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Earliest Memories of Pets Predict Adult Attitudes: Phenomenological, Structural, and Textual Analyses

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The human-animal interaction literature has many examples of how early childhood experiences affect adult pet attitudes, social development, and empathy; however, there have been no specific studies of the memories that are the bases of these attitudes and dispositions. In this study, adults described their earliest childhood memories of a pet, friend, or automobile in their own words, rated each memory on several phenomenological dimensions, and reported their current attitudes towards pets. Participants rated pet memories as being more emotionally intense and accessible and having more sensory detail than friend memories. Earliest memories of a friend were more positive than earliest memories of pets, largely due to early pet memories focusing more on death and loss. There was a modest positive correlation between assessed pet memory valence and attitudes towards pets. Participants who recalled memories of their own pet and described more interactive pet memories had more positive adult attitudes towards pets. Results of the linguistic analysis of the recorded memories converged with the valence and pet attitude measures, and further showed that negative emotion words and impersonal pronouns used in pet and friend memories were more similar for those with more positive attitudes toward pets. The study reveals the complexities of the relationship between the earliest childhood memories of pets and adult attitudes towards pets. Future research should investigate how pets are represented and processed in the full range of human cognition.

Key words: pets, human-animal interactions, autobiographical memories, attitudes, language

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Adult representations of and interactions with pets are no doubt influenced by early experiences with companion animals, and the human-animal interaction literature that pertains to children has studied a variety of issues related to this assumption. Some examples of these research topics include the demographics of pet experiences (Rud & Beck, 2003) and the effects of currently having pets on attitudes towards animals (Prokop & Tunnicliffe, 2010). Research on social development has studied the relation between childhood experiences with companion animals and healthy and unhealthy adult development (Barlow, Hutchinson, Newton, Grover, & Ward, 2012; Triebenbacher, 1998), the development of self-concepts (Poresky, Hendrix, Mosier, & Samuelson, 1988), emotional development (Robin & ten Bensel, 1985), and empathy (Daly & Morton, 2003).

Several studies have investigated how experiences with pets in early childhood affect individuals as adults, both in terms of interactions with pets as well as broader aspects of cognition and behavior. Serpell (1981) surveyed adults to determine the effects of childhood experiences with pets on adult attitudes and found a positive relationship between childhood pet experiences and the likelihood of keeping pets as an adult. Similarly, childhood socialization correlates with higher levels of attachment to pets during adulthood (Raupp, 1999).

The Role of Pets in Adult Development

Memories of pets are often of central importance to individuals' identities and autobiographical memories, regardless of their impact on adult attitudes or behavior. Specifically, Henniger (1994) asked about university students' favorite childhood play experiences during three to eight years of age. The memory of a pet as a playmate was especially memorable for several adults when they were children, with some describing pets as their "best friends" and partners in creative play sequences. People who had a pet during childhood also tend to be more empathetic, more prone to choose helping professions (e.g., teachers, doctors), and more oriented towards social values than those who did not have a pet during childhood (Vizek-Vidović, Arambašić, Keresteš, Kuterovac-Jagodíc, & Vlahović-Štetić, 2001). Such results are consistent with other studies on adult empathy and childhood pet experiences (e.g., Paul, 2000; Paul & Serpell, 1993).

The extent to which adults report bonding with pets also appears to be related to childhood experiences. Poresky et al. (1988) focused on pet bonding during childhood and its effects on adults' attitudes towards pets. These researchers conducted a retrospective analysis in which university students completed the Companion Animal Bonding Scale (Poresky, Hendrix, Mosier, & Samuelson, 1987) and the Pet Attitude Scale (PAS, Templer, Salter, Dickey, Baldwin, & Veleber, 1981). Individuals with higher reported childhood bonding strength had higher contemporary scores on the PAS. Moreover, they found that pet bonding during childhood had greater effects than later experiences with pets. Supporting the psychometric validity of early childhood memories of pets, the same authors found that students' contemporary relationships with pets were unrelated to their recollections of childhood pet bonding. Others have similarly found early memories to be relatively unbiased by current experiences, showing that adults present at the original time of recalled memories verified the accuracy of college students' earliest memories (Howes, Siegel, & Brown, 1993).

The Role of Autobiographical Memory

While it may be obvious that past experiences and memories are generally important for the formation of adult attitudes towards pets, we do not yet understand the specific cognitive components or the processes within the complex memory system that operate to produce or to facilitate the development of attitudes or decisions about pets. Memory processes, whether they be involved in the initial storage or subsequent retrieval of early childhood experiences, may very well have a major determining role.

In investigating links between autobiographical information and attitude formation, we were particularly interested in the role of episodic memories (i.e., time-tagged memories of the type elicited in the present study; see Tulving, 1972). Researchers have studied the nature of autobiographical memories, their cortical localization, and their role in making attitude evaluations (Johnson, Simon, Henkell, & Zhu, 2011). Johnson et al. (2011) compared brain activity while participants gave attitude evaluations and retrieved autobiographical information. They found a parietal episodic memory effect for both attitude evaluations and autobiographical retrievals, suggesting that the representations that form attitudes were stored in episodic memory. Thus, in the context of the greater objective of determining the roles of memory and other cognitive processes in attitudes towards pets, this study investigated autobiographical memory of early childhood experiences.

Further, although we do not take a position for or against a particular theory of attitude formation and subsequent event evaluation, we find the iterative reprocessing model of Cunningham, Zelazi, Packer, and Van Bavel (2007) to be a useful, guiding explanation of the role of memories in attitude formation. This model proposes that attitudes are based on representations stored in memory, and that the current evaluation of an attitude is the product of reflective reprocessing of that information. That is, as information is repeatedly reprocessed with accompanying reflective processes, the evaluations evolve, becoming more nuanced and complex over time.

Memory Components

As we contemplated our study, we made the initial decision that determining the accuracy of adults' early childhood memories would be beyond the scope of our research, and that our research would focus instead on participants' contemporary recollections from childhood by asking them pointed questions about those recollections. Given the previous research on the importance of the emotional content of childhood experiences, we considered initially that whether a specific memory aroused a positive or negative emotion (i.e., valence) would be of particular importance.

Because of the likely importance of one's perceived valence of a memory, and the possibility that other current experiences of the memory (i.e., phenomenological dimensions) would affect contemporary attitudes about pets, we used an adaptation of an instrument developed by Sutin and Robins (2007, the *Memory Evaluation Questionnaire, MEQ*) for eliciting and analyzing autobiographical childhood memories. They considered autobiographical memories to have many characteristics and dimensions that bring them alive in one's current experience, and these characteristics and dimensions can be assessed in one's phenomenology, wherein those memories are learned and experienced again. Sutin and Robbins (2007) stated, "These phenomenological characteristics are what bring autobiographical memories back to life upon retrieval and make them so important in guiding our future goals and actions" (2007: 390). From that perspective, this study assessed the phenomenology of adults' early childhood memories on their attitudes towards companion animals.

We also considered that certain structural and compositional aspects of memory might contribute to contemporary adult attitudes. Autobiographical memories are instances of episodic memories (Tulving, 1972); that is, they are recollections of specific, personal, time-tagged information (e.g., "My father gave me a kitten when I was four years old."), as opposed to semantic memory, more accurately referred to as knowledge (e.g., "How much is two plus two?").

Since the autobiographical memories we sought to have participants report would very likely involve a degree of mental imagery of the respective memory targets, and since visual imagery has been found to play an important role in autobiographical recall (Rubin, Schrauf, & Greenberg, 2003; Greenberg & Knowlton, 2014), we included the assessment of a well-known structural determiner of memory: whether the elements in the memory were interactive. Specifically, paired-associate learning is improved when the two components can be imagined to physically interact (Bower, 1970). Given the facilitative role of interactive mental imagery, we wanted to see if autobiographical memory for pets would be affected by interactive mental imagery in the same manner as autobiographical memory in other contexts.

Language Analysis

To further explore the cognitive and affective processes involved in remembering memories of pets and other salient targets, we analyzed the text of each memory using a computerized text analysis program called the Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007). LIWC automatically outputs the rates at which texts use words in several language content and style categories, such as positive emotion (e.g., *laugh*, *happy*) and first-person singular pronouns (e.g., *I*, *me*).

As this is the first study to link language use with attitudes towards pets and memories of companion animals, language analyses comparing pet memories with friend and automobile memories took a broad, quasi-exploratory approach, focusing on several social and affective categories that are theoretically relevant to individuals' past and present interactions with pets. We predicted that people who had more positive attitudes towards pets would (1) process memories of friends and pets more similarly, reflected in greater linguistic similarity between friend and pet memories for social and affective categories, (2) recall more personal or interactive memories of pets, including more self-references (e.g., *I*, *me*), more friend references (e.g., *buddy*, *pal*), and fewer socially distant references to others, including fewer impersonal pronouns (e.g., *it*, *that*), and references to humans (e.g., *guy*, *lady*), and (3) have more positive memories of pets, reflected in more positive emotion and fewer negative emotion words (see Table 1, page 37).

General Research Questions

To summarize, although it is apparent that there is research on many aspects of children's interactions with pets and the subsequent effects on adult social development and attitudes towards pets, to our knowledge there is no research that deals with specific memory processes that might affect interactions with, or attitudes towards, pets or companion animals. This study takes a beginning step towards filling that gap by examining adults' earliest memories of pets (autobiographical memories), and by asking the following exploratory questions:

(1) Are there differences in the reported earliest memories of pets, compared to the reported earliest memories of other salient targets (e.g., a friend, an automobile)?
(2) Are there structural or functional memory characteristics of the earliest memories of pets that differ among pets and other targets?
(3) Will textual analyses of the autobiographical memories reveal differences between pets and other salient targets (see specific hypotheses above)?
(4) Will any of these potential differences in autobiographical memories predict adult attitudes towards pets?

Method

Participants

The participants for this study were 223 adult volunteers (161 women) recruited through an email-delivered, general announcement bulletin board available to all students, faculty, and staff at a large southwestern university, with procedures approved by the appropriate Institutional Review Board. The announcement directed participants to a website that contained the research instruments and instructions. When finished, participants could elect to be included in a random drawing for one of several $25 gift certificates. The categorical age distribution for participants was ≤ 19

(5%), 20-24 (31%), 25-30 (19%), 31-40 (16%), and ≥ 41 (29%).

Materials

All questions and instruments were delivered by Qualtrics® research tools. The instruments included a modified version of the MEQ questionnaire (Sutin & Robins, 2007), with questions about three different autobiographical memories, and the latest version of the PAS (PAS-M; Munsell, Canfield, Templer, Tangan, & Arikawa, 2004).

The MEQ

Sutin and Robins (2007) acknowledged that the length of their full MEQ (i.e., ten scales, and 5-8 items per scale) might seem rather daunting and could lead to participant attrition, and that researchers could select among the scales to suit their purposes. In order to sustain the interest of participants and better manage study length, of the ten dimensions developed for the original MEQ we chose five that best suited our research. Further, although the original MEQ had between five and eight highly similar probing statements for each dimension, we chose to further reduce the length of the instrument by choosing three of those statements to assess each dimension, with the provision that one of the statements for each scale be reverse scored.

The five dimensions we chose to assess autobiographical memories in this study were vividness (visual clarity and intensity), accessibility (ease of retrieval), sensory detail (re-experiencing sensory details), emotional intensity (intensity of the emotions experienced), and valence (positive or negative valence of the experience described in the memory). Specific wording for the elicitation and the subsequent assessment of each of the three memories may be found in the Appendix.

The original PAS was developed to assess adult attitudes towards pets and has been used in numerous studies. It consists of 18 items that require a response on a seven-point Likert scale (1 = *Strongly Disagree* to 7 = *Strongly Agee*) about how one feels right now about pets, with several statements requiring reverse scoring. The PAS-M has very minor rewording of three items in the original. The PAS and the PAS-M both have Cronbach's alphas of .92. Sample statements include, "I really like seeing pets enjoy their food," and "Having pets is a waste of money" (reverse-scored).

Procedure

The three autobiographical memories solicited from the participants, and the questions about them, were presented in three separate blocks, with the order of blocks randomized for each participant. The three autobiographical memories were about one's earliest childhood memory of a pet, friend, and automobile. The earliest childhood memory about a friend was chosen to represent a memory about another living entity that would be likely to entail some or all of the following: bonding, emotionality, personal social meaning, and closeness. The earliest memory about an automobile was meant to focus on a non-living object that participants would have likely encountered in early childhood and remembered throughout their life.

Participants were instructed to first think about each memory and then write about it in their own words, with a 600-character limit. The 600-character limit was intended to keep memories relatively uniform, thus reducing error variance caused by differences in the time and effort participants devoted to the writing task. The participants then responded to questions about each memory on the five

MEQ dimensions. To avoid influencing the memories with questions from the PAS-M, the PAS-M was always presented last, after participants wrote about and assessed the three memories.

Language Analysis

All memory texts were checked for spelling errors and analyzed with the most recent version of LIWC (Pennebaker et al., 2007). LIWC is a computerized text analysis program that automatically categorizes every word in a text as belonging to one or more of over 80 internal categories, defined by dictionaries (i.e., word lists) of words and word stems. It then outputs the percentage of words in that text that belong to each category. LIWC includes psychological (e.g., negative emotion, insight), linguistic (e.g., personal pronouns, conjunctions), and content (e.g., work, death) categories. LIWC is the most widely used computerized text analysis software in psychology (Iliev et al., 2014) and has been extensively validated since it was first published over 20 years ago (Francis, 1993; Pennebaker, 1993; see Tausczik & Pennebaker, 2010, for a review).

Because shorter text samples produce less reliable results, participants whose description of at least one memory included fewer than 10 words (n = 34) were excluded from language analyses. Of those exclusions, 4 participants wrote text samples that were below the cut-off for all three memory categories. Overall, memories for automobiles were less likely to be below the word count cut-off (n = 13) than memories for pets and friends (ns = 19 and 18, respectively), although a chi-square test of independence showed that the difference was not significant, $p > .50$. The remaining written memories averaged approximately 47 words (SD = 31). Ten words is typically the minimum word count that is considered analyzable (e.g., Baddeley, 2012; Davison, & Pennebaker, 1997). Although that cut-off is low, a higher cut-off (such as the more standard 50 words) would exclude more than half of the sample and thus reduce our ability to compare language results with effects from the primary self-report analyses described earlier.

LIWC analyses focused on two broad classes of words: language content, such as positive emotion and references to humans, and language style, or function words (e.g., *it, a, I*). Content categories are made up of commonly used, face-valid nouns, verbs, and adjectives that reflect those topics. Style or function word categories are made up of a small group of frequently used words that are processed rapidly during language comprehension or production (Bell, Brenier, Gregory, Girand, & Jurafsky, 2009). Although they have little meaning outside of a sentence (or without common ground regarding their referents), function words make up nearly 60 percent of spoken conversation (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007) and are reliable indicators of mental states (e.g., deception, depression) and individual differences (e.g., gender, personality; Ireland & Mehl, 2014; Koppel, Argamon, & Shimoni, 2002; Mehl, 2006; Ott, Choi, Cardie, & Hancock, 2011; see Tausczik & Pennebaker, 2010).

More specifically, we focused on content and style categories relating to social and affective processes. In addition to exploring how these categories varied between memory types, irrespective of pet attitudes, we predicted that individuals with more positive attitudes towards pets would write memories of pets that were more positive (using more positive emotion words, such as *laughed* and *love*), less negative (fewer negative emotion words, such as *hate* and *idiot*), more interactive (higher rates of first-person pronouns, such as *I* and *my*), more socially intimate (more words referring to friends, such as *buddy* and *companion*), and less

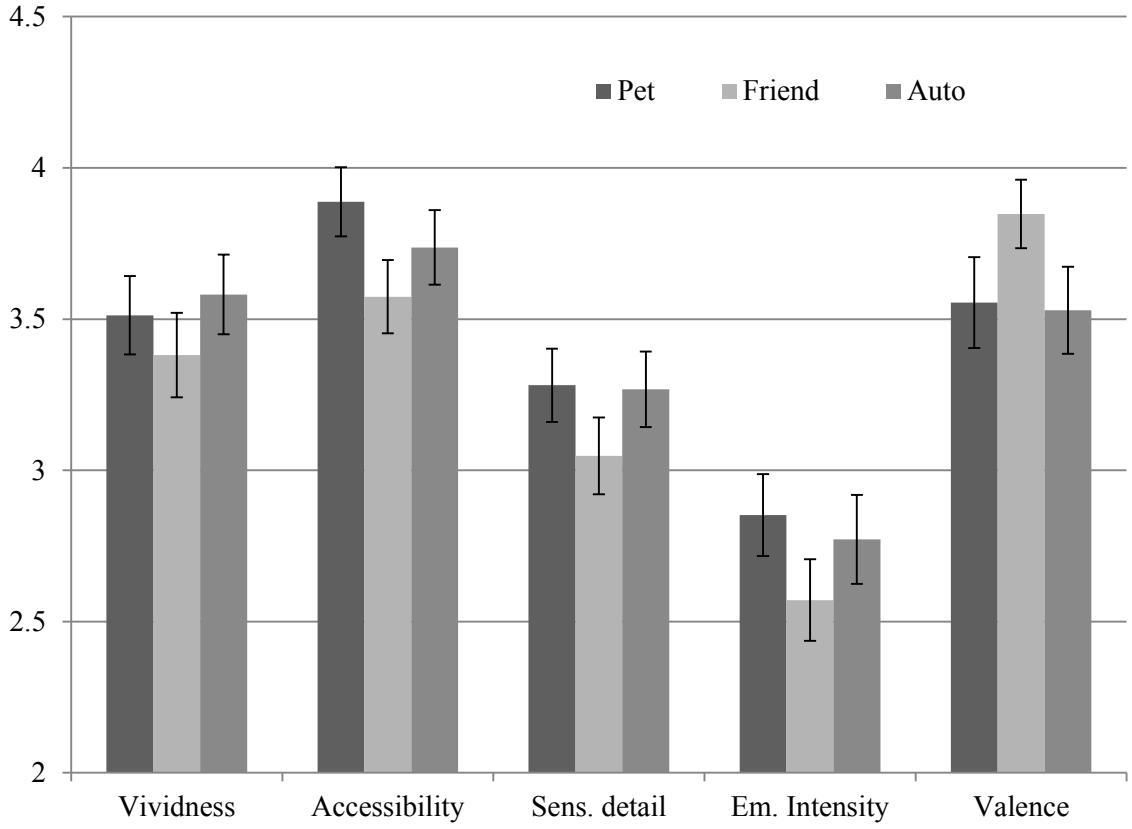

Figure 1. Mean self-reported memory dimensions as a function of memory category. Sens. = sensory. Em. = emotional. For valence, higher is more positive. Error bars are 95% confidence intervals.

socially distant (fewer impersonal pronouns, such as *it* and *that*; and fewer references to humans, such as *guy* and *person*). We also predicted that, for people who liked pets more, memories of pets and friends would be more similar to each other and more distinct from automobile memories in terms of social and affective language.

Note that each subcategory of LIWC's general social category was tested separately. The social subcategories all include references to people, but they vary widely in whether people are being discussed in an intimate or distant way. The humans subcategory includes words such as *lady* and *person* – words that most often refer to strangers or humans in the abstract, in other words. The friends (e.g., *girlfriend*, *partner*) and family (e.g., *mom*, *grandpa*) categories, on the other hand, include more intimate words that specifically refer to people the speaker knows or has a relationship with. Likewise, we used first-person pronouns (e.g., *I*, *we*) as an index of interactivity, rather than personal pronouns in general, because first-person pronouns are more obviously interactive than the comparatively distant third-person pronouns (e.g., *she*, *they*).

Results

Participants' mean scores on the three statements for each of the dimensions for each of the three memories were calculated. A composite phenomenological memory score was also taken as the sum of all the

assessments over the five dimensions for a particular memory.

MEQ Dimensions

Each participant's mean rating for each dimension for each memory was entered into a within-subjects 3 x 5 analysis of variance (ANOVA) with Memory and Dimensions as within-subjects factors. The data are shown in Figure 1 (previous page). The effects for Memory, $F(2, 444) = 3.54$, $p = .029$ $\eta^2_p = .015$; Dimension, $F(2, 888) = 112.50$, $p < .001$, $\eta^2_p = .336$; and the interaction between the two, $F(8, 1776) = 7.60$, $p < .001$, $\eta^2_p = .033$, were all significant. Subsequent Tukey HSD post hoc tests showed that, for Vividness, the only significant difference was between Friend and Auto ($p < .05$); for Accessibility, Pets was greater than Friends ($p < .001$); for Sensory Detail, both Pets ($p < .01$) and Auto ($p < .05$) were greater than Friends; for Emotional Intensity, both Pets ($p < .01$) and Auto ($p < .05$) were greater than Friends; for Valence, Friends was greater than both Pets ($p < .01$) and Auto ($p < .01$).

Although it makes sense that memories of automobiles would be less positive than memories of friends, the fact that pet memories were also less positive bears some consideration. The content of the pet memories reveals a likely reason for this difference. Put simply, not all pet memories were joyful, with some focusing on pets having been given and then taken away, dying and being buried by the family, and similar other tragic events. This is consistent with the finding that children's first experiences with death are often related to the loss of a pet (Dickinson, 1992). To further investigate this possible explanation for pet memories' less positive valence scores, we determined the "death" or "loss" content of both pet and friend memories. That analysis yielded 26 pet memories that dealt with the death or loss of a pet, while only 3 such memories were found for friend memories, a significant difference, $\chi^2(1) = 19.83$, $p < .001$.

To determine if gender had a role in the Memory x Dimension ratings, the data from the 62 male participants and 62 randomly chosen female participants were entered into a 2 x 3 x 5 mixed ANOVA with Gender as the between-subjects factor, and Memory and Dimensions as within-subjects factors. That analysis again returned the main effects for Memory, $F(2, 244) = 3.23$, $p < .041$, $\eta^2_p = .026$, and Dimension, $F(3,488) = 60.58$, $p < .001$, $\eta^2_p = .332$, but no significant effect for Gender or interaction with Gender, ps $> .05$.

To determine the extent to which attitudes towards pets were predicted by scores on any of the five phenomenological dimensions for the pet memory, individuals' mean scores on each of the five pet memory dimensions were correlated with participants' PAS-M scores. Only the correlation between memory valence and pet attitudes reached significance, $r(223) = .18$, $p < .001$. The composite pet memory score was also significantly positively correlated with the PAS-M measure, $r(223) = .16$, $p = .017$. People with more positive attitudes toward pets tended to recall memories that were more positive and related to the overall phenomenological memory composite, as indexed by the five dimensions described above. Given this outcome, we focused on memory valence and composite memory in the remaining analyses. Since the memory valence measure seemed to be of particular importance, we checked the external validity of the memory valence ratings by having four independent raters evaluate the valence of each memory. The correlation between the mean of the evaluators' valence ratings and participants' valence ratings was high, $r(223) = .78$, $p < .001$, attesting to the validity of the valence measure.

Finally, the distribution of the reported ages for each type of memory evidenced substantial overlap. The modal value for each

was 4 years, with means (*SD*s) being 4.09 (1.42) for pet memories, 4.29 (1.15) for friend memories, and 4.08 (1.27) for automobile memories.[1]

Word Count and Pet Ownership

The following analyses focused on some characteristics and features of the memories, per se. First, we considered that the length of the reported memories (i.e., word count) might give some indication of the relative importance or significance of the memory target. To assess this we determined the mean (*SD*) number of words entered for each memory, 39.88 (28.69), 40.40 (31.92), and 43.80 (32.74) for pet, friend and automobile memories, respectively. A one-way, within-subjects ANOVA indicated that the reported memories did not differ significantly by length, $p > .06$. Otherwise, women wrote longer memories than did men for pets, 43.02 vs. 31.74, $t(221) = 2.67$, $p = .008$, and friends, 43.39 vs. 32.65, $t(221) = 2.27$, $p = .024$, but not for automobiles, 45.86 vs. 38.47, $p > .13$

In considering the importance that childhood experiences with a pet might have on adult attitudes towards pets, a reasonable assumption might be that the long-term effects of interacting with pets would be more pronounced, protracted, or intense if the pet(s) were one's own, rather than belonging to someone else. Participants indicated whether the pet in the memory was theirs ($n = 186$) or belonged to someone else ($n = 37$), and we tested whether pet ownership at the time of the early experience affected memory valence, composite memory, or PAS-M scores.

For memory valence, mean (*SD*) memories of one's own pet, 3.63 (1.12), were significantly more positive than were memories of another's, 3.16 (1.22), $t(221) = 2.31$, $p = .022$. Pet attitudes also differed as a function of pet ownership, $t(221) = 3.45$, $p = .001$, with pet attitudes being more positive for individuals whose memories were based on their own pet, 101.7 (18.0), than for those whose memories were based on someone else's pet, 89.9 (24.2), $t(221) = 3.45$, $p < .001$.

Memory Interactivity

Presenting to-be-learned material in the form of interactive visual images can have beneficial effects on learning and memory (Bower, 1970; Bower & Winzenz, 1970), even for children as young as those in the first grade (Lopes & Richman, 1984). Thus, we considered whether interaction as a more general construct might afford some discriminative utility in assessing the relationships between the earliest memories, phenomenological ratings, and scores on the PAS-M. To that end, the three types of memories for each participant were judged to be "interactive" or "non-interactive" by two independent raters. The criteria for an interactive/non-interactive decision were uniform across the three types of memories. A memory was judged "interactive" if it involved the participant and the target (pet, friend, or automobile), the participant engaging with the target (e.g., touching, playing, involved in an activity), or the participant interacting otherwise with the target. A memory was determined to be non-interactive if it involved the participant merely observing the target, was a memory of just the target, was about a feeling or emotion about the target, or otherwise did not describe the participant engaging with the target. An example of an interactive memory from our sample is, "I was sitting by a water spigot outside, it was cool and shady. I was stroking my cat Smokey as he purred and walked circles around me. I was alone with the cat." An example of a non-interactive memory is, "We had a turtle, but he jumped off a two story balcony from the apartment that we stayed at." The level of initial inter-judge agreements for pet, friend, and automobile

memories were 80%, 72%, and 77%, respectively. A third independent rater made the final decision on interactive status in the instances of disagreements.

We then determined if the interactive status of the pet memories affected memory valence, composite memory, or PAS-M scores. Application of the decision scheme described above resulted in a total of 103 interactive pet memories and 120 non-interactive pet memories. For each measure, the interactive memories resulted in larger values. Pet attitudes, *M* (*SD*), were significantly higher for interactive memories, 102.59 (18.50), than for non-interactive memories 97.35 (20.21), $t(221) = 2.01$, $p = .046$. Interactive memories were also more positive, 3.72 (1.15), vs. 3.41 (1.13), $t(221) = 2.04$, $p = .043$, and had higher composite memory scores than non-interactive memories, 53.25 (10.12), vs. 49.56 (8.72), $t(221) = 2.93$, $p = .004$.

A similar analysis was also conducted on friend memories. Interactive friend memories ($n = 164$) were judged to be significantly more positive, 3.93 (0.89) than non-interactive memories ($n = 59$), 3.62 (.75), $t(221) = 2.37$, $p = .019$. Composite memory scores were not significantly related to interactive status, ps > .05.

Finally, for automobile memories there were 160 interactive and 63 non-interactive memories, but there were no significant differences on automobile memory valence or composite memory scores, ps > .05.

The pattern of frequencies observed in the foregoing analyses suggests fewer interactive memories for pets than for either friends or automobiles, and Chi-square comparisons found that indeed there were fewer interactive memories for pets compared to both memories for friends, $\chi^2(1) = 34.72$. $p < .001$, and memories for automobiles, $\chi^2(1) = 30.18$, $p < .001$.

Text Analyses

Three sets of analyses examined how language use differed as a function of attitudes towards pets. First, a series of one-way ANOVAs explored whether language dimensions related to affect and social interaction differed between memories of pets, friends, and automobiles. Building on these results, moderator analyses tested the prediction that social and affective language for memories of pets and friends would be more similar to each other and more distinct from automobile memories to the degree that individuals reported holding more positive attitudes towards pets (indexed by the PAS-M). Finally, we regressed language use in the texts of pet memories onto pet attitudes in order to test the predictions that memories of pets would be more interactive (increased first-person singular pronouns), intimate (more use of family and friends words), and positive, as well as less socially distant (fewer impersonal pronouns and words in the humans category) and negative to the degree that individuals reported liking pets.

Linguistic Differences

The first set of analyses explored whether pet memories differed from memories of friends and automobiles in several key categories (all means are available in Table 1, following page).

Affect. First, the affective content of memories was indicated by the percentage of positive emotion (e.g., *joy*, *smiling*) and negative emotion (e.g, *scary*, *cried*) words used in each text. Both categories differed as a function of memory category. For positive affect, all three categories were significantly different, $F(2, 561) = 23.10$, $p < .001$, $\eta^2_p = .076$. Tukey's HSD post-hoc tests revealed that friend memories contained nearly three times as many positive emotion words as pet

Table 1. Descriptive Statistics for Language Categories

LIWC category	Example	Pet *M* (*SD*)	Friend *M* (*SD*)	Auto *M* (*SD*)
Social				
1st-person sing.	*I, me, my*	9.34 (5.23)	9.51 (5.30)	9.57 (4.52)
1st-person plural	*we, our, us*	2.80 (3.32)	2.91 (3.16)	2.25 (2.71)
3rd-person plural	*they, them, their*	0.83 (2.10)	0.44 (1.38)	0.16 (0.63)
Impersonal pron.	*it, that, those*	3.20 (3.57)	2.81 (2.75)	3.69 (3.27)
Family	*mom, sister, aunt*	2.17_b (2.59)	1.56_b (2.38)	3.77_a (3.31)
Friends	*buddy, pal, friend*	0.35_b (1.11)	2.80_a (2.93)	0.08_b (0.47)
Humans	*lady, guy, kid*	0.43_b (1.23)	1.00_a (2.00)	0.34_b (0.84)
Affect				
Positive	*laugh, joy, yay*	2.04_b (2.62)	5.93_a (4.65)	1.35_c (2.15)
Negative	*hate, cried, stupid*	1.05_a (2.08)	0.80 (2.03)	0.67_b (1.27)
Complexity				
Words per sent.		16.7_b (9.6)	16.7_b (8.4)	19.3_a (10.2)
Negate	*no, not, never*	0.88 (1.53)	0.64 (1.18)	0.82 (1.50)
Exclusive	*except, without, nor*	1.84 (2.42)	1.46 (2.25)	1.70 (2.57)

Note. Sing. = singular, pron. = pronoun, sent. = sentence. All categories are percentages of total words used with the exception of words per sentence, which is a count variable (number of words). Means with different subscripts are significantly different at the $p \leq .05$ level within each row.

memories ($p < .0001$), and pet memories were more positive than were automobile memories ($p = .045$). For negative affect, memory category significantly influenced emotional language as well, $F(2, 561) = 3.00$, $p < .051$, $\eta^2_p = .011$. Post-hoc tests showed that pet memories contained more negative emotion words than automobile memories, $p = .045$, but were not significantly more negative than friend memories, $p = .179$. Friend and automobile memories did not differ in negativity, $p = .507$. The earlier analysis showing that memories of pets focused on death more frequently than did memories of friends suggests that death-related content may explain the greater negativity of pet memories. A complementary LIWC analysis confirmed that pet memories contained significantly more references to death (e.g., *funeral*, *dead*) than did friend or auto memories, $F(2, 561) = 4.66$, $\eta^2_p = .016$, $p = .010$.

Social interaction. Next, we tested whether memories differed in categories that relate to social interaction. Content categories included humans (e.g., *girl*, *man*), friends (e.g., *buddy*, *girlfriend*), and family (e.g., *dad*, *daughter*). Style categories included first-person singular pronouns (e.g., *I*, *my*), first-person plural pronouns (e.g., *we*, *our*), and impersonal pronouns (e.g., *it*, *that*). Memories differed for each of the above content categories, but none of the pronoun categories: Humans, $F(2, 562) = 11.48$, $p < .001$, $\eta^2_p = .027$, Friend, $F(2, 562) = 126.0$, $p < .001$, $\eta^2_p = .098$, and Family, $F(2, 561) = 31.58$, $p < .001$, $\eta^2_p = .019$. Post-hoc tests showed that memories contained more references to humans and friends for friend memories than for automobile or pet memories, all $p < .001$. References to family were more frequent in automobile memories than in pet or friend memories, $p < .001$. All other comparisons were not significant, $ps \geq .10$.

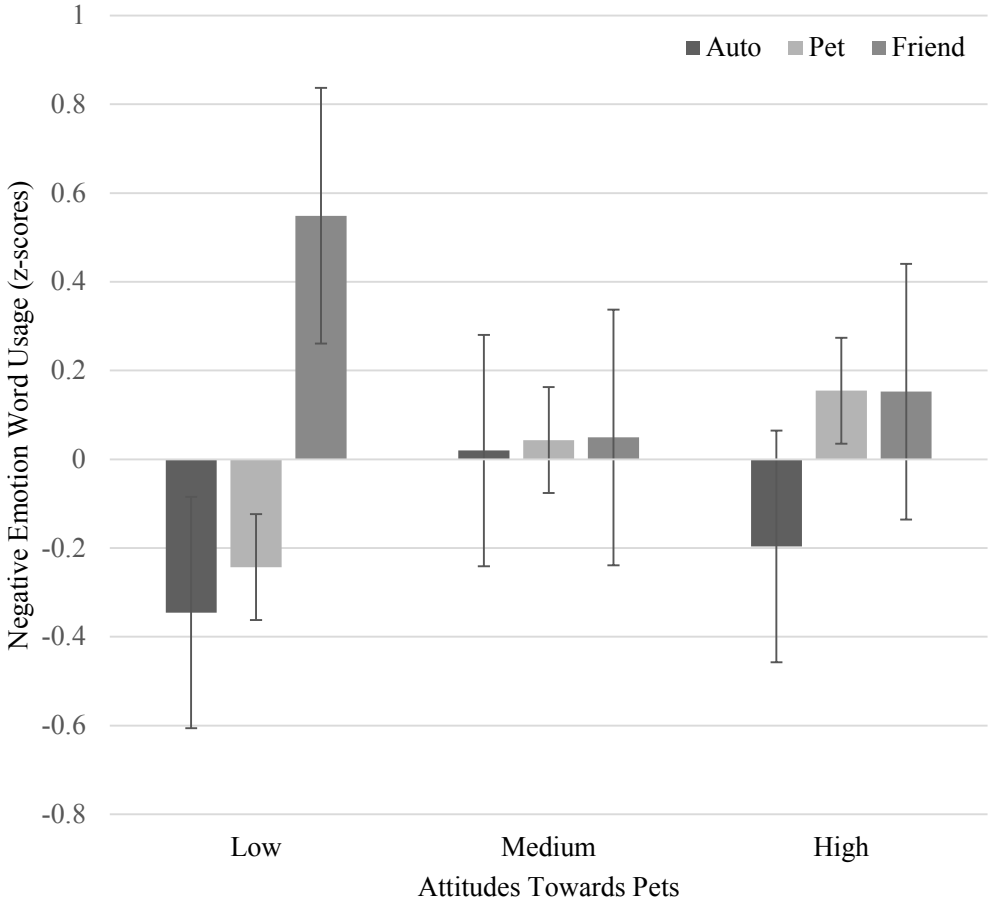

Figure 2. Use of negative emotion words as a function of attitudes towards pets and memory category. Error bars are standard errors from the regression models that produced each beta weight.

Moderation by Pet Attitudes

To test the prediction that pet memories would be more similar to friend memories in affective and social categories for individuals with more positive attitudes towards pets, we investigated whether the effect of memory category on language use was moderated by attitudes towards pets, as indexed by the PAS-M, for each of the above categories. For negative emotions and impersonal pronouns, the memory category x pet attitudes interaction was marginally significant: Negative emotion $F(2, 558) = 2.88$, $p = .057$ $\eta^2_p = .010$, and Impersonal pronouns $F(2, 558) = 2.51$, $p = .095$, $\eta^2_p = .008$. The memory category x pet attitudes interaction was not significant for any other social and affective language variables.

Decomposing the interaction into high ($z > 1$), moderate ($-1 > z \leq 1$), and low ($z \leq -1$) PAS-M z-scores revealed that pet and friend memories were more similar for both negative emotion and impersonal pronouns to the degree that individuals held more positive attitudes towards pets (see Figures 2 and 3). Specifically, for individuals with very positive attitudes towards pets, impersonal pronoun usage was high in automobile memories and similarly low in pet or friend memories. For those with the least positive attitudes toward pets, pet memories included much more negative emotion (e.g., *hate*, *scared*) than either friend or auto memories.

Relation to Pet Attitudes

To examine whether more positive attitudes towards pets were related to more personal and more positive language use in pet memories, we regressed the social and affective categories described earlier on PAS-M scores in a series of linear regressions. As predicted, individuals with more positive attitudes towards pet used more first-person singular pronouns (B = 0.17, SE = .07, t = 2.21, p = .028), fewer impersonal pronouns (B = -.18, SE = .08, t = -2.22, p = .028), and fewer references to humans (B = -.16, SE = .06, t = -2.68, p = .008), and marginally fewer negative emotion words (B = -.14, SE = .08, t = -1.73, p = .085). The remaining categories (family, friends, and positive emotion) were not significant, all ps > .30.

Discussion

The impetus of this study was the assumption that adult attitudes towards pets are at least partially dependent on memories of experiences with pets or companion animals over the course of one's lifetime, and

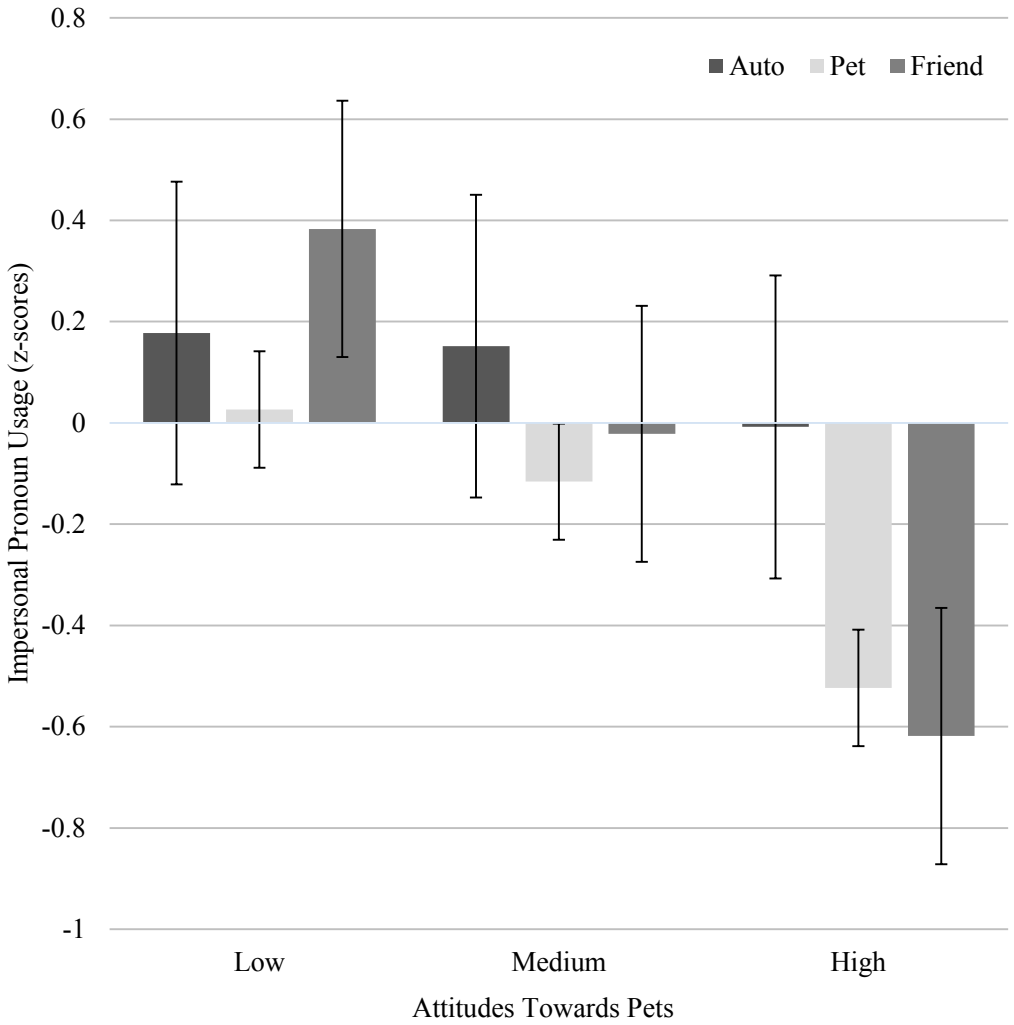

Figure 3. Use of impersonal pronouns as a function of attitudes towards pets and memory category. Error bars are standard errors from the regression models that produced each beta weight.

that this storehouse of memories begins in early childhood. We do not claim that the earliest memory is the sole or best determiner of adult attitudes towards pets. However, being the first retrieved memory gives it unique standing and gravitas, and makes it a useful starting point for examining the relationship between memories and attitudes.

To begin the analysis of the role of memories in adults' attitudes towards pets, we examined the phenomenology of people's earliest memories of pets and compared those assessments to earliest memories of two other salient targets, a friend and an automobile. Friends were chosen as other living beings that offer the possibility of attachment and close relationships, whereas automobiles were chosen as non-living objects likely to have been experienced as a child. We also administered the PAS-M to assess whether contemporary attitudes towards pets were related to any of the pet memory characteristics.

Our analyses and assessments of the pet memories followed three approaches. We first compared the phenomenological dimensions of the three memory types and explored whether there were any significant correlates between these dimensions and attitudes towards pets. We then examined objective, structural characteristics of the memories (e.g. word count, discussing one's own or another's pet) and the interactive nature of the remembered event. Finally, we conducted a textual analysis of each of the three memory categories. In the main, the answers to all four of our research questions were in the affirmative: (1) there were differences in the reported earliest memories of pets compared to those of other salient targets; (2) structural and functional memory characteristics differed between pets and other targets; (3) textual analyses revealed differences between autobiographical memories of pets and other targets; and (4) several of the differences found above were related to adult attitudes towards pets. The following sections address these findings.

Significance of MEQ and Textual Analyses

The analysis of the MEQ dimensions showed that pet and automobile memories had higher scores than friend memories on accessibility, sensory detail, and emotional intensity. Both were surpassed by friend memories on the valence dimension (higher scores mean more positive evaluation of the memory). The valence results were mirrored in positive and negative affective language, as indexed by LIWC, with friend memories being more positive and less negative than the others. The language results further highlighted a subtle difference in emotionality that was not captured by self-reports. According to participants' usage of positive emotion words, pet memories were less positive than friend memories, but more positive than automobile memories. More tellingly, memories of pets contained more references to negative affect than did memories of automobiles, but memories of pets and friends were similarly negative. In other words, although pet memories were less positive than friend memories, in terms of overall affective language, memories of pets were more similar to memories of friends than they were to memories of the inanimate automobile. A likely explanation for friend memories being more positive than pet memories – confirmed by both judged memory content for words dealing with death or loss and a subsequent LIWC analysis for death-related words such as *coffin* and *dead* – is that pet memories were more likely to focus on participants' early experiences with loss and death than were other memories.

Moderator analyses shed further light on the link between the emotional character of memories of pets and friends, revealing that people who like pets as adults remember pets in the same ways that they remember friends,

in terms of negative emotion and social language. Specifically, memories of friends and pets used impersonal pronouns and references to negative emotion more similarly to the degree that participants expressed more positive attitudes towards pets. For people who liked pets the least, pet memories were indistinguishable from automobile memories and distinct from friend memories in those same language categories (Figures 2-3). On the other hand, people with the most positive attitudes towards pets used similarly low rates of impersonal pronouns (e.g., *it*, *that*) and similarly moderate rates of negative emotion words (e.g., *scared*, *hated*) in memories of pets and friends. These results suggest that adults who hold more positive views of pets tend to process memories of pets and friends similarly. In some cases, thinking of pets as friends was literal. For example, one participant who held very positive attitudes towards pets remarked in her friend memory, "I have always considered my pets to be my friends." For many participants, the process was likely more abstract. We interpret the linguistic evidence as indicating that people with more positive attitudes towards pets remember pets more intimately, whereas those with negative attitudes towards pets appear to be thinking of pets more impersonally as objects, such as automobiles, rather than sentient beings. Future research may test whether using socially and emotionally distant language while describing pets relates to more specific pet-related attitudes (e.g., regarding pet care or animal rights).

The greater phenomenological dimension scores of pet memories over friend memories may support the idea that pets have a special place in our experiences over other significant, living beings (i.e., friends). However, this conclusion has to be tempered by the fact that memories for pets and automobiles were not significantly different from each other in the five MEQ dimensions. The selection of the automobile memory category was not entirely arbitrary, as the earliest memory of an automobile was chosen to represent a salient non-living object likely to produce a memory. It would seem, however, that we chose a salient object with special attributes. A marketing study on brand preferences (Braun-LaTour, LaTour, & Zinkman, 2007) explored individuals' earliest memories of cars, specifically because of the large literature on the relationship between automobiles and self-concept (Belk, Bahn, & Mayer, 1982) and the saliency of the car in American society. It would appear that in our attempt to provide a salient non-living object we may have chosen one that, for many participants, was as meaningful as a pet.

MEQ Predicts Attitudes Toward Pets

The valence of pet memories and the composite scores over all five MEQ dimensions yielded significant, albeit modest, positive associations with attitudes towards pets, as indexed by the PAS-M. Complementing the self-report results, language analyses showed that people with more positive attitudes towards pets recalled childhood pet memories that were more personal (more *I* and *me*), less socially distant (fewer impersonal pronouns such as *it* and *those* and impersonal nouns such as *person* and *guy*), and less negative, suggesting greater human-pet interactivity. As noted in the previous section, people with higher PAS-M scores also showed greater similarity between memories of pets and friends in negative emotion and impersonal pronoun categories. Specifically, people with the least positive attitudes towards pets were much more negative in their descriptions of pet memories than in auto or friend memories, and used a high rate of impersonal pronouns in both auto and pet memories. These effects

are consistent with the hypothesis that the nature of the memories of our earliest childhood experiences plays a role in shaping our current attitudes and beliefs about pets. We cannot be certain about the mechanism by which the self-identified earliest memories obtain persistence into adulthood, but emotions have been found to be important in determining which memories persist during childhood (Peterson, Morris, Baker-Ward, & Flynn, 2013). In Peterson et al. (2013), those memories with positive, negative, and even mixed emotions were more likely to persist over a 2-year period than less emotional memories, and this was true even for children 4 to 5 years old. Although that study did not include a longitudinal follow-up to determine if such persistence would have lasted into adulthood, it shows that emotions can remain attached to childhood memories and can influence those memories' longevity over a long period of time.

Importance of One's Own Pet

A second level of analysis of the MEQ data centered on the memories *per se*. To begin, the number of words used in the descriptions of the three types of memories did not differ substantially, although women wrote longer pet and friend memories than men did. Participants also indicated whether the pet memory was based on their own or someone else's pet. The majority of pet memories were based on ones' own pet (83.4%), and both the positivity of pet memories and attitudes towards pets were higher for those who recalled memories of their own pets. Having a memory of ones' own pet would usually imply a closer and longer relationship with the pet that is the subject of the earliest memory, and also a greater opportunity to bond both biologically and psychologically with the pet (see Olmert, 2009 for a general account).

The superiority of both greater valence and PAS-M scores for one's own pets is also consistent with Nelson's (1993) elaborative model of why certain memories persist. In Nelson's terms, families with pets are more likely to discuss and relive experiences and events with that pet (and possibly other pets) during the course of childhood and forward through development, thus keeping the memory of the event alive. That could build a stronger bond, expectation, and tolerance for pets, ultimately affecting both memory valence and adult attitudes towards pets consistent with Johnson et al.'s (2011) description of attitude development. In further support of this explanation, Tovares (2010) has found that a "family identity that includes pets emerges in diverse small stories that are embedded in on-going conversations and occur in a variety of places" (p. 1).

Interactive Imagery Predicts Attitudes Towards Pets

In spite of there being fewer memories for pets that could be described as being interactive in nature, compared to friends and automobiles (perhaps because a child would be more likely to play with a friend or ride in an automobile), participants reporting interactive memories of pets rated the memories more positively and expressed more positive attitudes towards pets. These results are buttressed by language results showing that adults with more positive attitudes towards pets used more self-references (e.g., *I*, *me*) in pet memories, suggesting greater interactivity in those memories. Interactions with a pet are probably more likely to lead to greater bonding and satisfaction with the pet, and in the long term, to more positive attitudes. Indeed, it is difficult to see how bonding with a pet (in childhood or as an adult), can attain substantial levels in the absence of interaction.

Limitations

We would be remiss if we did not acknowledge that the correlations between both valence and composite memory scores and scores on the PAS-M, though statistically significant, were quite modest. Future research may be able to develop new measures and secure a greater level of predictability. For now, however, we are encouraged that the present findings point in several promising directions.

As a somewhat critical observation, it should be noted that according to the Cunningham et al. (2007) iterative reprocessing model, requiring participants to recollect and to write down their earliest pet memory constitutes another iteration of that memory, and introduces the potential for attitude embellishment and augmentation. Subsequent completion of the PAS-M (i.e., measuring pet attitudes dependent on the stored memories) could possibly have been affected by the act of memory recollection and the reflective processing required by making the phenomenological ratings. We believe that one's earliest memories have a good degree of stability, and that they may have surfaced and have been retold and reflected upon many times in one's lifetime, reducing the potential effect of yet another recollection. However, future research should determine what effect, if any, the act of contemporary memory retrieval *per se* has on attitude judgments.

Finally, as in any study that analyzes language, we would have more confidence in our findings if the text samples had been longer. The word count cut-off of 10 words is the bare minimum that has been used in past research (Tausczik & Pennebaker, 2010). Larger text samples, like larger samples of participants, more reliably and robustly reflect individual differences in how people think and talk about a given topic (Pennebaker et al., 2007). The 600-character cut-off may have additionally limited the level of detail that participants recounted during the writing task and consequently compressed the sample's linguistic variability. On the other hand, limiting text samples to 600 characters did provide the benefit of ensuring that the task was relatively uniform for all subjects. Without the upper character limit, the amount of time that participants spent on the task could have varied dramatically, effectively meaning that different participants would have completed different tasks based on how much time they had available. Future studies of writing and memory may require that participants write at least 100 or 200 words for each memory as well as also limiting the time participants spend on the writing task, thus ensuring that text samples are both sufficiently large and relatively consistent across participants.

Future Research

Our findings serve as an example of how one might derive human-animal interaction questions and answers within a particular area of cognitive functioning. One might inquire about the saliency, primacy, availability, and recall of pet memories in situations without a specific "pet" prompt. That is, to what extent are early childhood memories about pets automatically triggered or retrieved, resulting in intrusions in the "stream of consciousness," a current, ongoing dialogue with one's self (James, 1890) when a person encounters a relevant environmental stimulus, such as a pet-related object or event? Further, to what extent are these triggered pet memories more likely in people with higher pet bonding scores, levels of attachment, and so on?

It may also be the case that people with more experience with pets and higher bonding or attachment scores process animal- or pet-related information differently due to greater vigilance or processing fluency. Such

individuals may have worldviews, frames of reference, or processing schemata that tend to be expressed in pet or companion animal terms. In general, we contend that a better understanding of human-animal interaction will result from theoretical and empirical work on how pets are "processed" by the human cognitive system, in all its stages (i.e., perceiving, processing, responding), and that this study provides an example of the benefits that such basic research offers.

This study also demonstrates how computerized text analysis can be a useful complement to self-report measures of memory qualities in three main ways. First, language results may overlap with self-reports in some respects, providing convergent evidence (for example, supporting the self-report evidence that friend memories are more positive than pet memories). Further, text analysis provides behavioral data that may help to explain findings from self-reports (e.g., by showing that pet memories' more negative tone may be explained by those memories' greater focus on death). Finally, exploring the text of individuals' memories can reveal patterns not predicted by existing theory and therefore suggest future avenues of research (e.g., by showing that people with more positive attitudes towards pets write about friend and pet memories more similarly).

In everyday life, people talk or write about memories frequently. Autobiographical recollections rarely take the form of checking boxes on a computer screen. Memory research may often ask individuals to recount memories in their own words, but systematically analyzing the resulting language when they do is much less common (but see Selcuk, Zayas, Gunaydin, Hazan, & Kross, 2012; Grysman & Hudson, 2011). This study provides evidence that computerized text analysis is a practical tool that can be used alongside more traditional means of studying memory to advance memory theory, particularly in the domain of autobiographical memories that receive significant reprocessing and narrative reconstruction throughout the lifespan (Cunningham et al., 2007).

Conclusion

This study provides further evidence that early childhood experiences, as revealed here in adults' memories, play a role in determining adult attitudes towards pets. We have found that an adult's single, 40-word, earliest pet memory contains a wealth of information about how such memories differ from those of other salient targets, especially from another salient being (i.e., a friend), and the extent to which characteristics of those memories predict adult attitudes towards pets.

We believe this study on earliest pet memories to be the first to integrate empirically the broad fields of human memory, lexical analysis, and human-animal interaction. We hope that the results of this study will inspire others to ask new and potentially fruitful questions that cross the boundaries of theoretical and empirical arenas in the study of how we interact with our non-human friends and companions.

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Footnote

[1]The age of memory scale was not wholly interval, since the last allowable entry was defined as 6+ years, so strictly speaking mean scores and an ANOVA on these comparisons would violate the assumption of interval data. Acknowledging that limitation, a repeated measure, one-way ANOVA tested whether age of memory differed among memory types. A significant overall effect was found ($p = .045$), but subsequent individual comparisons with the Bonferroni adjustment for multiple comparisons yielded no significant differences among the means for the different types of memories (all ps $> .05$).

Appendix: Modified MEQ Instrument for All Three Objects: Pet, Friend, Automobile

For each, participants chose one of the following; strongly disagree (1), disagree (2), neither agree nor disagree (3), agree (4), strongly agree (5). Numbers in parentheses are the numerical values used, and "R" signifies the answer was reverse scored.

Vividness:

My memory for this event is clear.

My memory for this event is very detailed.

My memory for this event is very vague. R

Accessibility:

This memory just sprang to mind when I read the instructions.

This memory was easy for me to recall.

I had to think for a while before I could recall this event. R

Sensory Detail:

As I remember the event, I can feel now the emotions that I felt then.

When I recall this event, I think the same things I thought when the event originally happened.

As I remember the event, I have a difficult time recalling the particular physical reactions and sensations I had during the experience. R

Emotional Intensity:

My emotions are very intense concerning this event.

The memory of this event evokes powerful emotions.

I do not have strong emotions about this event. R

Valence:

The overall tone of the memory is positive.

My feelings at the time were positive.

The experience described in this memory is negative. R