USE OF ATTACHMENT TERMS IN DESCRIPTIONS OF PARTNERS AS A POSSIBLE MARKER OF ROMANTIC ATTACHMENT FORMATION

A Thesis
Presented to the Faculty of the Graduate School
of Cornell University
in Partial Fulfillment of the Requirements for the Degree of
Master of Arts
by
Anne Catherine Laurita
August 2015

ABSTRACT

Mental representations of others in our world are presumed to be different in content and function throughout the process of relationship formation. The present research investigates the extent to which qualitative descriptions of romantic partner mental representations serve as markers of normative adult attachment formation. We conducted a multi-part study employing three methods—a brief online survey, an in-person interview, and an experimental manipulation. We collected data from 137 young adults in romantic relationships to compare partner versus familiar other mental representation descriptions between stressful versus neutral conditions. We hypothesized that mental representations of romantic partners—especially those who were also attachment figures—would be comprised of lengthier descriptions containing more attachment-language than would those of familiar others. Furthermore, we predicted that this association would be more pronounced for participants primed with an upsetting autobiographical memory—those who might also demonstrate a recovery effect after describing their partners but not familiar others. Results showed greater use of attachment language for partner than familiar other and higher word count differential (between partner and familiar other) for those were attached to their partner. Additionally, we observed a significant increase in positive affect for those primed with an upsetting autobiographical memory, after thinking about their partners. A comprehensive linear model was fit using these variables and relationship length, to predict attachment status. The results underscore the importance of examining cognitive awareness of salient partner mental representations for understanding adult attachment formation.

Keywords: adult attachment, mental representations, affect regulation

BIOGRAPHICAL SKETCH

Anne graduated from West Morris Mendham High School in Mendham, NJ, in May, 2010. That fall, she matriculated as a freshman in the College of Human Ecology at Cornell University. In May of 2013, she completed her undergraduate education with a Bachelor of Science in Human Development and a minor in History of Art. Later the same year, Anne began her doctoral studies in Human Development at Cornell University's Graduate School.

ACKNOWLEDGEMENTS

I wish to give special thanks to my committee members who generously provided me with their time, support, and great expertise. Thank you Dr. Cindy Hazan, my committee chairperson, for her encouragement of and investment in me as a scholar, throughout my undergraduate and graduate careers. Thank you also to Dr. R. Nathan Spreng and Dr. Adam K. Anderson for providing additional academic advice and serving on my committee.

TABLE OF CONTENTS

Use of Attachment Terms in Descriptions of Partners

As a Possible Marker of Romantic Attachment Formation

A growing literature within relationship science has demonstrated that adult attachment bonds with romantic partners develop over time, becoming increasingly evident across multiple levels of analysis—such as affect, behavior, cognition, and neurobiology (Hazan, Gur-Yaish, & Campa, 2004). The recent initiative to understand the timecourse of normative adult attachment formation necessitates great variation of methodologies, spanning the already interdisciplinary field. Although we are amassing evidence for certain behaviors and affective states associated with adult attachment relationships, less is known about how these cumulative experiences contribute specifically to the evolution of individuals' mental representations of their romantic partners. Mental representations of attachment figures provide a promising avenue for research integrating the aforementioned perspectives, as these cognitive representations have been shown to regulate affect and lead to various physical and mental health benefits (eg. Grewen, Anderson, Girdler, & Light, 2003; House, Landis, & Umberson, 1988). Yet, no work to date has investigated the conscious awareness and description of romantic partner mental representations as a marker of normative adult attachment relationship formation.

The present research confronts this issue, namely by probing for attachment-related differences related to the following central questions: 1) How are descriptions of mental representations of adult attachment figures different from those of familiar others? 2) In situations of internal stressors, how are these descriptions qualitatively different from those given in the absence of experimentally manipulated stress? And 3) How are mental representation descriptions of long-term or attached romantic partners different from those of short-term or pre-attached romantic partners?

Mental Representations in Attachment

Within the attachment literature—across studies of infants' primary caregivers and adults' romantic partners—one hallmark of these unique bonds is the feeling of security, and concomitant affect-regulatory benefits, associated with attachment figures' presence (Bowlby, 1982; Mikulincer & Shaver, 2007a; Sroufe & Waters, 1977). John Bowlby (1982) initially theorized that the function of attachment was to maintain proximity with a primary caregiver. Thus, lack of perceived proximity and the accompanying distress turns the system on, whereas comfort and the ability to explore is achieved through this system of attachment behavioral dynamics. Observational studies of young children were the first to demonstrate the important role of attachment figures (e.g., Ainsworth, Blehar, Waters, & Wall, 1978). This theoretical framework, which has since been extended to explain adult romantic relationships (Hazan & Shaver, 1987), currently serves as a predominant paradigm for understanding the regulatory powers of close social bonds (Hazan, Gur-Yaish, & Campa, 2004; Pietromonaco, Feldman Barrett, & Powers, 2006).

It is important to note, however, that physical proximity is not always needed for felt security. Within developing social relationships of any kind, individuals form mental representations—also known as "internal working models"—of their relationship partners (Carlston, 2010; Collins & Read, 1994; Pietromonaco & Feldman Barrett, 2000). Such mental representations are thought to consist of extensive interpersonal memories of, in addition to affective associations with, attachment figures (e.g., Zayas & Shoda, 2005). The ensuing social expectations, behaviors, and potential utilization of the attachment system are then based upon on those cognitive representations.

Romantic partner mental representations demonstrate important functions in the realm of social cognition, more broadly, in addition to their role of particular interest in the present study—promoting attachment formation with that specific relationship partner. Various experimental studies have demonstrated the occurrence of social-cognitive transference, suggesting that attachment figure mental representations heavily influence how we perceive and respond to others in our social world (Anderson & Cole, 1990; Günaydin, Zayas, Selcuk, & Hazan, 2012). Individuals also tend to appraise their experiences of social support in ways consistent with the patterns underlying their working models of attachment (Collins & Feeney, 2004).

Within the context of pair-bonds, romantic partner mental representations have been conceptualized as cognitive expansions of the self (Aron & Aron, 1986). They have been demonstrated to play a role in subconscious pursuit of partner-specific interpersonal goals (Fitzsimons & Bargh, 2003) and to inherently intertwine the cognitive and emotional contexts of both relationship partners (Zayas, Shoda, & Ayduk, 2002). Automatic reactions to partners, based on these mental representations, are also related closely to individual differences in attachment behaviors and styles (Zayas & Shoda, 2005). Beyond these described effects, of great importance to the present study's purpose are the ramifications of attachment figure mental representations in the face of stressors—at the affective, behavioral, neural, and cognitive levels.

Adult Attachment Mental Representation Utilization in the Face of Stressors

Mental representations of adult attachment figures serve as a topic of major interest in interpersonal affect regulation research, as previously noted (see Sbarra & Hazan, 2008; Selcuk, Zayas, & Hazan, 2010, for reviews). The ability of implicit attachment figure representations to facilitate emotional homeostasis maintenance has been investigated, specifically in the context of

situations that are threatening to individuals' physical and mental states. Neuroimaging experimental paradigms, in which participants viewed partner photographs, have demonstrated reduced subjective pain experience and patterns of heightened activation in safety-signal related regions in the brain (Eisenberger, Master, Inagaki, Taylor, Shirinyan, Lieberman, & Naliboff, 2011; Master, Eisenberger, Taylor, Naliboff, Shirinyan, & Lieberman, 2009). Using another method of partner representation evocation, Coan and colleagues found that partner hand-holding decreases neural threat response, as well (Coan, Schaefer, & Davidson, 2006).

Social-cognitive laboratory studies have also investigated the affect regulatory benefits of mental representations of attachment figures in threatening situations. One such study found increased accessibility of attachment figure mental representations when participants were presented with external threat primes, in the form of subliminally-displayed words pertaining to failure and separation (Mikulincer, Gillath, & Shaver, 2002). Another study manipulated an internal stressor—here, upsetting autobiographical memory recall—to discover a recovery effect associated with seeing images of attachment figures (Selcuk, Zayas, Günaydin, Hazan, & Kross, 2012). Yet, an apparent gap exists in the literature pertaining to conscious descriptions of romantic partner representations. Does the process of explicitly detailing a partner mental representation confer the same positive effects? And do these detailed descriptions convey important information about the attachment status of the relevant relationship? The present study includes an internal stressor prime manipulation (upsetting autobiographical memory recall) but also goes beyond previous researching, proposing a specific language analysis method in order to operationally define attachment markers within a more naturalistic, interview setting.

Describing Mental Representations; Language Usage and Word Count

As far as characterizing the change in mental representations over attachment relationship

formation, theoretical assertions have been made about the relevance of self-reported relationship turning points, particularly within the Personality-in-Context framework (Zayas, Günaydin, & Shoda, 2014). Additionally, individuals "infatuated" in romantic relationships report excessive talking about and daydreaming of their partners (Tennov, 1979). However, we might also predict longer-term pair-bonds to be associated with more detailed and extensive partner representations, constructed across a wealth of shared time and experiences. We seek to provide clarification of and potential support for these varied theories by looking specifically at attachment-related language and word count in in-person interviews.

Within the broader field of relationship science, novel inroads towards understanding the role of language in close relationships are only beginning to be made; for example, language style matching has been demonstrated to predict relationship initiation and stability within an ecologically-valid speed-dating scenario (Ireland, Slatcher, Eastwick, Scissors, Finkel, & Pennebaker, 2010). In this study, Ireland and colleagues (2010) utilized the computer software Linguistic Inquiry and Word Count (LIWC) (Pennebaker, Booth, & Francis, 2007). LIWC is a program that analyzes written or spoken text using a dictionary-based approach, in which words and phrases can be coded across linguistic dimensions of interest. A similar experimental protocol and data analytic strategy can be employed to examine language in romantic partner mental representation interviews.

The Present Study

The present research investigates the extent to which qualitative descriptions of romantic partner mental representations serve as markers of normative adult attachment formation. To answer these questions, we conducted a multi-part study employing three methods—a brief online survey, an in-person interview, and an experimental manipulation. We collected data from

137 young adults to compare romantic partner versus familiar other mental representation descriptions (within-subjects) between stressful versus neutral conditions (experimental paradigm) (Kross & Ayduk, 2011; Kross, Berman, Mischel, Smith, & Wager, 2011). Additionally, this sample was comprised of individuals in romantic relationships for varying amounts of time (between-subjects).

We had three primary predictions for this work: 1) *Partner versus familiar other hypothesis.* We hypothesized that mental representations of adult attachment figures compared to those of familiar others, would be comprised of lengthier descriptions with more attachment terms. 2) *Experimental (Negative memory) vs. Control (Neutral memory) hypothesis* Furthermore, we predicted that this effect would be more pronounced for participants primed with an upsetting autobiographical memory. 3) *Attachment status hypotheses.* Lastly, we predicted that individuals who demonstrated quantitatively greater attachment with their romantic partners would also have lengthier descriptions of their partner mental representations with a higher percentage of attachment-language.

Method

Participants.

One hundred thirty-seven university undergraduate and graduate students (82% female) participated in this study for course credit or ten dollars cash compensation. Participants ranged in age between 18 and 33 ($M = 20.59$, $SD = 2.14$) and a majority of the sample self-reported exclusive heterosexuality (75% "Exclusively heterosexual", 14% "Predominantly heterosexual, only incidentally homosexual, 6% "Predominantly heterosexual, but more than incidentally homosexual, 2% "Exclusively homosexual", and 1% or less of each of the following: "Predominantly heterosexual, but more than incidentally homosexual", "Equally heterosexual

and homosexual", "Predominantly homosexual, but more than incidentally heterosexual", and "Predominantly homosexual, only incidentally heterosexual"). Participants were recruited through a psychology experiment online recruitment program. In our study description on this website, we informed them that we would be asking about how they think and feel in certain interpersonal situations and that they would also be asked to complete a series of questions specific to their current romantic relationship. Eligibility was determined based on age (18 years or older) and relationship status (currently in a romantic relationship), (Relationship Length: M = 14.51, SD = 13.45). Eligible and consenting participants were then able to proceed through the survey online.

Materials and Procedure.

Overview of procedure. The study consisted of three parts: a brief online pre-test, an in-lab experimental manipulation utilizing information from the pre-test, and a two-component in-person interview. The 30-minute pre-test was completed by participants on their own computers, and the two in-lab parts were combined into one 25-minute session led by a research assistant.

Online pre-test. The online pre-test survey was conducted through Qualtrics; all participants completed this survey at least 48 hours before coming in for the lab session of the study. First, participants completed an online consent form before proceeding to the questions in the online pre-test. Upon completing this consent form, participants answered a series of self-report measures specific to attachment.

Participants completed Hazan and Zeifman's (1994) WHOTO measure—a 10-item questionnaire that prompts individuals to list the important people in their lives (in order of significance) to whom they would turn in various situations. The items that comprise this measure include measures of four primary attachment features: secure base behavior ("Person(s)

you know will always be there for you"), safe haven behavior ("Person(s) you immediately think of contacting when something bad happens."), separation distress behavior ("Person(s) you miss when they are away"), and proximity seeking behavior ("Person(s) you make sure to seek or talk to frequently"). Thus, the WHOTO can be used in various ways to measure individuals' attachment to their romantic partners. In the present study, we focused on using the WHOTO as a continuous measure of attachment with romantic partners by scoring each item based on the partner's ranking (highest scores = listed first) and totaling these scores; therefore higher WHOTO total scores and subscale scores—for each of the four attachment features—were indicative of greater levels of attachment with one's romantic partner.

The online pre-test also included Fraley, Waller, and Brennan's (2000) Experiences in Close Relationships - Revised (ECR-R) scale. This measure, which has often been used in studies of individual differences in attachment styles, consists of 10 seven-point Likert-style questions—5 assessing attachment avoidance and 5 assessing attachment anxiety. Although the present study does not propose a significant role of attachment style in moderating language used for romantic partner mental representations, we included this measure due to its prevailing importance in the field. Lastly, the survey included other relationship questions, mental representation questions, infatuation questions, and brief demographic questions.

Autobiographical memory retrieval and cue generation. As part of this online-pre-test, participants were prepared for quick autobiographical memory recall in the in-lab session by recalling and describing two autobiographical memories ahead of time. This protocol was adapted from the methods of Kross et al. (2009). Participants were instructed to provide detailed descriptions of two upsetting autobiographical memories, or two neutral memories (in the control condition). Participants were assigned randomly to one of these two conditions, ($n_{negative}$= 65,

$n_{neutral}$=72). After necessary removal of 6 outliers on the variable of relationship length (>72 months), relationship length did not differ significantly between the two conditions, $t(132.63) = 0.72$, $p = 0.47$.

The upsetting memories could include any kind of negative personal experience, so long as they did not include the participants' current romantic partners. The neutral memories were comprised of affectively neutral experiences in nature. After describing these memories, participants were asked to generate a "memory cue"—a 1—3 word phrase that would be used in the in-lab, experimental session to prompt their recall of these specific memories. After participants described each memory and provided corresponding memory cues, they were asked to rate the significant of the event they were remembering in their lives.

We implemented the following scale, created by Selcuk et al. (2012) for use with a similar paradigm in their study: "When this event happened, how significant was the event in your life?"; "How significant is the event in your life currently?"; "When you recall this experience now, how bad do you feel?"; "When this event happened, how bad did you feel?"; "When you think about this experience, how vividly does it come to mind?"; "How frequently have you thought about this experience since it happened?"; "How frequently do you think about this experience currently?"; and "How frequently did you think about this event soon after it occurred?" Participants answered the questions using a 7-point scale (1 _ not very, 4 _ somewhat, 7 _ very). This information was utilized to select appropriate memories based on negative affect level for the participants' in-lab sessions. For participants randomly assigned to view their negative cue words in the experimental session, our research assistants were instructed to include only negative memories rated a 4 or above on the item, "When you recall this experience now, how bad do you feel?" If participants did not list memories that met this criteria, they were

promptly emailed for another memory recall.

At the end of this survey, participants were instructed to sign up for an in-lab session/timeslot.

Autobiographical memory recall and Affect measurements. When participants came into the lab, they were given a second consent form for this second portion of the study. After providing consent, they were led through the first autobiographical memory recall manipulation, in which their first cue word was presented on the computer screen for 2 minutes. Participants were asked to reflect on the word or words they saw. Immediately following the presentation of this first autobiographical cue, participants completed the first positive and negative affect measurement. The affect measurements—the same for parts 1 and 2—consisted of two 7-point Likert-scale items each, one pertaining to negative affect and one pertaining to positive affect (How bad do you feel at the moment? 1 not at all – 4 somewhat – 7 extremely; How good do you feel at the moment? 1 not at all – 4 somewhat – 7 extremely). This same procedure was implemented preceding both interview segments: partner and familiar other. See Figure 1 below for further explanation of in-lab session procedure.

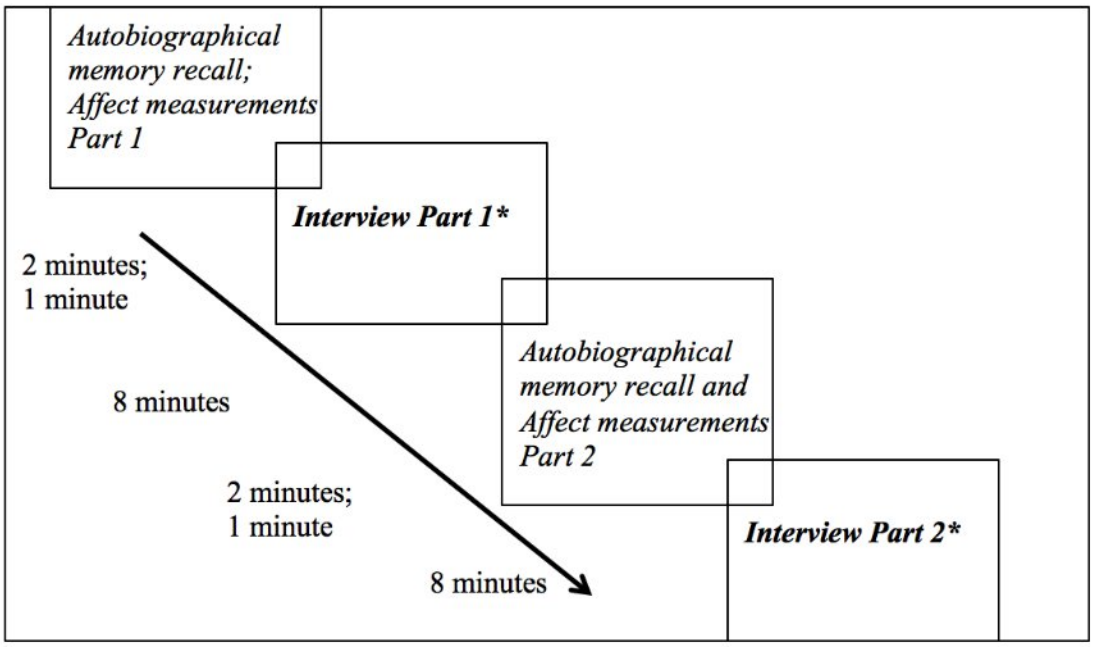


Figure 1. In-lab session procedure.

Interview process. In the interview, participants were asked to provide full descriptions of what comes to mind when they think of their romantic partner, in order to assess their mental representations. Research assistants instructed participants to type out their responses to interview questions on the lab computer, rather than speak them out loud, in order to maintain comfort and privacy given the personal content of the interview. This interview script was carefully generated to optimize participants' articulation of their thoughts. (Eg. *"For this next question, I'd like you to think about [whatever the participant calls his or her partner] and type everything that comes to your mind. Feel free to type words, phrases, or sentences. Just write down whatever pops into your head. I'm going to let you type, and I'll be back in 3 minutes. Please use all 3 minutes. And don't go back and edit this—if you write something down, leave it there. If there is anything you forget, you'll have a chance to add more later."*) Participants were also asked to highlight up to 5 words or phrases that were most important or central to how they think about their partner. This process was repeated for the participants' familiar other of

their choosing. The less-close familiar other was selected by participants based on the following prompt: *"Try to pick someone you are very familiar (maybe you have known them for a long time) but do not necessarily consider to be a very close friend."* The order of these two interview parts (romantic partner description and familiar other description) was counterbalanced so as to avoid any unwanted ordering effects. The full interview script can be found in Appendix A.

Before leaving the lab, participants were thanked and debriefed.

Data analytic strategy. The analysis of our qualitative data was performed using the computer program Language Inquiry and Word Count (Pennebaker et al., 2007). LIWC computes the degree to which people use certain categories of words, in their written or spoken language. An attachment-language dictionary was created for LIWC data analysis purposes, adapted from the unpublished work of Jeff Bowen and colleagues. The LIWC attachment dictionary postulated several variables of interest for predicting attachment, namely: 1) total word count and 2) attachment language as a percentage of total word count. The dictionary also included a coding scheme for other variables related to—but not as precisely representative of—attachment, including positive social language, negative social language, avoidant language, and anxious language, each as a percentage of total word count. All of the variables in Bowen's original attachment dictionary were assessed on construct and ecological validity; these terms were tested with a group of undergraduate-aged, independent raters and found to accurately represent attachment concepts, as explained in lay language. Additions to this original dictionary primarily accounted for one notable advance in the LIWC program technology over the past several years: the ability to include and analyze phrases, in addition to single words.

Examples of words and phrases coded as attachment language included "miss him/her", "security", and "tell him/her everything". Examples of positive social language included "fond,

"sweet", and "respectful". Utilization of the character '*' after numerous words and phrases in the dictionary reinforced consistent coding amongst words with identical roots. For example, one entry in the dictionary coded as positive social language was "express*"; therefore, "expression" and "expressive" would both also be coded as positive social language. See Appendix B for full LIWC attachment dictionary.

Quantitative output from LIWC was then analyzed using R (R Development Core Team, 2008), proceeding through inferential tests relevant for each of the previously specified hypotheses. As a first step, pairwise t-tests compared the three above variables between groups (partner versus familiar other descriptions, experimental condition), independent t-tests compared differences in reported affect between conditions, and Pearson correlation tests were used to assess relationships between the LIWC variables and WHOTO scale and subscale scores. Then, in line with these results, a linear model was fit to predict attachment (as implicated by WHOTO scores) using the LIWC variables of interest and other survey items as predictors. Lastly, this analytic procedure was repeated for the participant-highlighted interview text.

Results

Partner versus familiar other hypothesis. Participants' descriptions of their partner mental representations contained a higher percentage of attachment words and phrases than those of their familiar others ($M_{difference}$=2.30 percent), $t(136)= 5.13$, $p < 0.001$. This significant difference warranted the creation and use of a variable attachment-language$_{\Delta}$ (attachment-language$_{Partner}$ − attachment-language$_{Familiar\ other}$), which was then used in a bivariate comparison between the experimental and control conditions. Although there was no significant difference found between these same groups for total word-count, a variable word-count$_{\Delta}$ (word-count$_{Partner}$ − word-count$_{Familiar\ other}$) was created in the same manner for use in subsequent analyses. Lastly,

participants' highlighted phrases within their partner mental representations contained a higher percentage of attachment words and phrases than those of their familiar others ($M_{difference}$=21.81 percent), $t(136)= 14.37$, $p < 0.001$ (See figure 2).

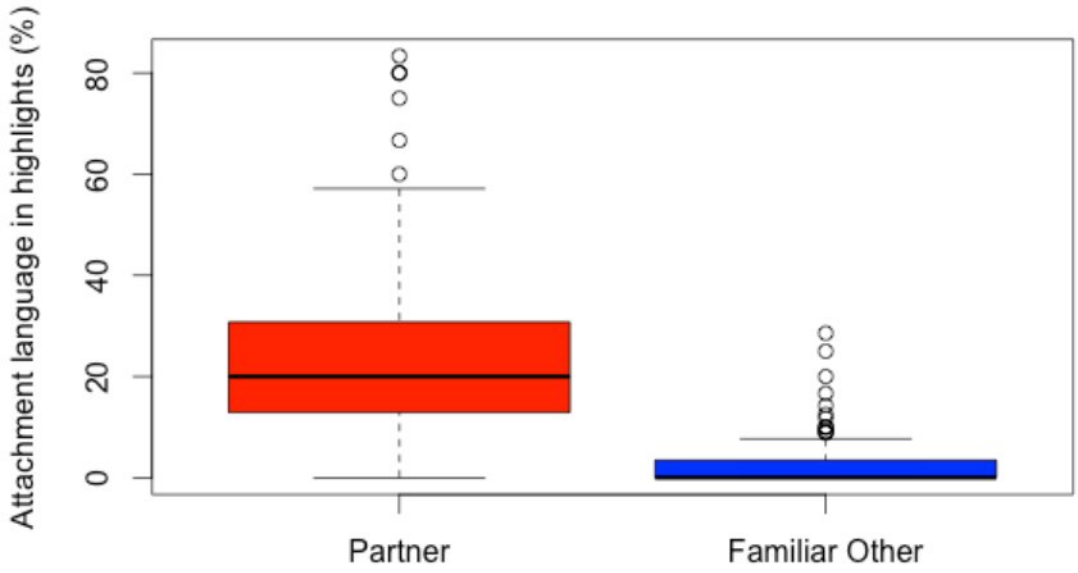


Figure 2. Participants' highlighted descriptions of their partner mental representations (red) contained a higher percentage of attachment-language than did those of their familiar others (blue).

Experimental (Negative memory) vs. Control (Neutral memory) hypothesis. We then sought to investigate the potential effects of our experimental manipulation of memory cues (negative versus a neutral control group). The measured difference between participants' attachment-language use for partners and familiar others (attachment-language$_{\Delta}$) was not found to be significant for those in the experimental and control conditions. Yet, participants did report significantly greater negative affect in the experimental condition across both measurements ($M_{measurement1}$=3.38; $M_{measurement2}$=3.40) than in the control condition ($M_{measurement1}$=1.89, M

$_{measurement2}$ = 1.90), (Measurement 1: $t(107) = 6.03$, $p < 0.001$; Measurement 2: $t(107) = 5.22$, $p < 0.001$). See Figure 3. It is important to note that, while these results did validate our implementation of the upsetting autobiographical memory recall paradigm, they were unfortunately prone to missing data effects; this concern is addressed at greater length in the discussion.

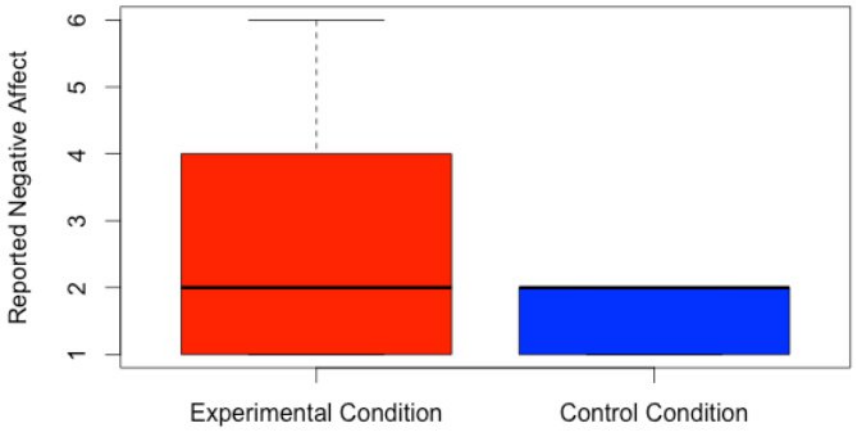
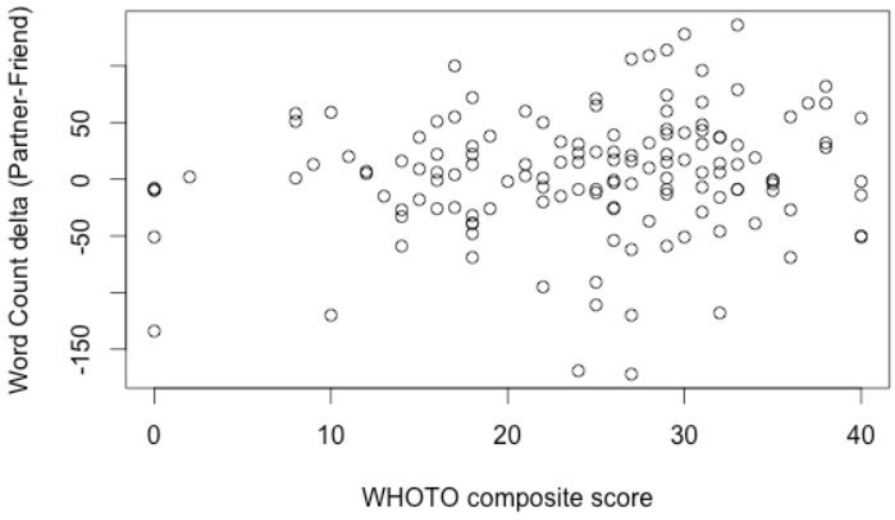


Figure 3. Participants reported significantly greater negative affect in the experimental condition (red) than in the control condition (blue), across both affect measurements.

We further examined the effects of our experimental manipulation by analyzing changes in reported affect between measurement 1 and measurement 2. Within the experimental group—comprised of participants who recalled upsetting autobiographical memories—the reported increase in positive affect from measurement 1 to measurement 2 was significantly greater after being interviewed about partners ($M = 0.30$) versus familiar others ($M = -0.18$), $t(107) = -2.44$, $p < 0.02$. This result provides support for a recovery effect of partner mental representation descriptions, to be examined in more detail in our discussion.

Attachment status hypotheses. Beyond the results qualitatively differentiating partner descriptions from familiar others, and experimental condition attachment-language$_{\Delta}$ from control condition attachment-language$_{\Delta}$, we were also interested in looking at how the descriptions from interview output related to attachment-relevant self-report measures such as relationship length, WHOTO attachment scale (composite score of all 10 items), and WHOTO subscales. Relationship length did not serve to significantly differentiate the descriptions; however, relationship length was significantly, positively correlated with WHOTO composite scores ($r(135) = 0.35$, $p < 0.001$).



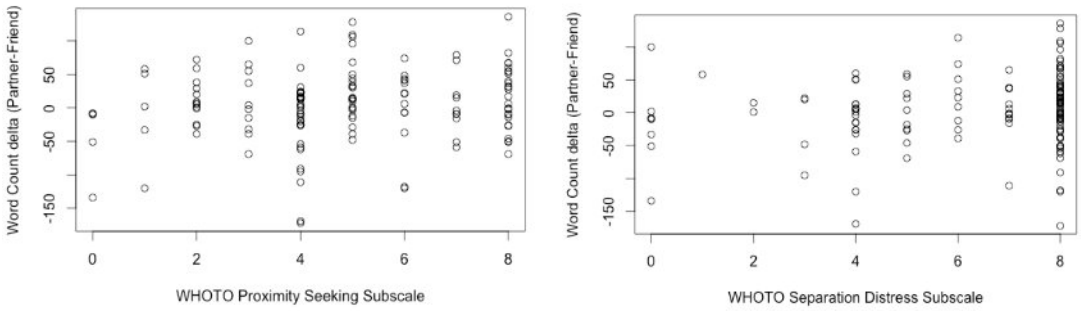


Figure 4. Word-count$_{\Delta}$ was found to have a marginally significant positive correlation with composite WHOTO scores. Additionally, Word-count$_{\Delta}$ was found to have a statistically significant positive correlation with WHOTO separation distress subscale scores and WHOTO proximity seeking subscale scores.

Yet, comparing WHOTO scores across the interest variable word-count$_{\Delta}$ yielded significant results. Word-count$_{\Delta}$ was found to have a marginally significant positive correlation with composite WHOTO scores, $r(135) = 0.16$, $p = 0.057$. Additionally, Word-count$_{\Delta}$ was found to have a statistically significant positive correlation with WHOTO separation distress subscale scores, $r(135) = 0.17$, $p = 0.048$, and WHOTO proximity seeking subscale scores, $r(135) = 0.18$, $p = 0.034$ (See Figure 4).

Table 1. Descriptive statistics for variables in linear model

Variable	***M***	***SD***	***Range***
WHOTO composite score	24.19	9.33	0—40
attachment-language$_{\Delta}$	2.30	5.24	-6.86—31.3
word-count$_{\Delta}$	5.20	53.81	-172—136
Relationship length	14.51	13.45	0—65

Linear model predicting attachment status. In order to work towards finding a significant marker of attachment, we constructed a linear model to best fit the data, based on several variables of interest. As such, we sought to predict WHOTO composite scores, which are representative of partner attachment. The best-fitting linear model utilized the predictor variables of interest were attachment-language$_{\Delta}$, word-count$_{\Delta}$, and relationship length and accounted for all interactions between these variables, $F(7, 129) = 3.86$, $p < .001$. Relationship length was associated significantly with WHOTO composite scores, $t\ (129) = 4.14$, $p < .001$, when controlling for attachment-language$_{\Delta}$, word-count$_{\Delta}$, and any potential interactions between these variables. Word-count$_{\Delta}$ was associated at a level of marginal significance with WHOTO composite scores, $t\ (129) = 1.76$, $p = 0.081$, when controlling for attachment-language$_{\Delta}$, relationship length, and any other potential interactions. Lastly, there was a marginally significant interaction effect of attachment-language$_{\Delta}$ and word-count$_{\Delta}$, $t\ (129) = -1.82$, $p = 0.071$, when controlling for relationship length and other potential interactions. See Table 1 for descriptive statistics of all variables in linear model.

Discussion

Mental representations of adult attachment figures are known to serve various beneficial purposes, supporting individuals' mental and physical health by providing a source of consistent affect regulatory capacities. Although a growing body of work investigates the impacts of representation utilization within the context of attachment bonds, the present study is the first to directly investigate how explicit descriptions of these cognitive representations may be uniquely telling of individuals' attachment status. The findings from the present study serve to confirm and refine our various hypotheses about how descriptions of mental representation convey information about the process of attachment formation.

We found there to be a qualitative, rather than quantitative, difference between descriptions of mental representations for individuals' romantic partners and their descriptions of familiar others. In other words, the romantic partner descriptions were, on average, comprised of more language related to attachment features or behaviors. In contrast to our original hypothesis, however, romantic partner descriptions were not necessarily longer in terms of overall word count. Although this finding did not support our original hypothesis, the observed absence of a quantitative difference (as operationalized here as word count) between partner and familiar other descriptions provides further justification for investigating qualitative markers of attachment.

Our experimental manipulation of autobiographical memory cues did not yield significant group differences in language use at a greater than marginal level; the measured difference between participants' use of attachment language for partner and for familiar other was not more pronounced in the upsetting autobiographical memory recall condition than in the control condition, as we had predicted. On the other hand, participants' self-reports of affect indicate that this experimental manipulation did have the desired effect, as those in the upsetting autobiographical memory recall condition reported significantly greater negative affect overall. Specifically within the upsetting autobiographical memory recall condition, we also observed a recovery effect (as measured by increase in positive affect) associated with describing romantic partner mental representations.

The quantitative difference between romantic partner and familiar other descriptions (namely, overall word count differences) did demonstrate importance when we considered variables related directly to self-reported attachment. The word count difference between partner and familiar other descriptions was significantly, positively correlated with WHOTO scores

overall, even more so with the separation distress and proximity seeking subscales of the WHOTO. Considering all of these results together, we were able to construct a linear model predicting WHOTO composite scores. This holistic model demonstrated the importance of relationship length, word count, and interactions between word count and attachment-language use for predicting attachment.

Implications for Adult Attachment

Attachment theory posits that attachment figures' presence allows for felt security and regulation of negative affect accompanying affect regulatory benefits, associated with attachment figures' presence (Bowlby, 1982; Mikulincer & Shaver, 2007a; Sroufe & Waters, 1977). Central to the extension of these principles to adult close relationships is a theoretical timecourse for how different features of attachment become directed towards romantic partners (displacing parents) in adulthood. In particular, when pair bonds are construed as attachments, research has shown that romantic partners will more quickly become the objects of proximity seeking and separation distress before later potentially fulfilling the roles of safe haven and secure base (see Zeifman & Hazan, 2008, for review). Yet, there exists a gap in the experimental literature regarding how mental representations of adult attachment figures may serve as important indicators of how far along individuals may be in the normative attachment process. The present study notably links lengthier explicit descriptions of romantic partners with the two attachment features that are thought to develop earlier within romantic relationships—as well as with an overall measure of attachment including all four features (WHOTO composite score).

The current findings also underscore the difference between our mental representations of familiar others and potential attachment figures and demonstrate that this may be a primarily qualitative distinction. The finding that individuals use noticeably different words and phrases to

describe their romantic partners versus their familiar others (and that attachment-related language is operative in this overall difference) indicates that we are, on a conscious level, aware of the distinct roles of these figures. The qualitative uniqueness of potential attachment relationships, previously hypothesized by adult attachment theory (Hazan & Shaver, 1987), is thus confirmed by our findings. Lastly, our findings suggest that predicting attachment—via a validated self-report method such as the WHOTO—is a complex matter, even when models are constricted to use of self-report and cognitive measures. These results provide even greater impetus for future work on markers at various levels of analysis—behavior, cognition, affect, physiology, and neuroanatomy and functional connectivity networks.

Generalizability of Findings

With regard to the generalizability of these findings, there were certain characteristics of our sample and constraints of our experimental paradigm that are important to address. Although our sample was sufficient in size, especially for an interview study, there were some significant imbalances in its demographic consistency: namely, the predominance of females and exclusively heterosexual individuals. Fortunately, gender differences have only been highlighted in previous research surrounding attachment styles—individual differences rather than normative attachment processes (Del Giudice, 2010). Additionally, the process of attachment formation with romantic partners is thought to be very similar for couples across sexual orientations (Ridge & Feeney, 1998). It should also be noted that our sample was comprised of a fairly homogenous group of college undergraduate students at a large research university; therefore, there are implicit assumptions about uniformity of age, race, and socioeconomic status of our participant group that may prevent these findings from applying directly to more heterogeneous groups.

As we did not find a significant effect of our experimental manipulation on language use, but did find a significant effect of the manipulation on self-reported affect, the present research raises important questions about the level on which adult attachment mental representation emotional regulation occurs. Here, we replicated the finding of past studies, which have demonstrated how individuals use attachment figure representations to recover from the negative effects of external and internal stressors (Mikulincer, Gillath, & Shaver, 2002; Selcuk, et al., 2012). Yet, these utilizations of accessible attachment figure representations did not entail the same level of conscious processing as our paradigm did, as we asked participants to explicitly describe their partners. It is quite possible that the more detailed descriptions of adult attachment figures provided in our study are not entirely representative of the key features that are (implicitly) chronically accessible in times of stress.

One methodological hurdle, pertaining to the missing affect measurement data, prevents us from making as robust conclusions as we had hypothesized about our sample. Only about three quarters of the total sample completed the post-recall, pre-interview affect measurements as originally instructed. This incompleteness of the dataset precludes further generalizability of the current findings. Furthermore, because participants completed the second affect measurement after the second recall induction (rather than immediately after their partner or familiar other interview), the experimental paradigm introduced a notable amount of uncertainty into the repeated measurement of mental representations' effects on emotional regulation. Future studies should aim to eliminate this experimental noise by included a higher number of more carefully regulated affect measurements. For example, researchers could include the brief positive and negative affect measure at the following 5 times: once at the beginning of the in-lab session, once after the first autobiographical memory recall, once immediately after the first interview

portion, once after the second autobiographical memory recall, and once immediately after the second interview portion. This more fine-grained tracking of affect could allow for closer analysis of the effects of talking about romantic partners and familiar others in the lab setting.

The Role of Language in Attachment Mental Representations; Future Directions

Although the present study was initiated within the theoretical framework of adult attachment, our findings may also serve to benefit research in the area of language inquiry within social cognition more broadly. Specifically, our interview methodology combined with statistical methods utilizing LIWC output differed from that of other social cognition studies using the same language analysis program (eg. Ireland et al., 2010; Pennebaker, Mayne, & Francis, 1997). Interviews that bring more implicit social cognitive processes to the forefront of individuals' minds (here, revolving around mental representations) may provide promising avenues for learning what we know about our relationships; however, the same methods may obscure the nuances of implicit cognitive processing. There is also an important question of the personal content of adult attachment mental representations. Since descriptions that individuals provide of their significant others can certainly be imbued with a sense of privacy and intimacy, we addressed this concern methodologically by requesting computer-typed interview responses rather than spoken responses to the interviewer.

The idiosyncrasies of what first comes to mind when we think of close others may be very difficult to articulate, on a personal level, and to capture, experimentally; yet, our study is the first to employ this type of detailed interview method for collecting adult attachment mental representation descriptions. Future research could combine a similar interview paradigm with another kind of assessment, such as monitoring of participants' physiological stress response. By combining methods of self-report with evaluation of dynamic biological responses to attachment

figures, we would expect to unveil more evidence supporting the shifting role of mental representations throughout attachment relationship formation and maintenance.

APPENDIX A.

Full interview script.

Instructions: prepare blank word document on computer for typing and station participant in front of computer

INTRODUCTION: "Thank you for completing that portion of our study. Now I have just a few questions. "

1) "What is your partner's first name? _____ What do you usually call her/him? _____

[OPTIONAL: Does s/he have any nicknames? _____"]

[note: use most relevant/comfortable name as the person you reference throughout rest of interview]

2) "For this next question, I'd like you to think about [whatever the participant calls his or her partner] and type everything that comes to your mind. Feel free to type words, phrases, or sentences. Just write down whatever pops into your head. I'm going to let you type, and I'll be back in 3 minutes. Please use all 3 minutes. And don't go back and edit this—if you write something down, leave it there. If there is anything you forget, you'll have a chance to add more later."

"Are you ready to begin?"

"Ok, remember you're going to be writing about [whatever the participant calls his or her partner]."

[exit room and return in 3 minutes]

3) "Ok, look at what you wrote down and think about what is most important about your relationship with [whatever the participant calls his or her partner]. Go ahead and highlight up to 5 words or phrases you've already listed."

4) "Is there anything else I would need to know about [whatever the participant calls his or her partner] to understand what he/she means to you? If so, you can write that down at this time."

[proceed with number 5 if they have written down additional words/phrases]

5) "Are these words or phrases that you have just typed equally important to you as the ones you wrote down earlier? If so, go ahead and highlight those important items."

Part II: Friend (same questions as above)

Start with: 1) “This time, please think of a friend of yours. Try to pick someone you are very familiar (maybe you have known them for a long time) but do not necessarily consider to be a very close friend. What is your friend’s first name? _____ What do you usually call her/him? _____”

APPENDIX B.

LIWC attachment language dictionary

%				
1 attachment				
2 possocial				
3 negsocial				
4 anxiety				
5 avoidan				
%				
accept*	2			
ador*	2			
affection*	1			
alone	3	4	5	
always there for me	1			
always there when I need	1			
angr*	3			
annoy*	3			
anxi*	3	4		
appreciat*	2			
ashamed	3			
assur*	1	2		
attach*	1	2		
atten*	1	2		
attract*	2			
avoid*	3	5		
bond*	2			
can't imagine my life without	1			
cannot imagine my life without	1			
care*	1	2		
caress*	2			
caring	1	2		
cherish*	2			
close*	1			
comfort*	1	2		
comforts me	1	2		
commit*	1			
company	2			
confidan*	1			
considerate	1	2		
contact*	2			
cuddl*	2			
cute	2			

depend*	1			
devote*	1	2		
disrespect*	3	2		
distrust*	3			
embrac*	2	5		
empath*	2			
encourag*	1			
enjoy*	2			
explor*	1			
express*	2			
fond*	2			
fondl*	2			
friend*	2			
frustrat*	3			
fun*	2	4	5	
gentle	2			
great*	2			
hate*	3			
help*	1			
hold*	1	2		
hug*	2			
ignor*	3			
immatur*	3	4	5	
infatuat*	2			
insecur*	3			
insensitiv*	3	4	5	
interact*	2	4	5	
interfer*	3			
interrupt*	3			
intrud*	3			
intrusive*	3	5		
isolat*	3	5		
kiss*	2	4	5	
lik*	2			
lonel*	3			
lov*	1	4	5	
massag*	2			
miss him	1			
miss her	1			
mollify	1			
need*	2			
nervous	4			
nice	2			

notic*	2		
nuzzl*	2		
optimis*	2		
our*	2		
pain*	3		
passion*	2	4	5
patien*	1		
prais*	2		
proud	2		
reassur*	1		
reject*	3	2	
relax*	1	4	
reliab*	1	2	
rely	1		
respect*	2		
respon*	1		
roman*	2		
safe*	1		
secur*	1		
sensitiv*	1	2	
sex*	2		
shar*	2		
shower*	2		
sleep*	2		
snugg*	2		
socia*	2		
special	1		
spontaneous*	2		
stress*	3		
stroke	2	4	
struggl*	3		
support*	1		
sweet	2		
talk to him	1		
talk to her	1		
talk*	2		
tell him everything	1		
tell her everything	1		
tender*	2		
tickl*	2		
together*	2		
trust*	1		

unemotion*	3		
unrespon*	3	4	5
upset*	3	4	
wak*	1	4	5
warm*	1	2	
we	2	2	
when I need to talk	1		
willing*	2		

REFERENCES

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). Patterns of attachment: A psychological study of the strange situation. Hillsdale, NJ: Erlbaum.

Andersen, S. M., & Cole, S. W. (1990). "Do I know you?": The role of significant others in general social perception. Journal of Personality and Social Psychology, 59, 384 –399. doi:10.1037/0022-3514.59.3.384

Aron, A. & Aron, E.N. (1986) *Love and the Expansion of Self: Understanding Attraction and Satisfaction*. New York: Hemisphere/Harper & Row.

Bowlby, J. (1982). *Attachment and loss: Vol. 1. Attachment* (2nd ed.). New York, NY: Basic Books.

Carlston, D. (2010). Models of implicit and explicit mental representation. In B. Gawronski & K. B. Payne (Eds.), Handbook of implicit social cognition: Measurement, theory, and applications (pp. 38-61). New York, NY: Guilford Press.

Coan, J. A., Schaefer, H. S., & Davidson, R. J. (2006). Lending a hand: Social regulation of the neural response to threat. *Psychological Science, 17*, 1032–1039. doi 10.1111/1467-9280.2006.01832.x

Collins, N. L., & Feeney, B. C. (2004). Working models of attachment shape perceptions of social support: evidence from experimental and observational studies. *Journal of Personality and Social Psychology*, *87*, 363-383.

Collins, N. L., & Read, S. J. (1994). Cognitive representations of adult attachment: The structure and function of working models. In K. Bartholomew & D. Perlman (Eds.), *Advances in personal relationships:Vol. 5. Attachment processes in adulthood* (pp. 53-90). London: Jessica Kingsley.

Del Giudice, M. (2010). Sex Differences in Romantic Attachment: A Meta-Analysis. *Personality and Social Psychology Bulletin, 37,* 193–214

Eisenberger, N. I., Master, S. L., Inagaki, T. K., Taylor, S. E., Shirinyan, D., Lieberman, M. D., & Naliboff, B. D. (2011). Attachment figures activate a safety signal-related neural region and reduce pain experience. *Proceedings of the National Academy of Sciences, USA, 108*, 11721–11726. doi:10.1073/pnas.1108239108

Fitzsimons, G. M., & Bargh, J. A. (2003). Thinking of you: nonconscious pursuit of interpersonal goals associated with relationship partners. *Journal of Personality and Social Psychology*, *84*, 148-164.

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item-response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, *78*, 350-365.

Grewen, K. M., Anderson, B. J., Girdler, S. S., & Light, K. C. (2003). Warm partner contact is related to lower cardiovascular reactivity. Behavioral Medicine, 29, 123–130. doi:10.1080/08964280309596065

Günaydin, G., Zayas, V., Selcuk, E., & Hazan, C. (2012). I like you but I don't know why: Objective facial resemblance to significant others influences snap judgments. *Journal of Experimental Social Psychology*, *48*, 350-353.

Hazan, C., Gur-Yaish, N., & Campa, M. (2004). What does it mean to be attached? In W. S. Rholes & J. A. Simpson (Eds.), *Adult attachment: New directions and emerging issues* (pp. 55-85). New York: Guilford Press.

Hazan, C. & Shaver, P. R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*, 511-524

Hazan, C., & Zeifman, D. (1994). Sex and the psychological tether. In D. Perlman and K. Bartholomew (Eds.), Advances in personal relationships, pp. 151-180. London.

Holmes, J. G. (2002). Interpersonal expectations as the building blocks of social cognition: An interdependence theory perspective. *Personal Relationships*, *9*, 1-26.

House, J. S., Landis, K. R., & Umberson, D. (1988, July 29). Social relationships and health. *Science,* 241, 540 –545. doi:10.1126/science.3399889

Ireland, M., Slatcher, R., Eastwick, P., Scissors, L., Finkel, E., & Pennebaker, J. (2010). Language Style Matching Predicts Relationship Initiation and Stability. Psychological Science, 22, 39-44.

Kross, E., & Ayduk, O. (2011). Making meaning out of negative experiences by self-distancing. Current Directions in Psychological Science, 20, 187–191. doi:10.1177/0963721411408883

Kross, E., Berman, M., Mischel, W., Smith, E. E., & Wager, T. (2011). Social rejection shares somatosensory representations with physical pain. Proceedings of the National Academy of Sciences, USA, 108, 6270–6275. doi:10.1073/pnas.1102693108

Master, S. L., Eisenberger, N. I., Taylor, S. E., Naliboff, B. D., Shirinyan, D., & Lieberman, M. D. (2009). A picture's worth: Partner photographs reduce experimentally induced pain. *Psychological Science,* 20, 1316 –1318. doi:10.1111/j.1467-9280.2009.02444.x

Mikulincer, M., Gillath, O., & Shaver, P. R. (2002). Activation of the Attachment System in Adulthood: Threat-Related Primes Increase the Accessibility of Mental Representations of Attachment Figures. *Journal of Personality and Social Psychology,* 83, 881–895

Mikulincer, M., & Shaver, P. R. (2007a). *Attachment in adulthood: Structure, dynamics, and change.* New York, NY: Guilford Press.

Mikulincer, M., & Shaver, P. R. (2003). The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. *Advances in Experimental Social Psychology*, *35*, 53-152.

Pennebaker, J. W., Booth, R. J., & Francis, M. E. (2007). Linguistic inquiry and word count: LIWC [Computer software]. *Austin, TX: liwc. net*.

Pennebaker, J. W., Mayne, T. J., & Francis, M. E. (1997). Linguistic predictors of adaptive bereavement. Journal of Personality and Social Psychology, 72, 863– 871. doi:10.1037/0022-3514.72.4.863

Pietromonaco, P. R., & Feldman Barrett, L. (2000). The internal working models concept: What do we really know about the self in relation to others? *Review of General Psychology, 4*, 155–175. doi:10.1037/1089-2680.4.2.155

Pietromonaco, P. R., Feldman Barrett, L., & Powers, S. (2006). Adult attachment theory and affective reactivity and regulation. In D. K. Snyder, J. A. Simpson, & J. N. Hughes (Eds.), Emotion regulation infamilies: Pathways to dysfunction and health (pp. 57–74). Washington, DC: American Psychological Association. doi:10.1037/11468-003

R Development Core Team (2008). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

Ridge, S. R. & Feeney, J. A. (1998). Relationship history and relationship attitudes in gay males and lesbians: attachment style and gender differences. *Australian and New Zealand Journal of Psychiatry, 32,* 848-859

Selcuk, E., Zayas, V., Günaydin, G., Hazan, C., & Kross, E. (2012). Mental Representations of Attachment Figures Facilitate Recovery Following Upsetting Autobiographical Memory Recall. *Journal of Personality and Social Psychology*. Advance online publication. doi: 10.1037/a0028125

Sroufe, L. A., & Waters, E. (1977). Attachment as an organizational construct. Child Development, 48, 1184 –1199. doi:10.2307/1128475

Tennov, D. (1979) *Love and Limerence: The Experience of Being in Love*. New York: Stein & Day.

Zayas, V., Günaydin, G., & Shoda, Y. (2014). From an unknown other to an attachment figure: How do mental representations change as attachments form? To appear in Zayas, V. & Hazan, C. (2014). *Normative Process in Adult Attachment Formation and Maintenance: From Brain to Mind to Behavior*. Springer Publishing.

Zayas, V. & Shoda, Y. (2005). Do automatic reactions elicited by thoughts of romantic partner, mother, and self relate to adult romantic attachment? *Personality and Social Psychology Bulletin, 31*, 1011-1025.

Zeifman, D., & Hazan, C. (2008). Pair bonds as attachments: Reevaluating the evidence. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 436-455). New York, NY: Guilford Press