall Task

Cued Recognition Task	Positive attachment	Negative attachment	Neutral words
Positive attachment words	-.103	-.012	-.007
Negative attachment words	-.087	-.063	-.059
Neutral Words	-.139	-.101	**-.286**

IAT Congruent Words	Pleasant words	Unpleasant words	Positive attachment	Negative attachment
Positive attachment words	.038	-.042	-.016	-.014
Negative attachment words	-.043	-.080	-.089	-.053
Neutral Words	-.079	-.183	-.183	-.233

IAT Incongruent Words	Pleasant words	Unpleasant words	Positive attachment	Negative attachment
Positive attachment words	.095	.097	.164	.120
Negative attachment words	-.072	-.003	.116	.031
Neutral Words	.020	.014	.054	.051

Table 6 continued

Cued-Recognition Task

IAT Congruent Words	Pleasant words	Unpleasant words	Positive attachment	Negative attachment
Positive attachment words	.007	-.009	-.027	-.010
Negative attachment words	.132	.071	.073	.085
Neutral Words	.106	.109	160	.175

IAT Incongruent Words	Pleasant words	Unpleasant words	Positive attachment	Negative attachment
Positive attachment words	.104	.040	.033	.106
Negative attachment words	.212	.211	.150	.233
Neutral Words	.105	.079	.081	.140

Note: A Bonferroni adjustment was made for all correlations in each set and the correlations which were significant at the corresponding Bonferroni level (setwise alpha = .05) are in bold. For the correlations between the Lexical Decision task and the IAT Congruent words and Incongruent words, $p<.05/16$, where an alpha level of .05 was used for the set of 16 correlations.

Table 7
Attachment task to attachment instrument bivariate correlations

	PAS ER	PAS R	PAS D	PAS F	IPPA	PBI Care	ASQ Con
Chinese Characters Affective Judgments Task							
Prime = MY MOM	.017	-.017	.022	.000	-.025	-.024	.050
Prime = NOT MY MOM	.087	.048	.109	.092	.165	.144	.094
Lexical Decision Task							
Positive attachment	-.012	.004	-.040	-.044	.050	-.030	-.036
Negative attachment	-.091	-.008	-.084	-.133	-.046	-.076	.046
Neutral words	-.016	.076	.006	-.083	.056	.015	-.051
Non-words	.144	.140	.128	.011	.192	.142	.061
Memory Task							
Free-Recall							
Positive attachment	-.013	-.084	.011	.040	.001	-.018	-.116
Negative attachment	.052	-.016	-.020	.022	.006	-.042	.023
Neutral words	-.034	-.066	-.125	.083	-.019	-.124	-.044
Cued-Recognition							
Positive attachment	-.144	-.098	-.087	-.035	-.063	.059	-.191
Negative attachment	-.149	-.088	-.135	-.120	-.061	.001	.244
Neutral words	-.080	.039	-.020	-.028	-.018	.036	.228
Implicit Attitude Task for Attachment Words							
IAT Congruent words							
Pleasant words	-.120	-.069	-.191	-.175	-.138	-.063	.102
Unpleasant words	-.261	-.158	-.273	-.234	-.265	-.222	-.031
Positive attachment	-.220	-.277	-.357	-.255	-.314	-.273	-.009
Negative attachment	-.140	-.082	-.172	-.144	-.169	-.137	.106
IAT Incongruent words							
Pleasant words	.053	-.010	.002	.009	.013	.016	.020
Unpleasant words	.050	.022	-.031	-.014	.054	.051	.077
Positive attachment	.027	-.050	-.094	-.103	.031	-.004	.011
Negative attachment	-.017	.010	-.017	-.023	.019	.017	.015

Chinese Characters Affective Judgments Task

Initial Analyses: In this task, participants were shown subliminally primed Chinese characters and asked to rate how much they liked them on a Likert scale. The characters were selected to be highly similar and thus affectively neutral. Given the relatively large numbers of participants self-reporting their ethnicity as "Asian," it appeared prudent to check which participants in the sample could read Chinese since obviously for such participants, these stimuli are not affectively neutral. Eight participants (4.5% of the sample) indicated that they could read more than 30 Chinese characters and were excluded from the analyses for this task.

In order to check that the characters were affectively equivalent, overall mean liking scores were computed for each character across all participants. Participants were asked to rate their liking for each Chinese character on a 6-point Likert scale; however the highest mean response was 4.12 and the lowest 2.67. This is a fairly narrow range and points towards the affective similarity of the characters for participants. Chart 1 shows a graph of mean Liking scores for each character across participants.

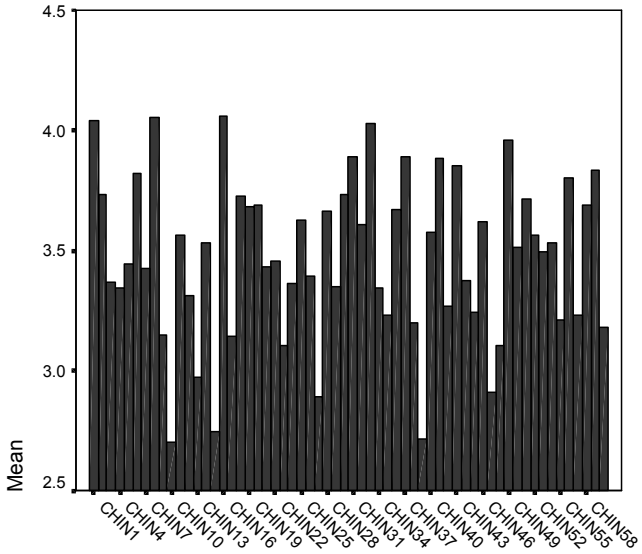
In order to confirm that the subliminal priming worked properly, participants were asked if they had seen any words during this task. Thirty-one of the participants (18% of the sample) indicated that they had seen a word during this task. Upon investigation however, only five reported having seen "mom," "my mom," or some variation thereof under the mask of XXXs in the subliminal priming tasks. These subjects were also excluded from the analyses for this task.

As an additional check on the efficacy of the subliminal priming, participants'

self- reported mood immediately following exposure to each block of subliminally primed-characters was checked through an examination of participants' responses to the PANAS mood-check instrument. Two paired-samples t-tests were conducted in order to explore the impact of the priming across all participants and the results suggested that the priming did affect participants' mood in the expected way. Participants' mood following exposure to the block of characters subliminally primed by "MY MOM," as rated through responses to the PANAS positive mood scale, was significantly more positive than following exposure to the block primed with "NOT MY MOM": $\underline{M}$ = 23.299, $\underline{SD}$ = 7.21 and $\underline{M}$ = 20.902, $\underline{SD}$ = 7.57), $\underline{t}$ (153) = 7.894, $\underline{p} < .001$. The standardized effect size index, $\underline{d}$, was .64, a medium to large value (Cohen, 1988). Comparison of responses to the PANAS negative adjective scale after each priming block also showed a significant difference, with mood following exposure to the block of characters subliminally primed by "MY MOM" being significantly more negative than following exposure to the block primed with "NOT MY MOM": $\underline{M}$ = 16.084, $\underline{SD}$ = 5.38 and $\underline{M}$ = 15.355, $\underline{SD}$ = 5.26), $\underline{t}$ (173) = 4.350, $\underline{p} < .001$. The standardized effect size index, $\underline{d}$, in this instance was .33, a small value. Although it might appear odd that the subliminal prime "MY MOM" would result in higher endorsement of both negative and positive adjectives, this was expected because this prime was chosen precisely because it is thought to have a differential affective impact on participants depending on their attachment status. For the majority of securely attached participants, exposure to this subliminal prime should result in a more positive mood but for an insecurely attached minority the opposite should be expected. It is hypothesized thus that the two significant t-tests reflect these two different groups.

Chart 1

Bar graph showing mean Liking scores (range 1-6) for each Chinese character (1-60) across all participants.



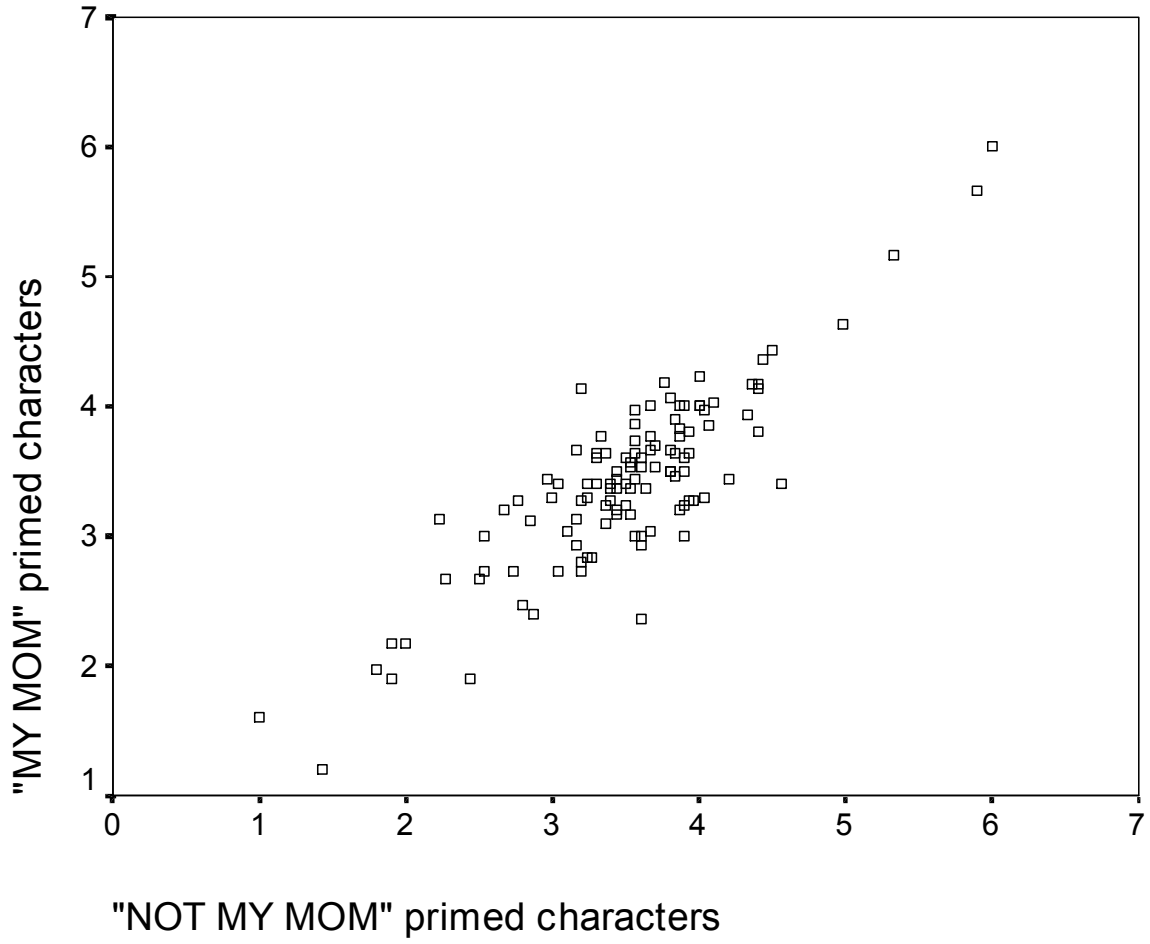
Note: Characters 1 through 30 were subliminally primed with "MY MOM" and characters 31 through 60 were subliminally primed with "NOT MY MOM."

While the subliminal primes may have impacted participants' mood it is not however clear that this resulted in differential responding to the Chinese characters. Chart 2 shows a scatterplot of mean responses to the characters in the two subliminally-primed blocks. This plot, and the high, positive (.865) correlation between responses to the two blocks of characters, clearly indicates a positive relationship between responses to the two subliminally primed blocks of characters, suggesting that participants who responded more favorably to the MY MOM primed characters tended to do the same for the NOT MY MOM characters. This does not support the task's underlying assumption that secure participants would respond more favorably to the MY MOM prime and less favorably to the NOT MY MOM prime, while insecure participants would show an opposite response pattern. The evidence appears thus to be that this task did not "work" as it was intended.

Main analyses: The first step was to establish whether the subliminal priming impacted affective judgments of the affectively neutral stimuli, Chinese characters. Thus a paired-samples t-test was conducted in order to explore the impact of the priming across all participants. Contrary to hypotheses, the results suggested that there was a negative priming effect: the mean liking score for the "MY MOM" primed characters ($M = 3.42$, $SD = 0.69$) was significantly smaller than for the "NOT MY MOM" primed characters ($M = 3.51$, $SD = 0.75$), $t\ (114) = -2.548$, $p = 0.12$. Although the standardized effect size index, d, was .24, a small value, these results suggest that, contrary to what might be expected, the subliminal prime "MY MOM" led to a more negative affective response to affectively neutral stimuli than when the stimuli were primed with "NOT MY MOM".

Chart 2

Scatterplot of responses to subliminally primed characters in Chinese Characters Affective Judgments Task



In the second step of the analyses for this task, responses to the task were analyzed in conjunction with self-reported attachment. Two sets of ordinary least squares regression analyses were conducted to examine the association of the attachment measures to the primed Chinese characters. In the first set of analyses, the established attachment instruments were entered (the IPPA Maternal scale, the PBI Care scale and the ASQ Concern scale). The results showed that the linear combination of the established attachment measures was not significantly related to either criterion variable (MY MOM primed or NOT MY MOM primed characters). For the "MY MOM" primed Chinese characters, the result was F (3,146) = 0.024, $p > .05$, $R^2 = .000$ and for the "NOT MY MOM" primed Chinese characters, the result was F (3, 114) = 1.477, $p > .05$, $R^2 = .037$. In the second set of analyses, the four PAS scales were entered (Emotional Responsiveness, Rejecting, Defensiveness and Forgiveness). The results showed that the linear combination of the PAS scales was not significantly related to either criterion variable. For the "MY MOM" primed Chinese characters, the result was F (4,120) = 0.148, $p > .05$, $R^2 = .005$ and for the "NOT MY MOM" primed Chinese characters, the result was F (4, 93) = .464, $p > .05$, $R^2 = .020$. The regression coefficients for both sets of analyses were non-significant and are reported in Table 8.

As a final, exploratory check, a difference score was computed for the two priming variables (MY MOM – NOT MY MOM) and the regressions re-run. For the established scales the result was: F (3,96) = 1.500, $p > .05$, $R^2 = .045$ and for the PAS scales the result was F (4, 76) = 0.261, $p > .05$, $R^2 = .116$. The non-significant regression coefficients are also in Table 8.

Table 8

Standardized regression coefficients for the Chinese Affective Judgments Task and Maternal Attachment Scales

	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Prime = MY MOM	-.067	>.05	-.010	>.05	.021	>.05
Prime = NOT MY MOM	.150	>.05	.033	>.05	.037	>.05

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	p	β	p
Prime = MY MOM	.030	>.05	-.091	>.05	.071	>.05	-.043	>.05
Prime = NOT MY MOM	.048	>.05	-.112	>.05	.169	>.05	.012	>.05

Results for "difference score" regression analyses

	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Difference score	-.908	>.05	-.235	>.05	-.573	>.05

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	p	β	p
Difference score	.034	>.05	-.510	>.05	-.214	>.05	.420	>.05

Lexical Decision Task

Initial analyses: In this word recognition task, participants were shown letter strings and asked to categorize them as "words" or "nonwords." One difficulty with response-time tasks is that participants responding too quickly or slowly may not be responding accurately or in good faith. One response to this problem is to select an upper- and lower-permissible value for responses and either to exclude all scoring above and below these points from analyses (Mikulincer, Birnbaum, Woddis and Nachmias, 2000) or to set such responses to the upper and lower bounds (Rudman, Greenwald, Mellott and Schwartz, 1999). However, given that participants responded differently to the different word/non-word categories it did not appear sensible to select one upper and lower bound for all word-types. Instead, the responses of participants in the bottom and top 2.5% in each response category were recoded and set at the upper and lower overall bound. This approach reduced statistical outliers but was more conservative than either of the other two approaches mentioned.

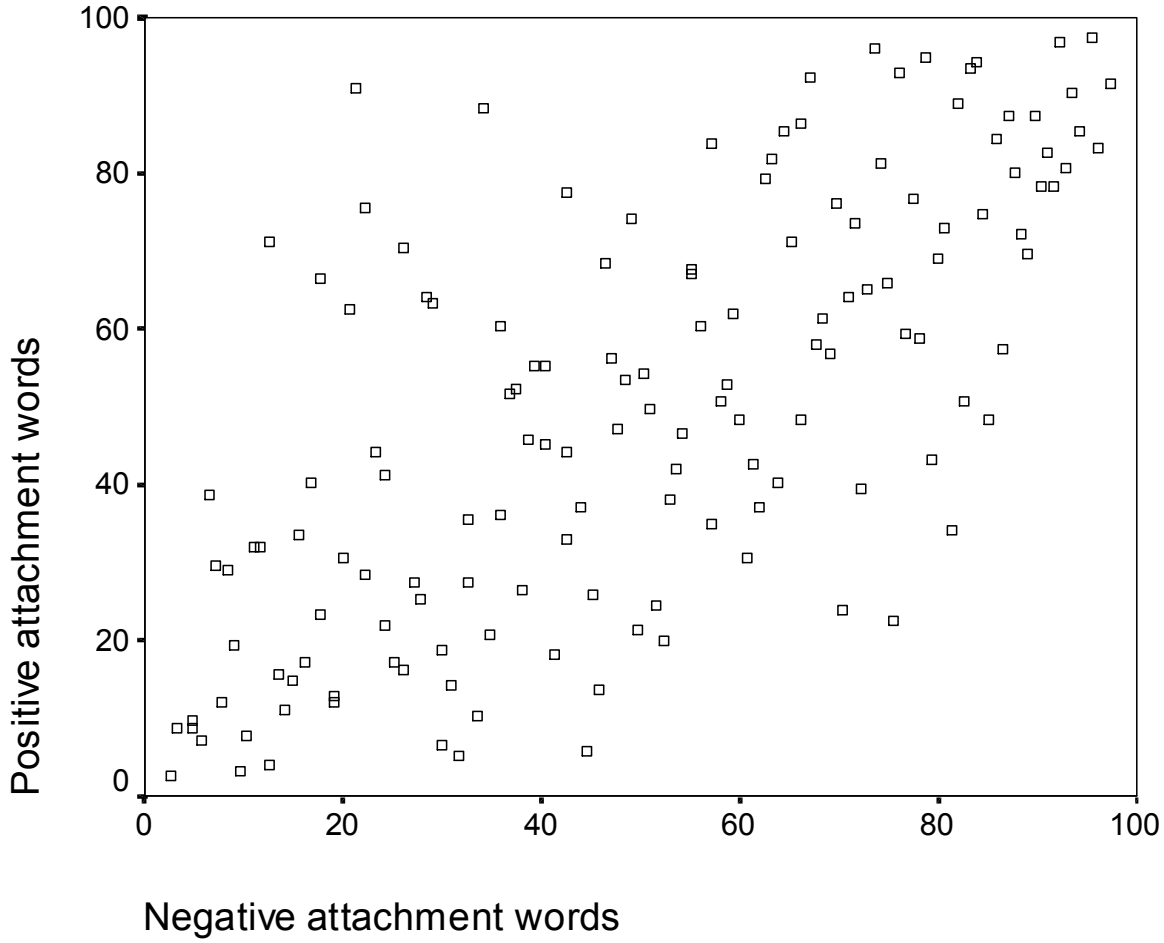
Error rates for the different types of words were also checked and found to be smallest for the attachment words, marginally higher for the neutral words and greatest for the non-words. The mean accuracy rate for the 20 positive attachment words was 19.55 (range 15 to 20, SD .847); for the 20 negative attachment words the mean was also 19.55 (range 16 to 20, SD .807); for the 20 neutral words it was 19.25 (range 14 to 20, SD .964). These means equate to about a 95% accuracy rate, which compares to the 91% accuracy rate for non-words. For the 60 non-words, the accuracy rate was 54.39 (range 7 to 60, SD 6.961).

As a further check, the accuracy rates for each word type were correlated with the censored response times for the same word type. Although these Pearson bivariate correlations were relatively small, all but one were statistically significant: for positive attachment words the mean response time and mean accuracy rate correlated at -.244; for negative attachment words the correlation was -.333; and for non-words it was -.419. Even with a Bonferroni adjustment for the four computations, these correlations were significant at $\underline{p} < .01/4$. The one non-significant correlation of mean response time and mean accuracy rate was for neutral words: -.063, $\underline{p} > .05$. These negative correlations suggest that, as might be expected, quicker response times were associated with higher errors for positive, negative and non-words. It is possible that the non-significant result for neutral words may indicate that these words were easier to detect as words.

Lastly, a scatterplot of responses to the negative and positive attachment words was generated in order to investigate whether some participants were responding faster to the positive attachment words and slower to the negative words, while others responded in the opposite direction. This was conceptualized as means to investigate whether there was evidence for the assumed contrasting patterns of response to the positive and negative attachment stimuli by participants with secure and insecure attachment patterns. If this had indeed been the case a roughly negative linear relationship would be seen; however, though there is a subgroup of study participants who responded faster to negative words than positive words, Chart 3 shows more of a positive relationship, suggesting that overall participants who responded more quickly to the negative words tended to do the same for the positive words.

Chart 3

Scatterplot of responses to negative and positive attachment words in the Lexical Decision Task



Note: the scale for this chart is 0-100 and represent a conversion since responses to this task were in milliseconds and ranged from 611 to 1728 milliseconds.

Main analyses: Firstly, in order to establish a base-line response to this task, a multivariate approach to a repeated measures analysis of variance design with one within-subjects factor was used in order to explore responses to the different categories of word (positive and negative attachment words, neutral words and non-words) across all participants. This showed that there was a statistically significant word-type effect (Wilk's $\lambda = .417$, Exact F (3, 150) = 70.013, $p<.001$, $\varepsilon^2 = .583$). Follow-up separate paired samples *t*-tests showed several significant type-of-word effects, although the hypothesis that responses would be overall fastest to positive attachment words was not met. Rather, the comparison between positive and negative attachment words was non-significant, with the mean response times respectively being M = 921 milliseconds, SD = 204 and M = 924, SD = 209), t (152) = -.311, p > .05, d = .02. However all other comparisons were statistically significant, and several had large effect sizes. Responses to positive words were faster than responses to neutral words (M = 962 milliseconds, SD = 202, t (152) = -3.878, p < .001, d = .31) and non-words (M = 1168 milliseconds, SD = 293, t (152) = -13.930, p < .001, d = 1.13). Similarly responses to negative attachment words were faster than responses to neutral (t (152) = -3.564, p < .001, d = .29) and non-words (t (152) = -13.489, p < .001, d = 1.09). Responses to neutral words were also faster than responses to non-words (t (152) = -11.596, p < .001, d = .94). Even with a Bonferroni adjustment for the six t-tests conducted, all the statistically significant differences remained so at p < .01/6.

In the second step of the analyses for this task, responses to the task were analyzed in conjunction with self-reported attachment. A series of ordinary least squares

regression analyses were conducted to examine the association of the attachment measures to the different words/non-words. As before, in the first set of analyses, the established attachment instruments were entered (the IPPA Maternal scale, the PBI Care scale and the ASQ Concern scale). The results showed that the linear combination of the established attachment measures was not significantly related to the criterion variables (positive and negative attachment words, neutral words and non-words). For the positive attachment words, the result was F (3, 141) = .756, $p > .05$, $R^2 = .016$, for the negative attachment words, F (3, 141) = 1.204, $p > .05$, $R^2 = .025$, for the neutral words, F (3,141) = .741, $p > .05$, $R^2 = .016$, and for the non-words, F (3, 141) = 1.478, $p > .05$, $R^2 = .030$. In the second set of analyses, the four PAS scales were entered (Emotional Responsiveness, Rejecting, Defensiveness and Forgiveness). The results showed that the linear combination of the PAS scales was not significantly related to the criterion variables. For the positive attachment words, the result was F (4, 117) = 1.178, $p > .05$, $R^2 = .039$, for the negative attachment words, F (4, 118) = .662, $p > .05$, $R^2 = .022$, for the neutral words, F (4, 117) = .684, $p > .05$, $R^2 = .023$, and for the non-words, F (4, 118) = .490, $p > .05$, $R^2 = .016$. The regression coefficients for both sets of analyses were non-significant and are reported in Table 9.

In a final exploratory step, it was decided to re-run the regression analyses for the positive and negative attachment words using a difference score (positive words – negative words) as the dependent variable, first with the three existing parental attachment scales and second with the four PAS scales. This was done because of the assumption that people with different attachment models (secure versus insecure) would

Table 9

Standardized regression coefficients for the Lexical Decision Task and Maternal Attachment Scales

	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Positive attachment words	.156	>.05	-.104	>.05	-.068	>.05
Negative attachment words	-.002	>.05	-.141	>.05	-.027	>.05
Neutral words	.158	>.05	-.115	>.05	-.061	>.05
Non-words	.191	>.05	-.019	>.05	-.080	>.05

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	p	β	p
Positive attachment words	.225	>.05	-.119	>.05	-.190	>.05	.080	>.05
Negative attachment words	-.063	>.05	.036	>.05	-.120	>.05	-.017	>.05
Neutral words	.069	>.05	.084	>.05	-.209	>.05	-.025	>.05
Non-words	.113	>.05	.004	>.05	-.002	>.05	0.28	>.05

respond differently to the positive and negative attachment words. However, the results were not statistically significant. For existing attachment scales the results were: R^2 = .046, F(3, 135) = 2.185, p > .05; for the four PAS scales the results were R^2 = .067, F(4, 115) = 2.073, p > .05. All the regression coefficients for these analyses were non-significant except those for the PAS Maternal Emotional Responsiveness scales. For the existing attachment instruments the result was: β = .267, p = .043; for the four PAS scales, the result was: β = .357, p = .006. However, it is difficult to interpret these two findings given that the overall F-tests in both cases were non-significant.

Free-Recall and Cued Recognition Memory Task

In this task, participants were shown a list of words one-at-a-time on the computer screen. Following a distractor task consisting of a fly-swatter game, they were asked first to try to recall as many of the words as possible within 3 minutes, and second to say which of a list of words (both seen and unseen) they recognized.

Initial analyses: Mean accuracy scores were calculated for both the recall and recognition portions of this task. For the free-recall task, mean number of correctly recalled words out of each list of 10 words, was 2.52 (range 1 to 10, SD 1.52) for positive attachment words; for negative attachment words the mean was 2.17 (range 1-10, SD 1.48) and for neutral words 2.96 (range 1-10, SD 1.74). The overall recall rate was thus quite low, with participants only recalling a little over two words on average in each category.

For the recognition task, the mean number of correctly recalled words out of each list of 10 words, was 5.61 (range 4.5-9, SD 0.78) for positive attachment words; for negative attachment words the mean was 5.76 (range 4.5-9, SD 0.82) and for neutral

words 5.60 (range 4.5-9, SD 0.83). In other words, the mean correct score across the different types of words was only about 55%. The error rates for the distractor list of similar but previously unseen words were also high, with the average number of positive attachment words (out of 10) that participants incorrectly recognized being 6.39 (range 3.5 to 9.5, SD 1.21). For negative attachment words the mean was 6.45 (range 4.5 to 9.5, SD 1.29), and for neutral words 6.62 (range 4.5 to 10, SD 1.41). As discussed below, these high error rates may reflect a problem with task design.

Main analyses: For both the recall and recognition tasks, a multivariate approach to a repeated measures analysis of variance design with one within-subjects factor was used in order to explore responses to the different types of word (neutral and positive and negative attachment) across all participants. For both the recall and recognition tasks, this showed that there was a statistically significant word-type effect: Wilk's $\lambda = .636$, Exact $F(2,87) = 24.936$, $p<.001$, $\varepsilon^2=.364$ for the recall task and, Wilk's $\lambda = .936$, Exact $F(2, 175) = 5.942$, $p =.003$, $\varepsilon^2=.064$ for the recognition task. Follow-up paired-samples t-tests were then computed to explore more narrowly how mean response was impacted by word types, within each case the hypothesis being that overall recall and recognition would be higher for positive attachment words. However, these hypotheses were not met. For the recall task, the recall rates were significantly better for neutral words than positive attachment words, $t(122) = 3.823$, $p < 0.001$, $d =.35$ and for neutral words than negative attachment words, $t(105) = 6.373$, $p < 0.001$, $d = .62$. The recall rate for positive attachment words was also significantly greater than for negative attachment words $t(89) = 3.554$, $p = 0.001$, $d = 0.38$. With a Bonferroni adjustment for the three analyses, these

differences were still statistically significant at $p < .01/3$.

For the recognition task, the recall rates were significantly better for negative attachment words than positive t (178) = 2.434, $p = 0.016$, $d = .18$ and for negative attachment words than neutral words, t (178) = 2.710, $p = .007$, $d = .20$. There was no statistically significant difference in mean recall between positive attachment and neutral words, t (178) = .244, $p > .05$, $d = .02$. With a Bonferroni adjustment for the three analyses, the two statistically significant results remained so at $p < .05/3$.

Next, responses to the task were analyzed in conjunction with self-reported attachment. A series of ordinary least squares regression analyses were conducted to examine the association of the attachment measures to the different words. As before, in the first set of analyses, the established attachment instruments were entered (the IPPA Maternal scale, the PBI Maternal Care scale and the ASQ Concern scale). Second, the four PAS scales were entered in a separate analysis. For the free-recall task, the results showed that the linear combination of the established attachment measures was significantly related to the criterion variables (positive and negative attachment words and neutral words) but only for neutral words with existing attachment measures; all other analyses were not statistically significant. For the free-recall task and the existing attachment measures, the results were: positive attachment words F (3, 119) = 1.503, $p > .05$, $R^2 = .036$, negative attachment words, F (3, 103) = 2.407, $p > .05$, $R^2 = .066$, and neutral words, F (3,137) = 2.788, $p = .043$, $R^2 = .058$. For the free-recall task and the PAS scales, the results were: positive attachment words F (4, 101) = .398, $p > .05$, $R^2 = .016$, negative attachment words, F (4, 84) = 1.197, $p > .05$, $R^2 = .054$, and neutral words, F (4,

115) = .315, p > .05, R^2 = .011.

For the cued-recognition task, the results showed that the linear combination of the established attachment measures was not significantly related to the criterion variables (positive and negative attachment words and neutral words). For the cued-recognition task, and the existing attachment measures, the results were: positive attachment words F (3, 168) = .108, p > .05, R^2 = .002, negative attachment words, F (3, 167) = .346, p > .05, R^2 = .006, and neutral words, F (3,168) = 1.636, p > .05, R^2 = .028. For the cued-recognition task and the PAS scales, the results were: positive attachment words F (4, 139) = .840, p > .05, R^2 = .024, negative attachment words, F (4, 138) = .588, p > .05, R^2 = .017, and neutral words, F (4,139) = 1.601, p > .05, R^2 = .044.

The regression coefficients for both sets of analyses are reported in Table 10; while four of these are statistically significant, it should be noted that only in one case was the overall test also statistically significant, for neutral words with existing attachment measures. In this case, it was the ASQ Confidence scale that appears to account for the significant F-test. It is also interesting that in three out of four cases it was the coefficients relating to the neutral words, rather than the positive and negative attachment words, the focus of interest, that showed statistical significance.

In a final exploratory step, it was decided to re-run the regression analyses for both the free-recall and recognition task using a difference score (positive words – negative words) as the dependent variable, first with the three existing parental attachment scales and second with the four PAS scales. This was done because of the assumption that people with different attachment models (secure versus insecure) would

Table 10

Standardized regression coefficients for the Free-Recall and Cued-Recognition Memory Tasks and Maternal Attachment Scales

	Free-Recall Task					
	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Positive attachment words	-.005	>.05	-.010	>.05	-.186	>.05
Negative attachment words	.008	>.05	.075	>.05	**-.267**	**.012**
Neutral words	.112	>.05	-.053	>.05	**-.256**	**.005**

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	p	β	p
Positive attachment words	-.054	>.05	-.057	>.05	-.034	>.05	.103	>.05
Negative attachment words	-.029	>.05	.156	>.05	-.346	>.05	.034	>.05
Neutral words	-.090	>.05	.170	>.05	-.045	>.05	.008	>.05

	Cued Recognition Task					
	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Positive attachment words	.040	>.05	-.024	>.05	-.040	>.05
Negative attachment words	.090	>.05	-.115	>.05	.026	>.05
Neutral words	.161	>.05	**-.252**	**.031**	.045	>.05

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	p	β	p
Positive attachment	-.024	>.05	-.135	>.05	.218	>.05	.029	>.05
Negative attachment	.150	>.05	-.045	>.05	.134	>.05	.074	>.05
Neutral words	.024	>.05	.011	>.05	-.238	>.05	**.225**	**.026**

respond differently to the positive and negative attachment words. However, the results were again not statistically significant. For the free-recall task and the existing attachment scales the results were: $R^2 = .014$, F (3, 54) = .251, $p > .05$; with the four PAS scales the results were $R^2 = .056$, $F(4, 46) = .677$, $p > .05$. All the regression coefficients for these analyses were non-significant. For the cued-recognition task and the existing attachment scales the results were: $R^2 = .009$, $F(3, 107) = .327$, $p > .05$; with the four PAS scales the results were $R^2 = .076$, $F(4, 92) = 1.881$, $p > .05$. All the regression coefficients for these analyses were non-significant except that for the PAS Maternal Defensiveness scale: $\beta = .395$, $p = .019$. However, it is difficult to interpret this one statistically significant result given that the overall F-test was non-significant.

Implicit Attitude Test

In this task, respondents were asked to categorize 80 stimulus words (positive and negative attachment words and pleasant and unpleasant words) into paired categories: MY MOM/Pleasant versus NOT MY MOM/Unpleasant (congruent categories), or MY MOM/Unpleasant versus NOT MY MOM/Pleasant (incongruent categories).

Initial analyses: Following the procedure used for the lexical decision task, timed-task responses of participants in the bottom and top 2.5% in each response category were recoded and set at the upper and lower overall bound, and this censored data was used for the main analyses.

As before, accuracy of responses to this task was checked. This was done only for pleasant and unpleasant words since there was no a-priori correct response for the negative and positive attachment words given the assumption that participants would

select “MY MOM” or “NOT MY MOM” categories for these words depending on their own unique parental experiences. Accuracy was examined by word type within congruent and incongruent categories, with the MY MOM/Pleasant versus NOT MY MOM/Unpleasant pairings being termed congruent and MY MOM/Unpleasant versus NOT MY MOM/Pleasant pairings being termed incongruent, since it was assumed that these latter pairings would be antithetical for the majority of securely attached participants. For pleasant words in congruent categories, the mean accuracy rate was 9.63 (range 5 to 10, SD 0.857); for pleasant words in incongruent categories the mean was 6.45 (range 1 to 10, SD 2.79); for unpleasant words in congruent categories, the mean accuracy rate was 9.70 (range 4 to 10, SD 0.814); for unpleasant words in incongruent categories the mean was 6.29 (range 1 to 10, SD 3.01). Next two paired sample t-tests were run to see whether the accuracy rates within word but across category were significantly different. These pairings were significant: pleasant words, t (142) = 13.505, $p < 0.001$, $d = 1.13$; unpleasant words t (142) = 13.369, $p < 0.001$, $d = 1.12$. Thus although mean accuracy across word type was similar, there were significant if small differences in how participants responded to the words when they were in congruent or incongruent pairings, with the incongruent categories being apparently slower (thus harder) to process for the majority.

As a last check, the accuracy rates for the pleasant and unpleasant words within congruent/incongruent categories were correlated with the response times for the same word type/category. All of these Pearson bivariate correlations were non-significant and small: for congruent pleasant words the mean response time and mean accuracy rate

correlated at -0.123; for incongruent pleasant words the correlation was 0.078; for congruent unpleasant words the correlation was 0.046; and for congruent unpleasant words, the correlation was 0.040. This suggests that there was little relationship for this task between accuracy of response and time taken to respond. This may suggest that this task was not overly impacted by individual differences in speed of response.

Main analyses: As a first step, a multivariate approach to a repeated measures analysis of variance design with two within-subjects factors was used in order to explore responses to the different types of word (pleasant, unpleasant, positive and negative attachment) and categories (congruent, incongruent) across all participants. This showed that there was a statistically significant word-type effect (Wilk's $\lambda = .742$, Exact $F(3, 158) = 18.319$, $p<.001$, $\varepsilon^2=.258$), category effect (Wilk's $\lambda = .641$, Exact $F(1, 160) = 97.518$, $p<.001$, $\varepsilon^2=.379$) and word-type by category effect (Wilk's $\lambda = .924$, Exact $F(3, 158) = 4.316$, $p<.001$, $\varepsilon^2=.076$). Separate paired samples *t*-tests were then conducted to further explore these differences between responses to the words in congruent and incongruent pairings. Even allowing for a Bonferroni adjustment for the four tests conducted, all of these mean differences were statistically significant at $p <.01/4$, indicating again that the incongruent categories were more difficult (slower) for participants to process. In other words, the initial hypothesis for this task, that participants would respond faster to congruent categories, was met. For pleasant words, the congruent categories response time was M = 1154 milliseconds, SD = 345 and the incongruent response time M = 1780, SD = 995), t (160) = -8.537, $p < .001$, d = -0.67. For unpleasant words, the congruent categories response time was M = 1113 milliseconds, SD = 323 and the incongruent response time

M = 1614, SD = 837), t (160) = -7.866, p < .001, d = -0.62. For positive attachment words, the congruent categories response time was M = 1021 milliseconds, SD = 304 and the incongruent response time M = 1663, SD = 810), t (160) = -10.198, p < .001, d = -0.81. For negative attachment words, the congruent categories response time was M = 1243 milliseconds, SD = 376 and the incongruent response time M = 1815, SD = 890), t (160) = -8.690, p < .001, d = -0.69.

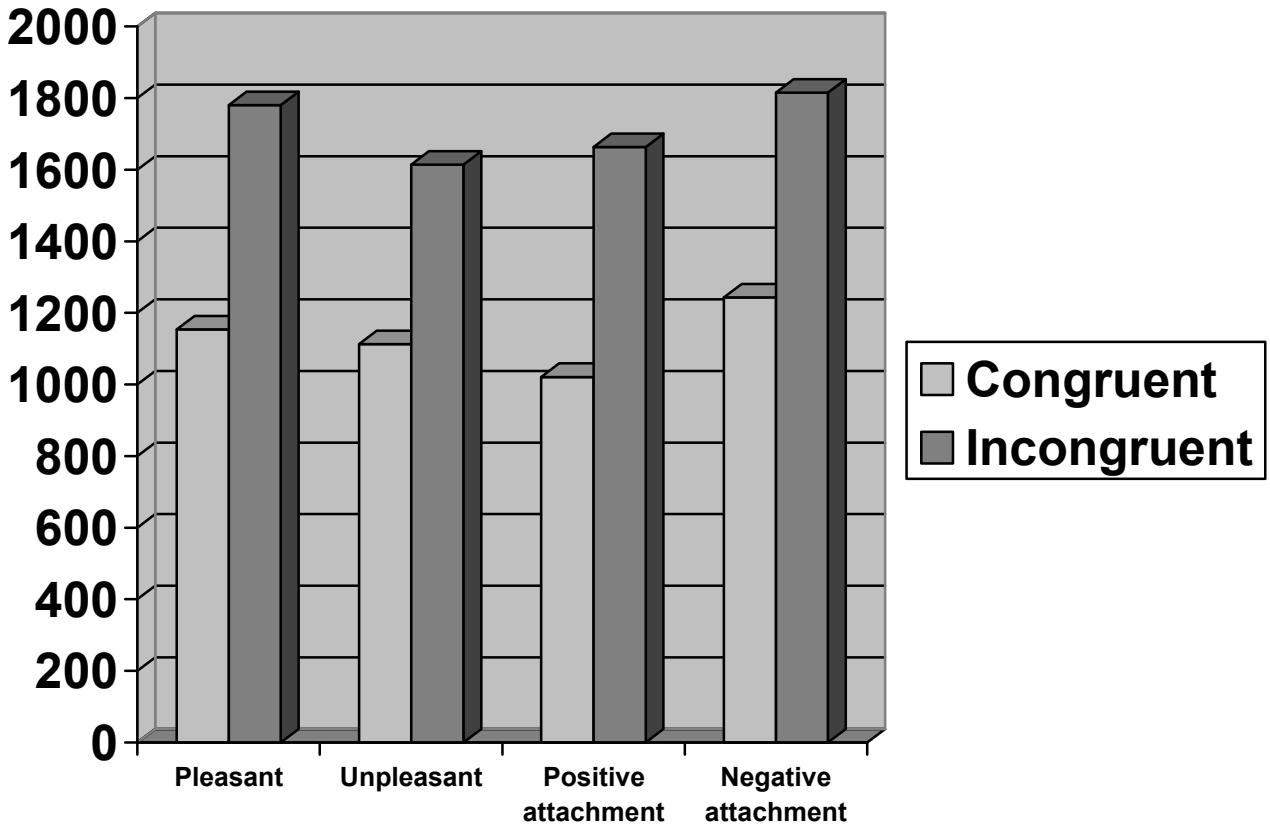
The second hypothesis for this task was that participants would respond fastest to the positive attachment words in the congruent categories, thus the mean responses to these words were further examined. A repeated measures analysis of variance analysis with one within-subjects factor of word-type was calculated for the different types of word (pleasant, unpleasant, positive and negative attachment) within the congruent categories. This showed that there was a statistically significant word-type effect (Wilk's $\lambda = .642$, Exact F(3, 158) = 29.359, p<.001, ε^2=.358). Inspection of Chart 3 shows that participants responded fastest to positive attachment words when MY MOM was paired with Pleasant and NOT MY MOM with Unpleasant (congruent categories). Three paired samples t-tests were conducted to investigate whether this difference was statistically significant for positive attachment words and responses to these words were indeed found to be faster than to: negative attachment words, t (160) = -9.101, p < 0.001, d = .72; pleasant words, t (160) = 6.488, p < 0.001, d = .51; and unpleasant words, t (160) = 5.092, p < 0.001, d = 0.40. Even allowing for a Bonferroni adjustment to the alpha level given the three analyses, this was statistically significant at p < .01/3. This fits with the assumption that for the majority of securely attached participants, the conceptual category

of MY MOM is associated with positively-toned descriptors that are also pleasant.

In accordance with this, participants also responded slowest overall to negative attachment words when MY MOM was paired with Unpleasant and NOT MY MOM with Pleasant (incongruent categories). Again, a repeated measures analysis of variance analysis with one within-subjects factor of word-type was calculated for the different types of word (pleasant, unpleasant, positive and negative attachment) within the incongruent categories. This showed that there was a statistically significant word-type effect (Wilk's $\lambda = .865$, Exact $F(3, 158) = 8.218$, $p<.001$, $\varepsilon^2=.135$). Three paired samples t-tests were then conducted to investigate whether this difference was statistically significant for negative attachment words and responses to negative attachment words in the incongruent category task were indeed found to be slower than: the unpleasant words, $t\ (160) = -4.781$, $p < 0.001$, $d = -0.38$ and positive attachment words: $t\ (160) = -3.171$, $p = 0.002$, $d = -0.25$ but not than the pleasant words, $t\ (160) = -0.764$, $p > 0.05$, $d = -0.06$. As before, even with a Bonferroni adjustment for the three analyses, the two statistically significant results remain so at $p < 0.01/3$. If the conceptual category of mother overlaps with that of pleasant, it would make sense that it would be hard for participants to process "not mom" words when the paired category provides a contrary cognitive cue. Interestingly, participants also responded slowest to negative attachment words within the congruent categories. For positive attachment words the results were: $t\ (160) = -9.101$, $p < 0.001$, $d = 0.72$; for pleasant words, $t\ (160) = -3.835$, $p < 0.001$, $d = 0.30$; and for unpleasant words $t\ (160) = -5.818$, $p < 0.001$, $d = 0.46$ (all analyses were statistically significant even after a Bonferroni adjustment for the three analyses conducted, $p <$

Chart 4

Mean response in milliseconds to words in Implicit Attitude Task



.01/3). Given that the conceptual cues in this instance were not contradictory for a majority of secure participants (NOT MY MOM was paired with Unpleasant), the negative attachment words appear to have been harder to process than other word types.

In the second step of the main analyses for this task, a series of ordinary least squares regression analyses were conducted to examine the association of the attachment measures to the different words in congruent and incongruent categories. As before, the IPPA maternal scale, PBI maternal Care scale and the ASQ Concern scale were entered in the first set of analyses and the four PAS Maternal scales in the second set of analyses. The results were mixed as can be seen in Tables 11 and 12. The only statistically significant F-tests were for words in the congruent categories. For the pleasant words the results were: F (3, 144) = 5.686, p = .001, R^2 = .106 for the existing attachment instruments and F (4, 120) = 3.793, p = .006, R^2 = .112 for the four PAS scales; and for the unpleasant words: F (3, 144) = 3.187, p = .026, R^2 = .062, for the existing attachment instruments and F (4, 121) = 3.815, p = .006, R^2 = .112 for the four PAS scales. From the attachment words, the chief focus of interest in the current study, only the analysis for the negative attachment words in congruent categories was statistically significant, and then only for the existing attachment instruments, F (3,142) = 4.511, p = .005, R^2 = .087. Inspection of the regression coefficients in Table 12 shows that it was the IPPA scale that appears to account for the statistically significant results for the Pleasant, Unpleasant and Negative words when the existing attachment instruments were entered as the predictors and it was the PAS Defensiveness scale that appears to explain the significant result for the Unpleasant words when the PAS scales were used as predictors.

Table 11

Results for regression analyses for Implicit Attitudes Task

		df	F-value	p-value	R^2
		Congruent categories			
Pleasant words	1	3, 144	5.686	**0.001**	0.106
	2	4,120	3.793	**0.006**	0.112
Unpleasant words	1	3, 144	3.187	**0.026**	0.062
	2	4,121	3.815	**0.006**	0.112
Positive attachment words	1	3, 142	2.429	>0.05	0.049
	2	4,119	2.329	>0.05	0.073
Negative attachment words	1	3, 142	4.511	**0.005**	0.087
	2	4,118	1.209	>0.05	0.039
		Incongruent categories			
Pleasant words	1	3, 142	0.350	>0.05	0.007
	2	4,118	0.845	>0.05	0.028
Unpleasant words	1	3, 142	2.151	>0.05	0.043
	2	4,117	0.739	>0.05	0.025
Positive attachment words	1	3, 143	2.453	>0.05	0.049
	2	4,119	0.431	>0.05	0.014
Negative attachment words	1	3, 142	0.712	>0.05	0.015
	2	4,119	0.906	>0.05	0.030

Note: statistically significant p-values are in bold. 1 = Predictors entered: IPPA Maternal Scale, PBI Maternal Care Scale and ASQ Confidence Scale; 2 = Predictors entered: PAS Maternal scales.

Table 12
Standardized regression coefficients for the IAT and Maternal Attachment Scales

Congruent Categories

	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Pleasant words	-.287	**.019**	-.044	>.05	-.010	>.05
Unpleasant words	-.315	**.012**	.158	>.05	.161	>.05
Positive attachment words	-.195	>.05	-.034	>.05	.001	>.05
Negative attachment words	-.418	**.001**	.191	>.05	.027	>.05

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	*P*	β	p
Pleasant words	-.133	>.05	.159	>.05	-.247	>.05	-.155	>.05
Unpleasant words	.173	>.05	.024	>.05	-.376	**.005**	-.085	>.05
Positive attachment words	.007	>.05	.006	>.05	-.294	**.034**	.038	>.05
Negative attachment words	-.033	>.05	.038	>.05	-.117	>.05	-.118	.>.05

Incongruent Categories

	IPPA		PBI Care		ASQ Confidence	
	β	p	β	p	β	p
Pleasant words	.080	>.05	-.034	>.05	.050	>.05
Unpleasant words	.173	>.05	.001	>.05	.081	>.05
Positive attachment words	.269	**.034**	-.072	>.05	.006	>.05
Negative attachment words	.164	>.05	-.061	>.05	-.010	>.05

Table 12 continued

	PAS Emotional Responsiveness		PAS Rejecting		PAS Defensiveness		PAS Forgiveness	
	β	p	β	p	β	p	β	p
Pleasant words	.012	>.05	-.167	>.05	.226	>.05	.047	>.05
Unpleasant words	.020	>.05	-.116	>.05	.233	>.05	-.082	>.05
Positive attachment words	-.124	>.05	-.080	>.05	.070	>.05	-.076	>.05
Negative attachment words	-.189	>.05	.033	>.05	.214	>.05	-.047	. >.05

As an additional check, difference scores (response times for the congruent and incongruent categories for each word type subtracted from each other) were computed and these used as the dependent variable in the same regression analyses, first with the three existing parental attachment scales and second with the four PAS scales. Correlations between these difference scores and the scales are reported in Table 13. These regression results are in Table 14. As can be seen from Table 14, all but one of these regression analyses were statistically significant; only the analysis for the PAS scales with the negative attachment words difference score as the dependent variable was non-significant. In the case of the established attachment instruments, inspection of the regression coefficients showed that in each case, it was the IPPA Maternal scale that appeared to account for the statistically significant result. For the PAS scales, while three of the overall regression analyses were significant (those for pleasant, unpleasant and positive attachment words), in only two instances (pleasant and unpleasant words) was a regression coefficient also statistically significant and in both cases it was the PAS Defensiveness scale that appeared to explain the statistically significant result.

Table 13

Correlations between IAT difference scores and instrument scales

	Pleasant words	Unpleasant words	Positive words	Negative words
IPPA	**-.341**	**-.271**	**-.382**	**-.322**
PBI Care	**-.264**	-.130	**-.294**	-.167
ASQ Confidence	-.123	.039	-.080	-.039
PAS Emotional Responsiveness	**-.278**	-.162	-.251	-.109
PAS rejecting	-.238	-.222	-.265	-.149
PAS Defensiveness	**-.371**	**-.334**	**-.294**	-.205
PAS Forgiveness	**-.309**	**-.204**	-.115	-.170

Note: Correlations in bold are significant at .05/28, with an alpha of .05 adjusted for the 28 correlations.

Table 14
Results for regression analyses for IAT difference scores

	df	F	p-value	R^2		β
Results for established attachment instruments						
Pleasant words	3, 138	6.647	**<.001**	.126	IPPA PBI Care ASQ Con	**-.342** -.008 -.024
Unpleasant words	3,135	5.256	**.002**	.105	IPPA PBI Care ASQ Con	**-.425** .154 .102
Positive words	3, 136	8.786	**<.001**	.162	IPPA PBI Care ASQ Con	**-.390** -.024 .024
Negative words	3, 132	7.033	**<.001**	.138	IPPA PBI Care ASQ Con	**-.502** .190 .046
Results for PAS						
Pleasant words	4,115	6.121	**<.001**	.176	PAS ER PAS R PAS D PAS F	-.109 . 233 **-.405** -.163
Unpleasant words	4,113	4.690	**.002**	.142	PAS ER PAS R PAS D PAS F	.083 .106 **-.484** -.015
Positive words	4,113	2.954	**.023**	.095	PAS ER PAS R PAS D PAS F	-.110 -.002 -.260 .103
Negative words	4,110	1.975	>.05	.067	PAS ER PAS R PAS D PAS F	.083 -.020 -.236 -.081

Note: significant p-values and betas ($p < .01$) are bolded. For the PAS scales, ER = Emotional Responsiveness, R = Rejecting, D = Defensiveness and F = Forgiveness.

Additional Exploratory Analyses

Finally, four sets of additional analyses were run. First, a subset of data from participants reporting a parental death, severe illness or divorce, were used for the same t-test comparisons of task data as in the main data set. This was done to explore whether participants who reported experiences that might be expected to be associated with insecure attachment, responded differently to the task stimuli. However, the results, which are presented in Appendix 6, show little statistical significance. This may result from the small sample size and thus lack of statistical power or it may be the outcome of grouping persons with widely differing experiences together. For while the death of a parent while young might negatively impact a person's attachment security, an amicable parental divorce in late adolescent might not.

Second, following Moller, McCarthy and Fouladi (2002), the PBI Care scale and ASQ Confidence scale were used to generate four groups with different self-reported attachment histories: continuously secure, earned secure, currently insecure and continuously insecure. These groups were then used in analyses of variance for the attachment tasks, in order to further investigate the relationship between task and instrument responses. Next, the four attachment groups were collapsed into two groups (secure and insecure) and the same analyses run. These results are presented in Appendix 7. Again, both sets of results were characterized by a lack of statistical significance.

Third, because the regressions run for the IAT were significant for both the existing attachment instruments and the PAS scales for two out of four of the word-types in the congruent categories, it was decided to run a two-step hierarchical regression

analysis for these variables. Given the initial hypothesis that the PAS scales would be more likely to show a significant relationship with the task variables, it was decided to enter these variables into Step one, and the existing attachment measures into Step two. The results, in Appendix 8, reveal that the overall F-tests for the pleasant and unpleasant words were statistically significant at both steps and for the negative attachment words only at one step. However, inspection of the standardized regression coefficients shows that only the PAS Defensiveness scale was significant at both steps and then only for the unpleasant words. For the pleasant words, despite the initial statistical significance, none of the coefficients were significant. For the negative words, as before, it was the IPPA scale that appeared to account for the overall significance of the regression analysis. In sum, these results echo closely the regression analyses reported earlier.

The fourth set of analyses run explored the relationship between the lexical decision task and the Implicit Attitudes Task by using the IAT response times as predictors in regressions with the lexical decision task response times for negative, positive and neutral words as criterion variables. Motivated by the significant cross-task correlations, the intent of this exploratory analysis was to investigate if participants' responses to positive and negative attachment words in one task were predicted by their responses to the same stimuli in a different task. Such a finding would provide credence to the idea that the tasks are both assessing attachment schemas. However, while these results, shown in Appendix 9, show a fair degree of statistical significance, there is little that is logical about them. For example, while it seems sensible that categorizing positive attachment words in the IAT would predict response times to the positive attachment

words in the lexical decision task, the fact that IAT positive attachment word performance also predicted neutral word response times in the lexical decision task, is not easily explained.

CHAPTER V

DISCUSSION

Participants completed four tasks designed to tap into their attachment working models and then completed self-report attachment instruments. This study design was aimed at allowing exploration of three research questions. The first concerned the affective component of participants' attachment working models of their mothers, and how that varies by self-reported attachment security. This question was addressed through the Chinese characters affective judgments task and investigation of the associations between task and instrument responses. The second issue was the extent to which participants' attachment working models of their mothers affects their recall and recognition of information and how that varies by self-reported attachment. This question was addressed through the free-recall and cued recognition memory tasks and investigation of the associations between task and instrument responses. The third inquiry was directed towards the semantic networks of associations in participants' attachment working models of their mothers and how these vary by self-reported attachment. This question was addressed through the lexical decision and IAT tasks and investigation of the associations between task and instrument responses.

The results of this study will be discussed first as it related to the tasks alone and secondly as it related to both the tasks and the attachment instruments. This organization allows a general discussion of each area to be followed by a focus on the individual tasks. Overall the aim is to understand study results in terms of their implications for a better

comprehension of the content, structure and processes of attachment working models. Limitations to the study and directions for future research will then be discussed.

Attachment Tasks

Chinese Characters Affective Liking Task: In this experimental paradigm, participants were asked to rate the likeability of affectively neutral stimuli, Chinese characters. Prior research using this paradigm suggested that participants respond to subliminally-primed attachment stimuli such as images of a mother and child (Mikulincer, Hirschberger, Nachmias & Gillath, 2001) or the names and faces of attachment figures (Banse, 1999; Mikulincer, Hirschberger, Nachmias & Gillath, 2001) with higher liking ratings than to neutral or non-attachment stimuli such as images of wealth or the names of strangers or acquaintances. In the current study, the subliminal primes used were "MY MOM" and "NOT MY MOM" and it was hypothesized that, given an overall majority of securely attached persons in the population, on average participants would respond with higher liking scores to the Chinese characters when subliminally primed with "MY MOM." In other words, the underlying assumption was that secure participants would respond with higher liking scores to the "MY MOM" primed characters and insecure participants with higher liking scores to the "NOT MY MOM" subliminally primed characters.

As it happens, analysis of differences in the liking scores for the block of characters primed with "MY MOM" as opposed to "NOT MY MOM" revealed a negative priming effect, with "NOT MY MOM" being found to generate statistically significant higher liking scores. Although the effect size was small, this finding is puzzling and contrary to what was expected. It does however match with what was found

in the pilot study for this research study, in which the subliminal prime "MY MOM" also led to slightly lower liking ratings (unpublished data, Moller, Fouladi & McCarthy, 2003).

One possible explanation for this finding is that the subliminal priming procedure using Flash 5 animation software did not function properly. However only five participants out of the entire group stated that they had seen "mom" "my mom" or some version of such under the masking XXXs. Further, in a separate study (unpublished data, Moller, McCarthy & Rude, 2003) the same software was used to program the same affective judgments task. In this case, the subliminal primes, presented in three separate blocks, consisted of ten positive attachment words, ten negative attachment words and ten neutral words. As expected, given the research cited above, liking scores were statistically significantly higher following subliminal exposure to the positive attachment words than to either the negative or neutral words, and there was no significant difference between the liking scores for the negative and neutral words. These findings suggest that the problem, if there is one, is not in the methodology of the liking task.

A second potential explanation is that the mood manipulation of the subliminal primes did not work. However, evidence that the priming procedure did impact participants' affect comes from examination of responses to the PANAS mood-check list following exposure to each block of subliminally-primed stimuli. This showed that participants reported statistically significantly better mood (higher ratings of positive mood adjectives) following exposure to "MY MOM." Moreover, this result had a fairly big effect size. This finding suggests that the subliminal prime did create positive affect

for the majority of participants, as hypothesized. Examination of responses to negative adjectives in the PANAS also showed that participants reported a small but statistically significant increase in negative affect following exposure to the subliminal prime "MY MOM". As discussed earlier, it is not surprising that the same prime would lead to both higher negative and positive affect; it is assumed that while for the majority of securely attached participants, exposure to this subliminal prime resulted in a more positive mood, for the insecurely attached minority the opposite occurred. In support of this hypothesis, while responses to the PANAS as a whole (both positive and negative adjectives) were highly correlated across the two blocks at 0.88 ($p < 0.001$), suggesting a fair degree of individual mood consistency across the task, the correlations between responses to the negative and positive adjectives within blocks were tiny and non-significant, -0.04 for the positive and negative adjectives in the block primed with "MY MOM" and -0.02 for the positive and negative adjective in the block primed with "NOT MY MOM". In other words, there was no pattern whereby individuals endorsed both higher negative and positive affect following exposure to the primes.

While there appears to be support for the idea that this task impacted participants' affect state, it is not however at all clear that this translated into responding, on the basis of that affect, to the Chinese characters. As discussed earlier, one possible explanation for the finding that the prime "MY MOM" led to lower liking ratings is that the same prime elicited different response patterns, with the higher liking scores of the majority being offset by the lower liking scores of the minority, creating overall lower mean liking scores across participants and thus obscuring potential differences between the two

priming conditions. However the high positive correlation between responses to the two blocks of characters, as reflected in Chart 2, contradicts this explanation. Another possibility thus that must be considered is that problems with the design of this task explain the result. One potential issue is that the primes chosen, "MY MOM" and "NOT MY MOM," may have been confusing to participants and created "noise" in responses to the Chinese characters because they were not emphatically different. In addition, while it was assumed that the "NOT MY MOM" prime would function for most participants as a neutral affective cue, and thus that responses to this prime would function as a baseline for the liking judgments task, this assumption was not tested. If this prime did evoke an affective response from participants that too may have muddied the findings. A third problem may have been the length of the task since participants were required to respond to 60 characters. It is possible that after a while responding to these highly similar stimuli became boring or tiring for participants and thus that an affective response to the task was the primary influence on character liking scores, rather than the subliminal manipulation of mood evoked by the primes. Clearly, in order to evaluate any of these ideas it would be necessary to run the same paradigm again, rectifying the problems, perhaps shortening the task, perhaps balancing "MY MOM" against a clearly different and clearly affectively neutral prime, such as "TABLE."

Lexical Decision Task: In this task, participants were asked to classify letter strings as words or non-words and the stimuli consisted of negative and positive attachment words, neutral words and matched non-words. Faster responding was assumed to provide information about semantic networks, and the extent to which participants' positive and

negative attachment schemas were triggered. The task was a simplified version of several supra- and subliminally primed lexical decision tasks that used attachment relevant stimuli and primes to reveal semantic associations within attachment schemas. As reviewed above, the chief finding in these studies was an association between, on the one hand, self-reported attachment security and faster responses to positive attachment primes and stimuli and, on the other, self-reported attachment insecurity and faster responses to negative attachment primes and stimuli. Similarly to the studies cited, the current unprimed design aimed to investigate individual differences in attachment working models by exploring response times to positive and negative attachment words in contrast to neutral and non-words. The hypothesis was that, given an overall majority of securely attached persons in the population and thus presumably in the sample, responses would be fastest overall to the positive attachment words. Thus the underlying assumption was that secure participants would respond faster to positive attachment words and insecure participants faster to negative attachment words.

Analysis of the results showed that participants responded significantly faster to both the positive and negative attachment words than to the neutral and non-words. This finding is in contradiction to what has been found in other research and to the predictions for this task; it does however imply a primacy effect for attachment working models. More specifically, the fact that participants responded fastest to the attachment words suggests that attachment working models are more easily triggered than the knowledge-based models associated with the neutral words. Given the central role that attachment relationships play in the lives of most individuals, this would not be a surprising finding,

even if it does not match the research findings cited. Another explanation is that responses were faster to the attachment words because they carry a strong emotional valence, in other words that it is positive and negative affect schemas that were triggered rather than specifically attachment or relational schemas. Evidence that this was not the case comes from another timed response task in this study, the IAT word categorization task in which the stimuli consist of two sets of words with emotional valence: positive and negative attachment words and pleasant and unpleasant words. Further discussion of the IAT findings are below but for the lexical decision task, the main import is that participants responded differently to the relational words, the positive and negative attachment words, than to the pleasant and unpleasant words. Obviously, before it can be concluded that the lexical decision task is tapping into attachment schemas rather than affective schemas, it would be necessary to incorporate pleasant and unpleasant words into the lexical decision task itself. Nonetheless, the IAT does provide support for the interpretation that the faster responses to attachment words in the lexical decision task indicate the primacy of attachment working models rather than simply the primacy of affective schema.

As discussed above with the Chinese characters affective judgments task, one potential explanation for the lack of a statistically significant difference in speed of response between the positive and negative attachment words, is that contrasting patterns of response to the positive and negative attachment stimuli by participants with secure and insecure attachment patterns, were washed out when responses to the stimuli were considered across the participants. However, the scatterplot of responses to the negative

and positive words (Chart 4) and high positive correlation between responses to the two types of words (.769) suggested that participants who responded more quickly to the negative words tended to do the same for the positive words, undercutting the idea that some participants responded faster to positive attachment words and slower to negative attachment words while other participants had the opposite response pattern. In other words, the evidence was not supportive for the idea that this lexical decision task captured differential responding to attachment stimuli as a result of secure and insecure attachment working models.

Negative evidence comes also from the exploratory regression analyses reported in Appendix 9. While the cross-task statistically significant correlations between the lexical decision task and the IAT might provide evidence for the idea that both tasks are assessing participants' attachment working models, the fact that the exploratory regression analyses reported in Appendix 9 are not logical contradicts this assumption. Logically, performance on the lexical decision task positive attachment words should be predicted by responses to the IAT positive attachment words and only by those words; equally it would make sense that response to the negative attachment words in the lexical decision task would be predicted by responses to the negative attachment words in the IAT only and that neutral words in the lexical decision task would not be clearly predicted by any of the IAT word-types. However these were not the findings—for example, responses to positive attachment words in the lexical decision task were predicted by congruent category unpleasant words, and responses to negative attachment

words were predicted by positive attachment words, pleasant and unpleasant words as well as by negative attachment words in the IAT.

Taken together these findings suggest that this lexical decision task may not be tapping into individual's personal attachment working models (and attachment status) so much as into general (non-personal) schemas about attachment words. Nonetheless before it can be finally concluded that participant's attachment status did not relate to lexical decisions in this task, examination of the regression analyses for self-reported attachment status is required. These results are discussed below.

Free Recall and Cued-Recognition Memory Task: In this task, participants were shown, in random order, 10 positive and 10 negative attachment words and 10 neutral words. Following a distractor task they were then asked to recall as many as possible of these words. Next, they were presented with the words they had seen and 30 similar but different words and asked to indicate which words they had seen before. As reviewed, the little research that has explored the relationship between attachment working models and memory processes suggests that two alternate hypotheses: first that attachment working models bias memory so that information consistent with the working models is better recalled and second that attachment insecurity may actually lead to poorer (rather than better) recall for negative attachment stimuli through the process of "defensive exclusion (Bowlby, 1980). As discussed, the hypothesis adopted for this task was the first; in other words, the assumption for this task was that overall participants would recall and recognize significantly more positive than negative attachment words in both memory tasks. Further, the underlying assumption was that attachment insecurity would be

associated with a recall and recognition bias for negative attachment words and attachment security with better recall for positive attachment words. The actual results were more complex.

Analysis of the results for the free-recall and recognition tasks showed that in the free-recall task, neutral words were remembered significantly better, with positive attachment words also being recalled at a significantly higher rate than negative attachment words. By contrast, in the recognition task, recall scores were highest for the negative attachment words with no significant difference in recognition rates for positive and neutral words. Interestingly, this finding matches that in the recall task for the Seijlmans van Emmichoven et al. (2003) study, although in that study too the authors appeared to have difficulty explaining this result since recognition scores did not relate to either clinical/non-clinical status nor AAI classification.

These findings may be explained by problems in the task design. One possibility for the free-recall task is that the neutral words were easier to recall because they were more common. Words were matched across category by word frequency but it is possible that this was not entirely successful; the word with the highest recall rate was “hug,” a positive attachment word, but the three next most well recalled words were all neutral words: “alligator,” “cauliflower,” and “wade” and overall average recall was higher for neutral words than attachment words. For the recognition task, there may also have been an issue of leakage between tasks that led to confusion for participants since some of the same words used in the lexical decision task (which immediately preceded the memory task) were used in the recall and recognition tasks. This leakage may have both lead to

the relatively high error rates for the memory tasks and the contradictory pattern of results.

Implicit Attitudes Test: In this task, implicit attitudes to mothers were explored through a word categorization task in which participants were required to categorize positive and negative attachment words, and pleasant and unpleasant words, into congruent categories ("MY MOM/Pleasant" and "NOT MY MOM/Unpleasant") and incongruent categories ("MY MOM/Unpleasant" and "NOT MY MOM/Pleasant"). Faster responses to the paired categories were assumed to provide information about implicit semantic associations, for example between the conceptual categories of "my mom" and "pleasant."

Of the two prior studies located that have used the IAT and attachment stimuli, one found contradictory findings across two samples with self-reported attachment security being associated with faster response times to relationship word/pleasant word categories in one data set but not in the second (Aspelmeier, 2000) A second study (Feldman Barrett, McCabe, Costa, Bevaqua & Bliss, 1999) found that self-reported attachment security was associated with significantly faster responses to self/pleasant and other/pleasant categories than was found with self-reported insecure attachment.

Based on these findings, it was hypothesized that overall participants would respond overall faster to the "MY MOM"/"Pleasant" congruent categories and slower to the "MY MOM"/"Unpleasant" incongruent categories. It was also hypothesized that participants would respond significantly faster to positive attachment words than other types of words across word types but within congruent words. Both hypotheses were met

for this data set. Within types of words, participants responded faster to the congruent than to the incongruent categories and within the congruent words, participants responded fastest to positive words.

The first result suggests that for most participants, the semantic association was stronger between "MY MOM" and "Pleasant" than "MY MOM" and "Unpleasant." As stated earlier, this fits with the hypothesis that for the majority of securely attached participants, the conceptual category of "MY MOM" is associated with positively-toned descriptors that are also "pleasant". Further, given the assumed majority of securely attached participants, the fact that within the congruent words, participants responded fastest to positive attachment words, provides further evidence of semantic associations between secure maternal attachment models and positive attachment stimuli. This understanding is also supported by the finding that within the incongruent categories (MY MOM/Unpleasant and NOT MY MOM/Pleasant), participants responded slowest overall to negative positive attachment words (though the difference was not statistically significant for pleasant words). If, for the secure majority, the conceptual category of mother overlaps with that of pleasant, it would be difficult for participants to process negative "my mom" words when the paired category provides a contrary cognitive cue of "unpleasant."

Interestingly, participants also responded slowest to negative attachment words within the congruent categories. In other words, given that the conceptual cues in this instance were <u>not</u> contradictory for the majority of secure participants (since NOT MY MOM was paired with Unpleasant), the negative attachment words appear to have been

harder to process than any other type of word. This would again fit with the idea that if the majority of participants were securely attached, the slowest average responses would be to negative attachment stimuli.

The fact that both hypotheses were met for this task suggests that this task did "work," did tap into participant's attachment working models. By contrast, as discussed, it is not clear that the lexical decision task "worked". As stated above, rather than individual attachment schemas, it seems likely that responses to this task were generated from a general (non-personal) schema about attachment stimuli, and not from individual, idiosyncratic attachment working models. However, if the IAT did "work" and the lexical decision task did not, then the cross-task correlations (and the confused pattern of statistical significance for the Appendix 9 regression coefficients) between these tasks must be explained by something other than parallel assessment of attachment schemas. The most obvious explanation for the correlations is probably methodological: the outcome variable for both tasks consisted of response time measured in milliseconds and thus the between-task associations may simply reflect within-individual similarities in speed of response to timed, computerized tasks. However further research is required to confirm this point.

Attachment Instruments:

The second set of analyses conducted sought to establish whether self-reported maternal attachment was related to responses to the experimental tasks. Scales from four attachment instruments were used: the IPPA maternal attachment scale, the PBI maternal attachment Care subscale, the four maternal scales of the PAS, also assessing parental

attachment, and the Confidence subscale from the ASQ, which measures non-relational attachment security.

In the studies reviewed, there were surprisingly few connections between attachment task performance and self-reported attachment status except when some kind of cognitive load or attachment threat was first instituted. For the Chinese characters affective judgments tasks, in none of the studies reviewed were the liking ratings significantly related to self-reported attachment status except when participants were either given false failure feedback or asked to visualize an unwanted separation from a loved one prior to beginning the experimental task (Mikulincer, Hirschberger, Nachmias & Gillath, 2001). In both cases, under these threat conditions, the only finding was that self-reported attachment anxiety was related to decreased liking ratings.

For the lexical decision task, in several studies utilizing supraliminal stimuli, self-reported attachment security was related to faster response times for positive attachment cues and attachment security to slower response times for negative attachment stimuli, (c.f. Baldwin, Fehr, Keedian, Seidel & Thomson, 1993; Baldwin & Meunier, 1999). However, in several studies where connections between self-reported attachment and responses to tasks with attachment-related subliminal primes were found, the stressfulness of the tasks had been increased by providing failure feedback or requiring visualization of a separation episode prior to task completion (Mikulincer et al, 2001), or by creating cognitive load by requiring participants to complete an auditory task while simultaneously engaged in a lexical decision task (Mikulincer, Birnbaum, Woddis & Nachmias, 2000). In only two of the Mikulincer et al. (2000) studies did self-reported

attachment appear to be linked to responses to non-cognitively loaded subliminally primed stimuli, but in both cases self-reported anxious-ambivalent attachment was predominantly found to result in faster responses to stimuli irrespective of whether they were primed with an attachment threat word or a neutral word such as "hat."

For the memory tasks, the only study assessing attachment through a self-report instrument found a relationship between secure attachment and better recall for positive events but only when participants were first primed by writing about a rejecting friendship experience, in other words again when an attachment threat was primed. Fearful attachment was however associated with better recall for negative events irrespective of priming condition.

For the IAT, a relationship between self-reported attachment status and task performance was found consistently only for one study (Feldman Barrett, McCabe, Costa, Bevaqua & Bliss, 1999).

The fairly limited evidence of connections between task performance and self-reported attachment status, is in line with the generally very modest associations between self-report instruments and the AAI, which like the attachment tasks, is also thought to tap into unconscious attachment working models (e.g. Crowell, Treboux & Waters, 2000; Shaver, Belsky & Brennan, 2000; see also, Jacobvitz, Curran & Moller, 2001).

These results are also in line with the results of the pilot study for this project, in which none of the analyses conducted on established attachment instruments (PBI and IPPA) found statistically significant results. Rather, the results showed that in no case did the set of subscales from the established attachment instruments explain variance in

response times to any of the stimuli in a subliminally primed lexical decision task nor to the Chinese characters affective liking task (Fouladi, Moller & McCarthy, 2005; Moller, Fouladi & McCarthy, unpublished data). In fact, self-reported attachment accounted for 4% or less of the variance in the tasks. The results for the PAS subscales however, while non-significant for the Chinese characters task, were statistically significant for the lexical decision task. When responses to the unprimed attachment words were controlled for (by being entered first into the regression equation), the set of PAS scales explained a statistically significant proportion of the variance in response times to the positive attachment words; and when controlling for responses to unprimed words as well as PBI and IPPA scores, the set of PAS subscales explained a significant proportion of the variance in response times to both positive and negative subliminally primed attachment words.

Both the research cited and the pilot study suggested two hypotheses for the attachment self-report instruments: first that there would be no statistically significant relationships between attachment as self-reported in the PBI, IPPA and ASQ and responses to the four experimental tasks; and second, that an unspecified pattern of statistically significant relationships would be found between attachment as self-reported in the PAS and responses to the four experimental tasks. With partial exceptions for the IAT, neither of these hypotheses were met in this data-set.

For the Chinese characters affective judgments task, the lexical decision task, and the cued recognition memory tasks, there was no statistically significant relationship between task performance and performance on the attachment tasks as assessed by the

regression analyses. For the free-recall and IAT, there was some marginal evidence of a relationship. In the case of the free-recall task, the only word-type to show an unambiguous relationship with any of the attachment measures was the neutral words, not the focus of interest for this study. Further, the only statistically significant predictor was the ASQ Confidence scale. It is difficult to come up with an explanation for a relationship between attachment security, which is what the ASQ scale assesses, and ability to recall neutral words; it is possible that attachment security is associated with less anxiety and hence better recall but there is not enough evidence to conclude that this was the case in this instance. The major finding for this task thus still appears to be the failure of the attachment instruments to predict recall of the attachment stimuli, positive or negative.

As argued earlier, one explanation for the overall lack of statistically significant findings for the existing attachment instruments (IPPA, PBI and ASQ) with the Chinese characters, Lexical decision and memory tasks, is that these instruments do not capture nonconscious elements of attachment working models, while the attachment tasks do. It is also possible however that problems, cited above, with the design of these attachment tasks, are responsible for the lack of findings. For these three tasks, the overall lack of significant findings for the PAS scales is disappointing, particularly in light of the positive results found for the lexical decision task in the pilot-test. However this instrument is still in development and at least one of the scales (the Forgiveness) scale is problematic in terms of reliability. It is thus possible that subsequent versions of this scale might more successfully predict attachment task performance.

Given the lack of links between the attachment self-report instruments and task performance in the Chinese characters, Lexical decision and memory tasks, the evidence of links found for the IAT are interesting. For the regression analyses using response times for each type of word in each category (congruent or incongruent) the IPPA Maternal scale appeared to predict responses to pleasant, unpleasant and negative words in congruent categories, while the PAS defensiveness scale appeared to predict responses to unpleasant words in the incongruent categories. However, these findings were muddied by a somewhat inconsistent pattern of results such that in some cases a regression coefficient was statistically significant while an overall F-test was not, and vice-versa, making the results hard to interpret because the statistical evidence was sometimes contradictory.

The results for the regression analyses for the IAT which used difference scores as the dependent variable were stronger in that there was a clearer pattern of statistical significance and interestingly the same scales appeared to account for the statistically significant findings. In each case, it was the IPPA Maternal scale out of the established attachment instruments that appeared to predict responses to each type of word, while, from the PAS scales, the PAS Defensiveness scale appeared to predict responses to the pleasant and unpleasant words.

These findings suggest that self-reported security of maternal attachment, as assessed on a single secure-insecure dimension by the IPPA, predicts response times in the IAT so that individuals reporting greater security respond more differently to the congruent and incongruent categories than those who report less security. In other words,

it appears that securely attached persons find it easy to categorize the congruent categories and hard to categorize the incongruent categories, while for insecure persons, responses to the two categories are more similar, presumably because the semantic networks in their maternal attachment working models incorporate more "unpleasant" associations, meaning that sometimes the "congruent" categories feel incongruent and vice-versa.

The more limited findings for the PAS Defensiveness scale suggest that persons reporting higher idealism of their parents also process the congruent and incongruent categories more differently than persons reporting lower idealism. This finding is somewhat counter-intuitive since the Defensiveness scale was designed to tap into an aspect of insecure attachment typical in the Avoidant/Dismissing category, the tendency to defensively idealize less than perfect parents. The AAI demonstrates that persons categorized as Dismissing by that instrument often have two narratives of their parents, one more abstract story about their perfect parents and another more autobiographical narrative about actual events from childhood that reveals a quite different image of harsh and oftentimes rejecting parental behavior to the child. An assumption of the functioning of the IAT is that it has the capacity to access the underlying narrative rather than the defensive stance (implicit rather than explicit prejudice), thus the hope is that the IAT captures the "true" negative content of the semantic associations in the maternal attachment working model and not the idealized picture. However, if this were true, it would mean that those who report themselves high on the PAS Defensiveness scale would respond to the congruent and incongruent categories in the IAT somewhat

similarly, as persons with insecure attachment working models, and not respond to these categories differently, as person with secure working models. Thus one possibility is that the IAT is not distinguishing between those with secure and dismissing working models. The other possibility however is that this finding reveals not so much a problem with the task as with the scale. The four-item Forgiveness scale includes statements such as "My mother is the best mother in the world" and is designed to capture defensive idealism through an unrealistically high evaluation of parents. However, it is likely that such statements are probably also often strongly endorsed by persons with accurately high opinions of their parents. The scale itself may thus not distinguish well between secure and insecure persons, and thus may function, like the IPPA, as a simple measure of self-professed maternal attachment security. If that is the case then these findings may in fact echo those for the IPPA scale. However this interpretation remains to be tested, possibly by assessing participants' security status and in particular their use of defensive idealism, through another methodology , such as the AAI.

Limitations of Study

One limitation of this study is the relatively homogenous and majority female student sample, which makes it difficult to extrapolate results to other, more diverse, populations. In addition, it is assumed throughout that because, in the population, a majority is securely attached (van Ijzendoorn & Bakermans-Kranenburg, 1996), that the same would be true for the sample in this study. While it is true that, by their own self-report (see Table 1), the majority did report as securely attached, the problems with self-report instruments in terms of accuracy and defensive responding have also been

discussed. This assumption thus remains just that, unproven.

There are also a number of design issues with the attachment tasks, such as the potentially confusing use of a "NOT MY MOM" prime in the Chinese characters affective judgments task, the length of this task, the use of visual tracking game rather than a verbal game as a distractor in the memory tasks and an issue of leakage between tasks impacting performance on (at the least) the two memory tasks. The degree of skew and kurtosis for some of the task responses (most specifically responses to the incongruent words in the IAT) is also of concern. As mentioned, the psychometric weaknesses of some of the PAS scales are also a limitation.

Future Research

Further research is necessary to replicate the results of this study in a more diverse population before firm conclusions can be drawn about task efficacy or the predictive power of the attachment instruments. Additional modifications to the PAS might reduce some of the problems with that instrument and thus its performance in this experimental design. It also seems important to more thoroughly investigate what the attachment tasks are assessing by modifying the design in different ways and re-running them. For example, with the Chinese Characters Affective Liking task it would be useful to repeat the experiment cutting the number of characters participants are expected to respond to and balancing "MY MOM" against a different prime, such as "TABLE." Doing so would help to clarify why, contrary to expectations, participants responded with higher liking scores to the "NOT MY MOM" primed characters than to the "MY MOM" primed characters and whether the "NOT MY MOM" subliminal prime was confusing to

participants.

For the lexical decision task, one idea would be to compare responses to positive and negative attachment words with responses to pleasant and unpleasant words. Both sets of words carry an emotional valance and this paradigm would help to establish whether the task triggers attachment working models or simply a general positive and negative affective schema. Another idea would be to introduce, for half the lexical decisions, subliminal primes such as "MY MOM" that cue a personally attachment relevant relationship for participants and for half the lexical decisions, neutral subliminal primes such as "TABLE". Doing so would shed light on the differences between responses to attachment stimuli (positive and negative attachment words) when an attachment working model is primed and when a non-attachment schema is primed. In the pilot study for this study, half of the words in the lexical decision task were primed with "MY MOM", with the rest being unprimed, and there was a statistically significant pattern of results for the regression analyses for the PAS scales (Fouladi, Moller & McCarthy, 2005).

For the memory free-recall and recognition tasks, a verbal game, such as hang-man, should be substituted as the distractor task rather than the visual tracking task used. In addition, although the desire to retain sufficient subjects for all the statistical analyses led to a within-subjects design in the current study, in future research it might be better to have participants do only one task. This would prevent the kind of inter-task interference that may have created "noise" in the cued-recognition memory task since several of the tasks drew stimuli (positive and negative attachment words and neutral words) from the

same pool of words.

For the IAT, the results supported the task performance hypotheses but nonetheless, further experimentation with this task is warranted before it can be concluded that it is indeed tapping into implicit models of attachment relationships. It might make sense to use different attachment category headings and stimuli, such as positive and negative attachment words with "[name of participant's romantic partner]/Pleasant" vs "NOT {name of participant's romantic partner]/Unpleasant" categories. Another idea would be to use as stimuli, names of attachment partners, non-attachment friends and strangers, with categories that cue attachment schema like "love" or "comfort" or "secure".

Given the lack of correspondence between responses to the attachment tasks and self-reported attachment status, together with the cited problems with attachment self-report instruments in general, it would also be important to assess correspondence between task responses and attachment security as assessed through another means. The most obvious assessment methodology to select would be the AAI. Using the AAI would allow the assumption inherent in this paper, that the majority are securely attached, to be more properly examined. Such a study would be also important since, as far as is known, no study using both the AAI and cognitive attachment paradigms such as those used here, has yet been published.

Conclusions and Implications

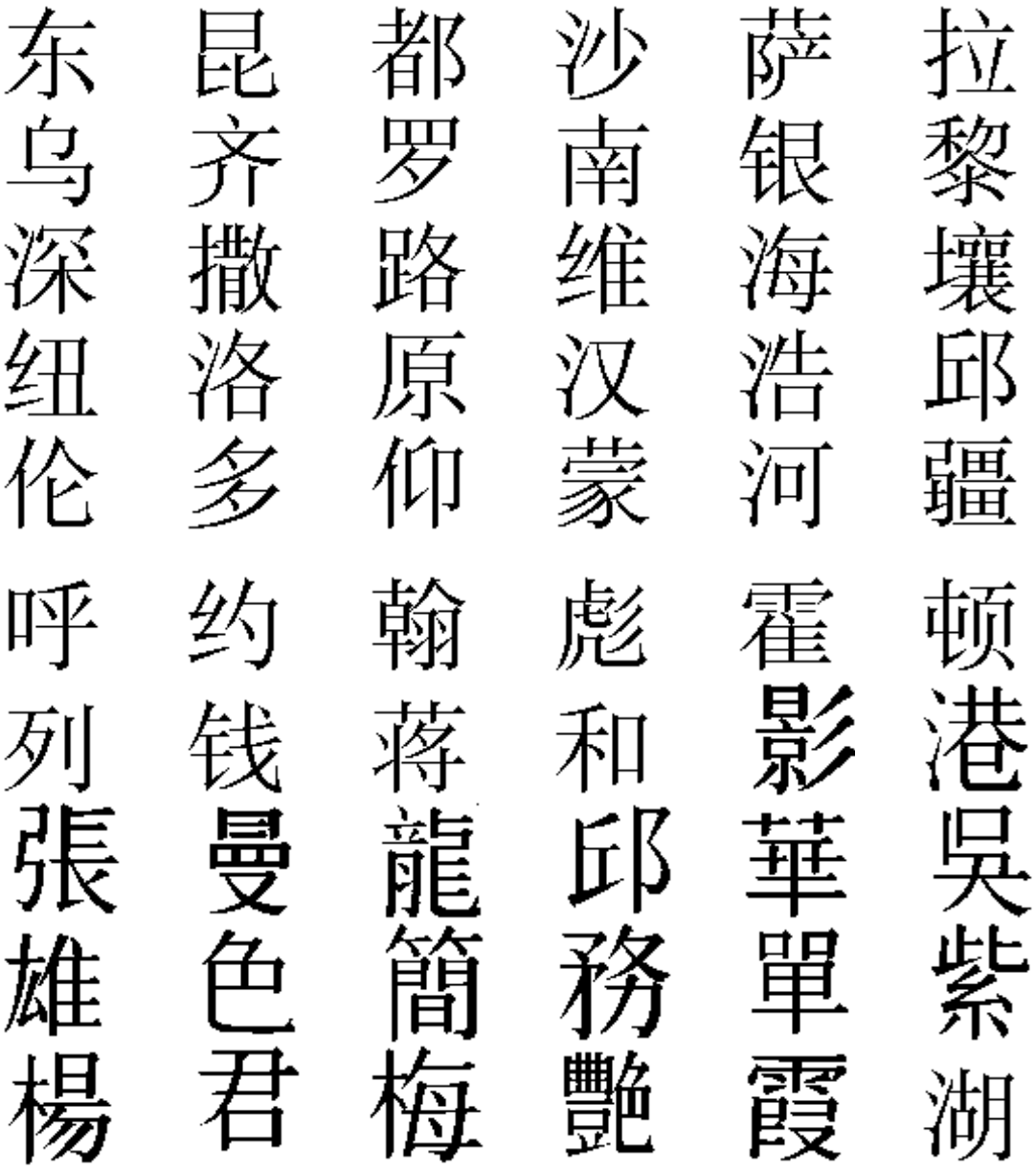
This study used four different attachment tasks in an attempt to generate a better understanding of the content, structure and processes of attachment working models. For

three of the four tasks, the hypotheses for tasks responses and associations between task performance and self-reported attachment security, were not met, although responses to the lexical decision task revealed some support for the notion that attachment working models are easily triggered since participants responded faster to attachment words than neutral and non-words. For the fourth task, the IAT, the results did support hypotheses about task response and evidence was therefore provided for the idea that working models of attachment security incorporate semantic associations with both positive attachment and pleasant words. Given the newness of this research area however, further research is required before conclusions can be drawn about whether the paucity of statistically significant findings was due to problems with the study design or with, more generally, the idea of using cognitive paradigms to assess attachment working models. In this light, this study represents an important step towards trying both to establish a methodology for exploring attachment working models and to reach a better understanding of the content, structure and processes of such models.

APPENDICES

Appendix 1

Task 1—Affective Judgments Chinese Characters



Appendix 2

Task 2—Lexical Decision Task Words/Nonwords

Postive Attachment Words		**Matched Non-Words**	
Loving	Hug	Sabpit	Ras
Close	Cuddled	Pioto	Sumject
Trust	Listens	Chise	Reamies
Warm	Nurtured	Caom	Santince
Giving	Concerned	Himtle	Consinont
Safe	Comforting	Doak	Transclapt
Kindly	Affectionate	Engoge	Unprositible
Loyal	Helpful	Oatis	Matirer
Supporting	Caring	Faundamion	Feamed
Accepting	Dependable	Temeshone	Conneptiom
Negative Attachment Words			
Ignore	Guilt	Saster	Crasp
Cold	Rejecting	Bujs	Computote
Hate	Judging	Fosm	Furping
Mean	Preoccupied	Dirn	Diffarintly
Angry	Distant	Thraw	Runming
Hurt	Vicious	Peab	Fandly
Cruel	Controlling	Carms	Cooparition
Critical	Scared	Pleamure	Rastag
Abandoned	Separation	Direstion	Telemision
Neglected	Absent	Briafcale	Camare
Neutral Words			
Swimmer	Gadget	Brather	Pleidt
Front	Tint	Houmd	Faje
Merchant	Alligator	Enrelape	Finamcial
Voice	Cauliflower	Crile	Comthehends
Imagine	Evidence	Bartiar	Shriking
Product	Farmed	Satilfe	Pirade
Astronaut	Wade	Wondarpul	Brug
Juicy	Voyage	Greit	Peamle
Novel	Headline	Broam	Neckluce
Pudding	Watered	Elagint	Pranter

Appendix 3

Task 3: Recall/Recognition Stimulus Words and Never-seen words

Stimulus Words		
Positive attachment words	**Negative attachment words**	**Neutral words**
Hug	Guilt	Gadget
Cuddled	Rejecting	Tint
Listens	Judging	Alligator
Nurtured	Preoccupied	Cauliflower
Concerned	Distant	Evidence
Comforting	Vicious	Farmed
Affectionate	Controlling	Wade
Helpful	Scared	Voyage
Caring	Separation	Headline
Dependable	Absent	Watered
Never-seen Words		
Loving	Ignore	Swimmer
Close	Cold	Front
Trust	Hate	Merchant
Warm	Mean	Voice
Giving	Angry	Imagine
Safe	Hurt	Product
Kindly	Cruel	Astronaut
Loyal	Critical	Juicy
Supporting	Abandoned	Novel
Accepting	Neglected	Pudding

Appendix 4:
Task 4: IAT "Pleasant" and "Unpleasant" words.

Pleasant	Unpleasant
Gold	Evil
Lucky	Sickness
Peace	Disaster
Success	Poverty
Sunrise	Vomit
Talent	Bomb
Triumph	Rotten
Diamond	Poison
Freedom	Death
Rainbow	Ugly
Peace	Jail
Heaven	Stink
Pleasure	Tragedy
Diploma	Crash
Gift	Filth
Cheer	Pollute
Miracle	Corpse
Paradise	Failure
Vacation	Slime
Laughter	Torture

Appendix 5—Instruments

Manipulation Checks and Demographic Information

1. Do you read or recognize Chinese characters?
    No
    Yes, but not more than 30
    Yes, more than 30

2. One of the tasks that you were asked to do, involved participants looking at a row of XXXXs. Did you notice any word or words presented at the same time as the XXXXs?
    No
    Yes
    If yes, what was the word/words?
    Did not see any XXXXs

3. What is your age?

4. What gender are you?

5. What is your ethnicity?
    African/African American/Caribbean
    Asian/Asian American/Pacific Islander
    European American/Caucasian/Anglo
    Hispanic/Latino(a)
    Biracial
    Multiracial
    Other

6. What is your academic year in college?
    Freshman
    Sophomore
    Junior
    Senior
    Other

7. Which description best fits your parent(s) or guardians?
    Father and Mother
    Mother only
    Mother and Stepfather
    Father only
    Father and Stepmother
    Grandparents or other relatives
    Foster parents or unrelated guardian

8. What is your current residential status?
    I live at home with my parents (or guardians) and commute to UT Austin for classes

I live in Austin during the semester (not with my parents or guardians) and spend vacations at my family's home

I live in Austin most or all of the year (not with my parents or guardians), and visit home only from time to time

9. Have you lost a parent to death?

Yes

No

If yes, were you: Under 14?

Over 14?

10. Are your parents divorced?

Yes

No

If yes, how old were you when they divorced?

If yes, did you maintain regular contact with both parents?

Yes

No

If no, how often did you see the non-custodial parent?

Never or almost never

About once a year

More often than once a year

11. Did either of your parents develop a severe illness before you were 14, such that they were effectively unable to play a parental role to you?

Yes

No

Inventory of Parental and Peer Attachment

Instructions: This questionnaire asks about your relationship with your parents. You will answer the same questions, first for your mother, and second for your father.

This part asks about your memories about your mother/father, or the woman/man who has acted as your mother/father. If you have more than one person acting as your mother/father (e.g. natural and step-mothers/father) answer the questions for the one you feel has most influenced you.

Response Options:
"Almost never or never true"
"Not very often true"
"Sometimes true"
"Often True"
"Almost always or always true"

1. My mother respects my feelings.
2. I feel my mother does a good job as my mother.
3. I wish I had a different mother.
4. My mother accepts me as I am.
5. I like to get my mother's point of view on things I'm concerned about.
6. I feel it's no use letting my feelings show around my mother.
7. My mother can tell when I'm upset about something.
8. Talking over my problems with my mother makes me feel ashamed or foolish.
9. My mother expects too much from me.
10. I get upset easily around my mother.
11. I get upset a lot more than my mother knows about.
12. When we discuss things, my mother cares about my point of view.
13. My mother trusts my judgment.
14. My mother has her own problems, so I don't bother her with mine.
15. My mother helps me to understand myself better.
16. I tell my mother about my problems and troubles.
17. I feel angry with my mother.
18. I don't get much attention from my mother.
19. My mother helps me to talk about my difficulties.
20. My mother understands me.
21. When I am angry about something, my mother tries to understand.
22. I trust my mother.
23. My mother doesn't understand what I'm going through these days.
24. I can count on my mother when I need to get something off my chest.
25. If my mother knows something is bothering me, she asks me about it.

Parental Bonding Instrument.

Instructions: This questionnaire lists various attitudes and behaviors of parents. You will be asked to complete the questionnaire once for each parent. In each case, think about how you REMEMBER your parents in your first 16 years.

This part asks about your memories about your mother/father, or the woman/man who has acted as your mother/father. If you have more than one person acting as your mother/father (e.g. natural and step-mothers/father) answer the questions for the one you feel has most influenced you. For all statements, the stem is: "I remember that in my first 16-years of life, my mother/father...."

Response Options

"Almost never or never true"
"Not very often true"
"Sometimes true"
"Often True"
"Almost always or always true"

1. Spoke to me with a warm and friendly voice
2. Did not help me as much as I needed
3. Seemed emotionally cold to me
4. Appeared to understand my problems and worries
5. Was affectionate to me
6. Enjoyed talking things over with me
7. Frequently smiled at me
8. Did not seem to understand what I needed or wanted
9. Made me feel I wasn't wanted
10. Could make me feel better when I was upset
11. Did not talk with me very much
12. Did not praise me

Attachment Style Questionnaire–Confidence subscale

Instructions: Please indicate how much you agree with the following statements.

Response Options:
"Totally Disagree"
"Strongly Disagree"
"Slightly Disagree"
"Slightly Agree"
"Strongly Agree"
"Totally Agree"

1. Overall I am a worthwhile person.
2. I am easier to get to know than most people.
3. I feel confident that other people will be there for me when I need them.
4. I find it relatively easy to get close to other people.
5. I feel confident about relating to others.
6. I often worry that I do not really fit in with other people.
7. If something is bothering me, others are generally aware and concerned.
8. I am confident that other people will like and respect me.

Parental Attachment Scale (in development)

Each of the following statements asks about your feelings about your mother or the woman who acted as your mother during your first 16 years. If you have more than one person who acted as your mother (e.g. a natural mother and a step-mother) answer the questions for the one you feel has most influenced you.

Please read each statement and indicate how much you agree with it, by clicking on the appropriate button.

Response Options:
"Totally Disagree"
"Strongly Disagree"
"Slightly Disagree"
"Slightly Agree"
"Strongly Agree"
"Totally Agree"

1. I got upset a lot more than my mother knew about.
2. When I was upset, I tried to hide it from my mother.
3. My mother didn't understand what I was going through back then.
4. My mother had no idea what I was thinking or feeling.
5. I felt there was no point in telling my mother when I was upset.
6. My mother could make me feel better when I was upset.
7. When I had a problem, I knew my mother would know what to do.
8. I liked to get my mother's point of view on things I was worried about.
9. When I had a problem, it helped me to think about what my mother would do.
10. I had to be very upset for my mother to pay attention.
11. When I was upset, my mother was often angry with me.
12. My mother was too busy to listen to my problems.
13. At times, my mother was unloving or rejecting.
14. I had to make a big fuss to get my mother to listen when I was upset.
15. I can remember times when I was upset and my mother laughed at me.
16. Sometimes my mother was not a good parent.
17. My mother did a perfect job as my mother.
18. My mother was the best mother in the world.
19. My mother was the best mother a child could wish for.
20. I understand why my mother acted like she did when I was a child.
21. My relationship with my mother is better now than it was.
22. I forgive my mother for any mistakes she made as a parent.
23. I understand now that being a parent is a difficult job.

Positive and Negative Affect Scale

Please indicate the degree to which the following words describe you AT THIS MOMENT, using the following scale"

"slightly or not at all"
"a little"
"moderately"
"quite a bit"
"extremely"

END

Right now I feel:

1. sick
2. strong
3. scared
4. exhausted
5. afraid
6. enthusiastic
7. alert
8. active
9. hostile
10. interested
11. irritable
12. upset
13. determined
14. jittery
15. sleepy
16. ashamed
17. inspired
18. guilty
19. distressed
20. nervous
21. proud
22. attentive

Appendix 6

T-test results comparing mean performance on attachment task for subgroup of participants reporting parental death, illness and divorce.

Stimuli	Mean	SD	t	df	p-value	d
Chinese Characters Affective Judgments Task						
MY MOM/	3.25	.681	1.064	25	>.05	.21
NOT MY MOM	3.33	.742				
Lexical Decision Task						
Positive attachment/	970	234	.002	41	>.05	.01
Negative attachment	970	219				
Positive attachment/ Neutral words			1.893	41	>.05	.29
Negative attachment/			1.892	41	>.05	.29
Neutral words	1016	220				
Positive attachment/			7.140	41	**<.001**	1.12
Non-words	1237	300				
Negative attachment/ Non-words			7.136	41	**<.001**	1.11
Neutral words/ Non-words			5.881	41	**<.001**	.92
Free Recall and Recognition Memory Task						
Free Recall						
Positive attachment/	2.62	1.52	.979	27	>.05	.05
Negative attachment	2.28	1.35				
Positive attachment/			3.013	33	**.005**	.18
Neutral words	3.48	1.93				
Negative attachment/ Neutral words			4.372	31	**<.001**	.26
Recognition						
Positive attachment/	5.46	.558	.805	46	>.05	.12
Negative attachment	5.59	.775				
Positive attachment/			1.206	46	>.05	.18
Neutral words	5.55	.584				
Negative attachment/ Neutral words			.504	46	>.05	.07
Implicit Attitudes Test						
Pleasant words	1185	306	1.455	36	>.05	1.22
congruent/incongruent	1856	1467				
Unpleasant words	1102	255	.308	38	>.05	.24
congruent/incongruent	1674	1237				
Positive attachment	1019	219	1.582	36	>.05	1.24
congruent/incongruent	1747	1286				
Negative attachment	1232	303	.475	38	>.05	.45
congruent/incongruent	1837	1279				

Appendix 7

Results of One-Way ANOVAs for continuously secure, earned secure, continuously insecure and currently insecure groups.

Stimuli	F	df	p-value
Chinese Characters Affective Judgments Task			
MY MOM	.298	3,146	>.05
NOT MY MOM	1.652	3,114	>.05
Lexical Decision Task			
Positive attachment	.304	3,139	>.05
Negative attachment	1.015	3,139	>.05
Neutral words	1.581	3,139	>.05
Non-words	.985	3,139	>.05
Memory Task			
Free Recall			
Positive attachment	.620	3,119	>.05
Negative attachment	.742	3,103	>.05
Neutral words	1.904	3,137	>.05
Recognition			
Positive attachment	2.746	3,168	**0.04**
Negative attachment	1.005	3,168	>.05
Neutral words	.006	3,168	>.05
Implicit Attitudes Task			
Congruent			
Pleasant words	1.416	3,151	>.05
Unpleasant words	.702	3,151	>.05
Positive attachment	2.369	3,151	>.05
Negative attachment	1.103	3,151	>.05
Incongruent			
Pleasant words	.227	3,151	>.05
Unpleasant words	.419	3,151	>.05
Positive attachment	.401	3,151	>.05
Negative attachment	.285	3,151	>.05

Note: Cell sizes for the analyses were: Continuously secure = 44 (26%), earned secure = 27 (16%); Continuously insecure = 66 (38%) and currently insecure = 35 (20%).
Also, the sole statistically significant F-test was associated with a recognition of positive attachment words; Dunnett's C post-hoc test (which does not assume equal variances) showed one statistically significant result (p = 0.009), the difference between the earned secure and currently insecure groups.

Results of One-Way ANOVAs for two grouped secure vs. insecure groups

Stimuli	F	df	p-value
Chinese Characters Affective Judgments Task			
MY MOM	.710	1,148	>.05
NOT MY MOM	2.930	1,116	>.05
Lexical Decision Task			
Positive attachment	1.547	1,148	>.05
Negative attachment	.021	1,148	>.05
Neutral words	2.801	1,148	>.05
Non-words	.257	1,148	>.05
Memory Task			
Free Recall			
Positive attachment	.829	1,121	>.05
Negative attachment	.316	1,105	>.05
Neutral words	5.297	1,139	**.023**
Recognition			
Positive attachment	6.694	1, 170	**.011**
Negative attachment	1.137	1, 170	>.05
Neutral words	.006	1, 170	>.05
Implicit Attitudes Task			
Congruent			
Pleasant words	.166	1,153	>.05
Unpleasant words	1.723	1,153	>.05
Positive attachment	.043	1,153	>.05
Negative attachment	1.036	1,153	>.05
Incongruent			
Pleasant words	.204	1,153	>.05
Unpleasant words	.361	1,153	>.05
Positive attachment	.294	1,153	>.05
Negative attachment	.284	1,153	>.05

Note: Cell sizes for the analyses were: Secure = 71 (41%), Insecure = 101 (59%).

Inspection of the mean recognition rate for the secure and insecure groups showed that for the positive attachment words, the secure group had lower recognition scores than the insecure group.

Inspection of the mean recognition rate for the secure and insecure groups showed that for the neutral words, the secure group again had lower recognition scores than the insecure group.

Appendix 8

Results of two-step hierarchical regression analyses for Implicit Attitudes Task, congruent words

		df	F-value	p-value	R^2
		Congruent categories			
Pleasant words	Step 1	4, 119	3.860	**.006**	.115
	Step2	7,116	2.598	**.016**	.136
Unpleasant words	Step 1	4, 120	3.744	**.007**	.111
	Step2	7, 117	3.450	**.002**	.171
Positive attachment words	Step 1	4, 117	2.226	>.05	.071
	Step2	7,114	1.878	>.05	.103
Negative attachment words	Step 1	4, 116	1.002	>.05	.033
	Step2	7, 113	2.339	**.029**	.127

Standardized coefficients and p-values

	Pleasant words		Unpleasant words		Positive words		Negative words	
Step 1	β	p	β	p	β	p	β	p
PAS Emotional Responsiveness	-.134	>.05	.174	>.05	.032	>.05	-.008	>.05
PAS Rejecting	.155	>.05	.025	>.05	-.002	>.05	.034	>.05
PAS Defensiveness	-.247	>.05	-.376	**.008**	-.302	**.030**	-.125	>.05
PAS Forgiveness	-.158	>.05	-.084	>.05	.048	>.05	-.105	>.05
Step 2								
PAS Emotional Responsiveness	-.012	>.05	.177	>.05	.146	>.05	.205	>.05
PAS Rejecting	.215	>.05	.019	>.05	-.003	>.05	.091	>.05
PAS Defensiveness	-.195	>.05	-.430	**.003**	-.276	>.05	-.043	>.05
PAS Forgiveness	-.125	>.05	-.012	>.05	.122	>.05	-.009	>.05
IPPA	-.233	>.05	-.301	>.05	-.307	>.05	-.545	**.001**
PBI Care	-.044	>.05	.287	>.05	.117	>.05	.100	>.05
ASQ Confidence	-.004	>.05	.135	>.05	-.054	>.05	-.001	>.05

Note: statistically significant p-values are in bold. Step One = PAS Maternal scales; Step Two = IPPA Maternal Scale, PBI Maternal Care Scale and ASQ Confidence Scale.

Appendix 9

Regression analyses exploring relationship between Lexical Decision task response times and Implicit Attitudes Task response times.

Predictors	F	df	p-value	R^2	β	p
Positive attachment words (Lexical Decision Task)						
IAT Positive attachment	7.068	2,122	**.001**	.104	.241	**.016**
(congruent & incongruent)					.199	**.025**
IAT Pleasant words	3.919	2,123	**.022**	.060	.147	> .05
(congruent & incongruent)					.155	> .05
IAT Negative attachment	3.396	2,123	**.037**	.052	.153	> .05
(congruent & incongruent)					.125	>.05
IAT Unpleasant words	4.150	2,123	**.018**	.063	.240	**.011**
(congruent & incongruent)					.029	>.05
Negative attachment words (Lexical Decision Task)						
IAT Positive attachment	12.459	2,121	**.001**	.171	.320	**.001**
(congruent & incongruent)					.204	**.017**
IAT Pleasant words	8.868	2,124	**.001**	.125	.253	**.005**
(congruent & incongruent)					.183	**.039**
IAT Negative attachment	8.364	2,124	**.001**	.119	.316	**.001**
(congruent & incongruent)					.069	>.05
IAT Unpleasant words	9.474	2,124	**.001**	.133	.320	**.001**
(congruent & incongruent)					.094	>.05
Neutral words (Lexical Decision Task)						
IAT Positive attachment	15.700	2,121	**.001**	.206	.327	**.001**
(congruent & incongruent)					.253	**.003**
IAT Pleasant words	9.347	2,124	**.001**	.131	.282	**.002**
(congruent & incongruent)					.157	>.05
IAT Negative attachment	8.024	2,124	**.001**	.115	.239	**.009**
(congruent & incongruent)					.171	>.05
IAT Unpleasant words	7.229	2,123	**.001**	.105	.269	**.004**
(congruent & incongruent)					.110	>.05

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