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Memory for partner-related stimuli: Free recall and frequency estimation

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ABSTRACT

The role of partner schema in memory for laboratory-presented stimuli was examined to evaluate the existence of memory bias associated with partner sentiment. Highly dissatisfied (n = 30) or satisfied (n = 35) dating individuals rated, recalled, and estimated the frequency of positive and negative partner trait-relevant words. Word applicability ratings were consistent with relationship schema for all participants. Recall for positive partner-related words was schema consistent, but recall for negative words was unrelated to relationship satisfaction. All participants accurately estimated the proportion of positive and negative words, suggesting that recall is better than frequency estimation for detecting partner schemas in memory. Together, findings suggest a positive sentiment-override in memory for partner-related stimuli in dating relationships.

KEY WORDS: dating relationships • frequency estimation • memory • recall • relationship satisfaction • schema • sentiment override

Research has previously examined the role of schemas in memory (e.g., Hastie & Kumar, 1979; Rojahn & Pettigrew, 1992), but only recently has this research been extended to close relationships by using partner-applicable stimuli. In this study, individuals' memories for partner-relevant words are investigated to determine whether these memories are affected by relationship satisfaction. The main focus of this study is to better understand memory for partner-related stimuli among satisfied and dissatisfied dating individuals.

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Memory research is particularly relevant to the study of romantic relationships because evidence that global views of one's partner may affect retrieval of specific relationship events has important implications on psychological assessment of couples in both research and clinical contexts. In the present study, we ask whether satisfied individuals rate and retrieve partner-relevant stimuli in a different manner than dissatisfied individuals.

Factors affecting memory of external stimuli

A schema is a presumed interconnected knowledge structure where information is classified based on past experiences, perceptions, and expectations (Andersen, 1993; Rojahn & Pettigrew, 1992). In romantic relationships, past experiences can be internalized and can then be re-enacted to guide future behavior and influence relationship satisfaction (Andersen & Saribay, 2004). For instance, a schema can influence behavior by virtue of previous experiences ("The last few times I behaved in X manner, my partner responded in Y manner") which are aggregated and generalized into if-then contingency-based statements ("If I behave in X manner, then my partner will respond in Y manner"). Such contingencies can influence reinterpretation of specific past events, and can be transferred to new experiences by affecting an individual's expectations for their partner's future behavior. These reinterpretations and expectations can influence (and be influenced by) relationship satisfaction. Substantial overlap between a *relationship* schema and a *partner* schema has been proposed, as both are part of the general relational schema (e.g., Baldwin, 1992). As such, the present paper focuses on the role of relationship satisfaction in schema of the partner.

Consistent with the notions of relational schema, *sentiment override* (Weiss, 1980) suggests that individuals are more attuned to information (positive or negative) confirming their overall sentiment toward their partner. Processing of specific partner-relevant information is likely to fit this global sentiment. Therefore, general attitudes toward the partner are assumed to affect perceptions of the partner in a manner that is consistent with relationship satisfaction.

In addition to affecting perception, schemas can color memories (e.g., McFarland & Ross, 1987; Ross, 1989). Ross's (1989) wide-ranging review indicated that individuals' recollection of past events is often affected by factors related to current experience. In addition, information retrieval consistent with one's present emotional (e.g., Blaney, 1986; Bower, 1981) or cognitive (e.g., Rholes, Riskind, & Lane, 1987) state at the time of retrieval was more likely than retrieval inconsistent with the present state. In other words, circumstances surrounding an event or situation may prime one to retrieve information consistent with one's current state of being. Consistent with this notion, we hypothesize that individuals highly satisfied in their relationship may demonstrate a bias in the recall of positively valenced information.

Little laboratory-based work has been conducted on the role of partner schema in memory within the domain of close relationships. The present study follows a study by Whisman and Delinsky (2002) that examined the

role of relationship satisfaction in memory among a community-based sample of 43 married couples. The encoding phase consisted of participants rating 20 positive and 20 negative partner-relevant adjectives in terms of whether or not they described the spouse. Participants were then asked to retrieve as many of those words as possible during an unexpected free recall task. The authors then calculated the number of words from the encoding (rating) phase that were rated as partner-applicable, and, of these, the number that were recalled accurately during the retrieval phase. Relationship satisfaction was positively correlated with the number of partner-applicable positive words and negatively correlated with the number of negative words endorsed, suggesting that ratings of relationship-relevant words were associated with participants' relationship satisfaction. In addition, relationship satisfaction was inversely associated with the number of negative words (but not positive words) endorsed and then recalled. These results suggest a recall bias facilitating memory for schema-consistent negative stimuli.

Three potential retrieval effects

There are many ways that retrieved information can be compared with originally presented information. Three potential retrieval effects are identified and briefly discussed.

Schema consistent

If memory is schema consistent, individuals should be more likely to recall relational information biased by relationship satisfaction. In other words, satisfied individuals would retrieve more positive (and less negative) partner information than dissatisfied individuals. Whisman and Delinsky (2002) clearly support schema consistency for negative words. Support for schema consistency also comes from other lines of research. For example, normal weight and overweight adolescents were presented with words representing high-caloric foods and controls (Soetens & Braet, 2007). Overweight participants recalled more food words than the normal weight subjects on a free recall task, but groups did not differ in the recall of control words. These findings suggest that overweight participants demonstrated a bias which "may well reflect a more elaborative encoding of this type of information [i.e., food words] or a bias at the retrieval stage of memory processing" (Soetens & Braet, p. 297). Denny and Hunt (1992) found that, when asked to rate and then later engage in free recall positive and negative self-related adjectives, non-depressed individuals recalled more positive than negative words, while depressed individuals recalled more negative than positive words. This suggests that depressed and non-depressed individuals are each more likely to recall words that fit their self schema.

Schema inconsistent

Memory can also be biased by being schema inconsistent. Indeed, some research suggests that individuals remember more behavior that *violates*

expectations. Such information, by virtue of being contrary to expectation, may stick out in one's mind (e.g., Wyer & Gordon, 1982). In another study, Hastie and Kumar (1979) had participants engage in a series of laboratory tasks. For example, participants read eight trait adjectives about a fictional target person, then read 20 sentences about that target (12 consistent with the trait adjectives, four inconsistent, and four neutral), and finally performed a written free recall task. Results indicated more accurate recall for schema-inconsistent information. Along similar lines, Pyszczynski, LaPrelle and Greenberg (1987) provided evidence of schema inconsistent vs. consistent retrieval of information about a fictional target. Finally, a meta-analytic study indicated that, using free recall, schema-inconsistent information is retrieved slightly more accurately than schema-consistent information (Rojahn & Pettigrew, 1992).

Schema independent

Finally, it is possible that recall of past events is not affected by partner schema. Although other individual-level factors (i.e., decay, memory capacity, susceptibility to interference) may affect retrieval, it suggests that people's memories are generally unbiased by their general schema *of the partner*.

To test schema consistency, schema inconsistency, or schema independence in retrieval, it is important to sample from a broad range of stimuli. Therefore, the present study included both positive and negative descriptors to allow for schema-consistent and inconsistent information to be coded by both satisfied and dissatisfied individuals.

Emotional valence, or the differential recall of positive and negative words irrespective of partner schema, produces greater memory for negative stimuli in younger adults (e.g., Charles, Mather, & Carstensen, 2003; Grady, Hongwanishkul, Keightley, Lee, & Hasher, 2007) and sometimes for positive stimuli in older adults (e.g., Charles et al., 2003; Spaniol, Voss, & Grady, 2008). However, this valence bias does not apply to the present investigation because previous studies utilized stimuli that had neither personal relevance to the participants nor were processed for personal relevance. The present study focused on the effects of partner schema-related processing of personally relevant words.

The present study

The present study is similar to Whisman and Delinsky (2002), and our main goal was to determine if differences exist in memory processes for satisfied and dissatisfied individuals. This study differs from that previous research in notable ways. First, we selected a college dating sample to determine the role of schemas on memory in the early stages of relationships. Given their greater fluidity, it may be that some college relationships end because one or both couple members aren't "happy enough." When marriages end, unhappiness has been developing for a considerably longer time. Therefore, recall of positive stimuli may be more salient in college dating relationships than negative stimuli. The present study compares highly satisfied

individuals to highly dissatisfied individuals, maximizing the likelihood that truly "unhappy" (rather than "not happy enough") couples would be included in the sample.

Second, we conducted multiple memory analyses to maximize sensitivity to differences between satisfaction groups. We utilized Whisman and Delinsky's (2002) technique (recall only of high-applicability words), particularly since stimulus relevance (rather than schema consistency or inconsistency) is key to retrieval (Hastie, 1980; Judd & Kulik, 1980). In addition, consistent with considerable research, we calculated recall of all originally presented words (e.g., Tulving, 1962).

Finally, in addition to the free recall task, we also included a frequency estimation task. Some research suggests that retrieval can happen either effortfully (e.g., free recall), or automatically (e.g., frequency estimation, Zacks & Hasher, 2002). Although there is some debate concerning this effort-based distinction (Greene, 1986; Maki & Ostby, 1987; Naveh-Benjamin & Jonides, 1986), it is generally agreed that free recall and frequency estimation tap different types of information and have different implications (Bradburn, Rips, & Shevell, 1987). For instance, unlike free recall, frequency estimation involves counting or estimation (Brown, 1995; 1997; 2001). Therefore, including both tasks may allow us to measure both fine-grained (free recall) and more general (frequency estimate) outcomes. We hope to ascertain whether frequency estimation is schema independent (frequency estimation may exhibit less bias than free recall) or whether it is schema dependent, suggesting that both techniques are able to tap memory bias.

Hypotheses

Word ratings. We hypothesize that satisfied individuals will rate positive words as more applicable, and negative words less applicable, to their partners than dissatisfied individuals (see, e.g., Whisman & Delinsky, 2002). We also hypothesize that both satisfied and dissatisfied individuals will generally rate their partner in positive terms. Although we predict differences between satisfied and dissatisfied individuals, overall partner perceptions are more positive than negative. Extremely negative partner perceptions at such an early relationship stage would likely lead to immediate relationship termination.

Free recall. Laboratory-based research on the role of schema on free recall has typically used fictional targets. Consistent with Whisman and Delinsky (2002), participants in the present study processed personally and affectively relevant information based upon relevance to their dating partner. Therefore, in the free recall task, we hypothesize a schema-consistent effect such that people will recall more information that is applicable to their partner.

Method

Participants

Participants were screened based on relationship satisfaction and other variables from a pool of 337 individuals who expressed interest in the study. A strong association exists between the global satisfaction item (#31) from the Dyadic Adjustment Scale (DAS; Spanier, 1976) and the full DAS (Goodwin, 1992; Jose & O'Leary, 2009; Sharpley & Cross, 1982). Informed by these findings, our first pilot study on the distribution of relationship satisfaction scores in a college student sample (Williams, O'Leary, Rajaram, & Persampiere, 2005) used DAS Item 31 (range: 0–6) as a screen for relationship satisfaction, and found that participants scoring 0–2 were in the lowest 10% of that sample, and participants scoring 5–6 were in the highest 10%. Based on these findings, we recruited participants scoring between 0 and 2 ("dissatisfied") or 5 and 6 ("satisfied") in preliminary screening to ensure that the current sample included both very satisfied and very dissatisfied individuals. Dating relationships may be relatively fluid, and thus less likely to be highly dissatisfying relationships than marriage.

In addition to relationship satisfaction, other inclusion criteria included: (i) were currently in an exclusive romantic relationship, (ii) with a partner of the opposite sex, (iii) had been dating for at least 6 months, and (iv) had not participated in a related pilot study. The final sample included 30 dissatisfied individuals and 35 satisfied individuals. The 65 students (63% female; 44.6% White) from a large northeastern university received class credit or US$20 payment for completion of the study. On average, students were 20.07 years old (SD = 3.56 years) and the median dating relationship length was 15 months.

Satisfaction groups differed significantly on time spent together per week. Dissatisfied individuals (M = 21.08, SD = 16.48) reported spending fewer hours together than satisfied individuals (M = 33.69, SD = 23.44), $t(56)$ = –2.40, $p < .05$, Cohen's d = .62. Relationship satisfaction groups did not differ on a variety of other variables such as participant gender, participant age, relationship length, or self-reported drinking problems.

Materials

Word list. A set of 32 adjectives describing positive (e.g., *approachable*, *caring*) and negative (e.g., *dishonest*, *unreliable*) traits were selected from a list of words and accompanying normative information provided by Kucera and Francis (1967). Nineteen (approximately 60%) of the words were positive and 13 were negative. Positive and negative words did not differ on word length or frequency of use in American English (Kucera & Francis, 1967).

The 60–40 ratio of positive to negative words was based upon a second pilot study of 341 undergraduates not involved in the full study designed to determine the ideal ratio of positive to negative trait words (Jose, Rajaram, O'Leary, & Williams, 2006). Ratios were tested at 5% intervals to determine a ratio where participants (who were *not* primed to think about a

relationship) could accurately estimate the frequency of presented words. The 60–40 split was judged appropriate as pilot participants were most accurate in the frequency estimation task.

Measurement

Demographics. Participants answered questions focusing on demographics (age, gender), their relationship (length of time dating, time spent together per week), and factors that may influence their memory (alcohol use).

Relationship satisfaction. The DAS (Spanier, 1976) measures general relationship adjustment in a number of areas. The global satisfaction item (Item 31) asks participants for their overall level of satisfaction in the relationship, accompanied by a Likert scale ranging from 0 ("Extremely Unhappy") to 6 ("Perfectly Happy"). This brief assessment of satisfaction correlates strongly with the full DAS and is able to discriminate between satisfied and dissatisfied individuals (Goodwin, 1992; Sharpley & Cross, 1982). Item 31 and other single-item dyadic satisfaction measures of have been utilized to screen potential participants in the past (e.g., Atkins, Baucom, & Jacobson, 2001; Babcock, Roseman, Green, & Ross, 2008).

Procedure. During the first session, participants provided demographic information, and engaged in a series of tasks.

Oral history task. Participants were asked to describe their relationship with the romantic partner for up to 3 minutes, with minimal intervention from the experimenter. The experimenter only probed for more information if the participant stopped speaking for at least 5 seconds before 3 minutes had passed. Up to three nondirective probes were used, and if the participant was still unable to continue, the interview was stopped. This procedure is similar to that used by Halford, Keefer and Osgarby (2002) to prime participants to think about their own relationship when engaging in the remaining tasks.

Word rating and distracter tasks. Immediately following the oral history task, participants were asked to rate each of the words that appeared on a computer screen for "How well does this word describe your partner?" Participants responded on a seven-point Likert-type scale (1 = "Not at All" and 7 = "Very Much So"). Each word appeared for 6 seconds, regardless of the speed with which the rating was made. In addition to the 32 words analyzed here, participants responded to six "buffer" words which were not included in the analyses but were used to control for primacy and recency effects. Directly after the word rating task, participants played Solitaire on the computer for 10 minutes, as a distracter.

Free recall and frequency estimation. After the distracter task, participants were asked to recall as many words that they had rated as possible in 7 minutes. They then estimated, in percentages, the relative frequency of

positive to negative words. The recall and frequency estimation tasks were not counterbalanced since previous results did not indicate order effects. Frequency estimation followed free recall (Jose, O'Leary, Rajaram, & Williams, 2009).

Rating of recalled words. After the recall and estimation tasks, participants rated each recalled word (including intrusions, that is, words that were not the originally presented stimuli) as positive, negative, or neutral.

Results

Participants were asked to rate, and later retrieve, a series of 32 target words that may or may not have been applicable to their partner. Given our hypotheses, we conducted independent sample *t*-tests (two-tailed) to compare high vs. low satisfaction groups on each outcome variable separately for positive and negative words.

Word rating task

Positive words. Satisfied individuals (M = 6.12, SD = .62 on a 0–7 scale) evaluated positive words as significantly more applicable to their partner than did dissatisfied individuals (M = 5.35, SD = .96), $t(54) = -3.56$, $p < .01$. Along similar lines, satisfied participants rated more positive words (i.e., 97%, M = 18.53, SD = 1.29) as highly applicable (i.e., rated above the midpoint of the scale) than did dissatisfied participants (88%, M =16.52, SD = 2.93). Although both satisfied and dissatisfied individuals rated the large majority of positive words as applicable to the partner, the difference between groups was significant in the schema consistent direction, $t(55) = -3.48$, $p < .01$, $d = .94$.

Negative words. Individuals in satisfied relationships rated negative words as less applicable to their partner (M = 2.07, SD = .75) than those in dissatisfied relationships (M = 2.83, SD = 1.00), $t(55) = 3.24$, $p < .01$. When considering only highly applicable negative words, dissatisfied individuals rated twice as many words (34%, M = 4.40, SD = 3.24) as highly applicable compared with satisfied individuals (16%, M = 2.06, SD = 2.33), $t(55) = 3.17$, $p < .01$, $d = .85$. As with positive words, these results indicate schema consistency; however, even dissatisfied individuals rated fewer than five negative words as highly applicable to the partner.

Recall of all words

Accurate recall was initially measured using the standard measure (using all words). The number of words accurately recalled was divided by the total number of words. Separate ratios were created for positive and negative words. For positive words, satisfied individuals accurately recalled a significantly greater percentage of words (40%, SD = .11) than did dissatisfied

individuals (31%, SD = .10), $t(55) = -3.07$, $p < .01$, $d = .83$. This difference was significant in the schema-consistent direction. For negative words, satisfied (26%, SD = .16) and dissatisfied (23%, SD = .15) individuals did not differ in the percentage of words recalled, $t(55) = -0.77$, $p = .45$, $d = .21$.

Recall of highly applicable words

Following Whisman and Delinsky (2002), recall was also assessed by focusing specifically on words deemed highly applicable. Recall was measured by the number of accurately recalled, applicable words divided by the total number of words participants had rated as applicable.

For positive words, satisfied participants successfully recalled significantly more applicable words (39%, SD = .13) than did dissatisfied participants (30%, SD = .13), $t(56) = -2.75$, $p < .01$, $d = .73$. Dissatisfied participants (28%, SD = .30) and satisfied participants (17%, SD = .22) did not differ in the number of applicable but negative words, $t(40) = 1.37$, $p = .18$, $d = .43$.

Recall of intrusions

Satisfied and dissatisfied participants did not differ on the recall of positive intrusions (satisfied $M = 5.00$; dissatisfied $M = 4.84$, $t(56) = .23$, $p = .82$, $d = .06$), negative intrusions (1.46 vs. 1.13, $t(56) = .23$, $p = .82$, $d = .06$), or neutral intrusions (.84 vs. .77, $t(56) = -0.29$, $p = .77$, $d = .08$).

Frequency estimation

Participants estimated the percentage of positive and negative words they had seen. Only estimates of positive words are presented. Satisfied and dissatisfied individuals' retrospective frequency estimates did not differ $t(61) = .59$, $p = .59$, $d = .15$. The mean estimate was 59.52% (SD = 16.96) positive words, almost identical to the actual frequency of 59.4%.

Discussion

The aim of this study was to determine whether free recall and frequency estimation of information about a partner differed as a function of relationship satisfaction. We hypothesized that word ratings and free recall would vary as a function of relationship satisfaction in a schema-consistent manner. In addition, we investigated the role of relationship satisfaction in the estimated frequency of positive and negative words. These issues were examined in a dating college sample to determine whether relationship satisfaction can influence partner-relevant memory in early stages of romantic relationships.

Word ratings

As predicted, ratings of both positive and negative words were schema consistent. Satisfied individuals rated positive words as more characteristic of their partner than did dissatisfied individuals, and dissatisfied individuals rated negative words as more characteristic of their partner than did satisfied individuals. Satisfied individuals also rated more positive words as highly

applicable than did dissatisfied couples, and dissatisfied individuals rated more negative words as highly applicable than did satisfied individuals. Consistent with Whisman and Delinsky (2002), relationship satisfaction influences how dating individuals rate partner-relevant traits. It should be noted, however, that both satisfied and dissatisfied participants in this study rated a large majority of positive words as highly applicable to the partner. This suggests that, although satisfaction influences word ratings, participants see their partners in a positive light.

Free recall

In the standard measure of recall, involving all words, recall of positive words was schema consistent, while recall of negative words did not differ between satisfied and dissatisfied groups. The relative instability of college dating relationships (compared with marriage) may explain the null effect for negative words. Given their long-term expectations, marriages may end only when partners are truly unhappy (emphasizing the role of negative schemas), while dating relationships may be more likely to terminate quickly when partners aren't happy "enough" (emphasizing the role of positive schemas). As an unhappy dater may exit his or her relationship relatively quickly compared with a spouse, the dissatisfaction may occur for much shorter duration in dating relationships. Therefore, truly unsatisfying dating relationships are unlikely to last long enough to be eligible for this study.

In addition, following Whisman and Delinsky's study (2002), recall was measured considering only words originally considered highly applicable. As with the standard recall measure, schema consistent recall was found for positive words but not for negative words.

Differences between dating and marriage are likely key to understanding how the current results differ from Whisman and Delinsky (2002), who used a married sample. Therefore, the negative override in Whisman & Delinsky's (2002) married sample and the positive override in the present dating sample provide a window into how "relationship dissatisfaction" might vary across samples. We attempted to ensure two differing relationship satisfaction groups were represented, to take into account the relative instability of college dating relationships. It appears that dating relationships fundamentally differ from marital relationships, and that this difference accounted for the difference in results. Our findings suggest that negativity may be a more salient indicator of dissatisfaction and distress in married couples, while a lack of positivity may be a better indicator in dating couples. Indeed, dissatisfied daters rated relatively few negative words, and rated a large number of positive words, as highly applicable to their partner.

Some research suggests that free recall is typically schema consistent (e.g., Whisman & Delinsky, 2002), while other research suggests that free recall is schema inconsistent (e.g., Rojahn & Pettigrew, 1992). Many of the schema-consistent studies incorporate personally relevant stimuli in recall measures (e.g., Whisman & Delinsky, 2002), while many schema-inconsistency studies utilize fictional targets (descriptions of an imaginary person; e.g., Hastie & Kumar, 1979). In addition, studies that yield schema-inconsistent

findings often include data about imaginary targets that is novel and informative, regardless of whether it is schema consistent or inconsistent. In the present study, however, schema-inconsistent partner data is likely uninformative and may be less accessible. It is possible that the use of highly relevant information may yield greater schema consistency when subjected to free recall. This notion merits further research.

Frequency estimation

No significant difference for satisfaction groups emerged when considering frequency estimation. Instead, both satisfied and dissatisfied participants were generally very accurate, and similar to each other, when estimating the frequency of positive and negative words. This suggests that the schema-consistent bias present in free recall does not influence frequency estimation. This may also suggest that the use of cognitively and affectively salient information may not influence frequency estimation and is also consistent with research suggesting free recall and frequency estimation are different constructs (Zacks & Hasher, 2002).

Conclusion

Frequency estimation, free recall, and other tasks used extensively in basic cognitive psychology research have not always translated well to the applied domains of personal relationships, particularly the study of memory of partner-relevant qualities. The area requires additional memory research with implications for intimate relationships, particularly constructs such as sentiment override (Weiss, 1980), a widely cited but understudied phenomenon. Whisman and Delinsky (2002) and the present study each provides partial support for sentiment override, with Whisman and Delinsky (2002) providing evidence for negative sentiment override in a married sample, and the present study a positive sentiment override among a dating sample.

The effect of sentiment override on memory for stimuli associated with a romantic partner (or a romantic relationship) has important implications. "In its strongest form, [sentiment override] poses a threat to the validity of self-report studies on marriage" (Fincham, Garnier, Gano-Phillips, & Osgarby, 1995, p. 5). Thus, research on the implications of sentiment override and schema-based biases in memory for partner characteristics should be extended to relationship characteristics and individual or couple relational behaviors to determine their influence on self-reports in a couple context. More generally, memory for characteristics in non-romantic personal relationships (e.g., friend, or co-worker) may be associated with relationship functioning.

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