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BRIEF REPORT

Remindings influence the interpretation of ambiguous stimuli

Jonathan G. Tullis · Michael Braverman · Brian H. Ross · Aaron S. Benjamin

Abstract Remindings—stimulus-guided retrievals of prior events—may help us interpret ambiguous events by linking the current situation to relevant prior experiences. Evidence suggests that remindings play an important role in interpreting complex ambiguous stimuli (Ross & Bradshaw Memory & Cognition, 22, 591–605, 1994); here, we evaluate whether remindings will influence word interpretation and memory in a new paradigm. Learners studied words on distinct visual backgrounds and generated a sentence for each word. Homographs were preceded by a biasing cue on the same background three items earlier, preceded by a biasing cue on a different background three items earlier, or followed by a biasing cue on the same background three items later. When biasing cues preceded the homographs on the same backgrounds as the homographs, the meanings of the homographs in learner-generated sentences were consistent with the biasing cues more often than in the other two conditions. These results show that remindings can influence word interpretation. In addition, later memory for the homographs and cues was greater when the meaning of the homograph in the sentence was consistent with the earlier biasing cue, suggesting that remindings enhanced mnemonic performance. Remindings play an important role in how we interpret ambiguous stimuli and enhance memory for the involved material.

Keywords Reminding · Interpretation · Ambiguity · Memory · Study phase retrieval

Remindings serve a critical role in navigating novel situations because they direct us to relevant prior knowledge. In doing so, remindings reduce the separation of events distributed in time and space and enable distant events to influence each other (Benjamin & Ross, 2010). Prior research shows that remindings can influence categorization (Ross, Perkins, & Tenpenny, 1990), analogical reasoning (Gentner, Rattermann, & Forbus, 1993), and problem solving (Reeves & Weisberg, 1994). In the present experiment, we evaluated whether remindings play a role in interpreting ambiguous stimuli and whether remindings influence subsequent mnemonic performance for those stimuli, as seen in prior literature (Benjamin & Tullis, 2010). More specifically, we investigated whether remindings can influence our understanding of homographs and whether remindings affect free recall of those homographs.

Considerable research in categorization and problem solving has examined the importance of remindings. Exemplar-based views of categorization suggest that learners rely upon earlier, similar examples as a means of determining category membership (Murphy, 2002; Ross & Makin, 1999). Remindings of noncritical features can affect how items are categorized, sometimes deleteriously (Brooks, Norman, & Allen, 1991; Ross et al., 1990), and can affect what is learned about a category (Medin & Schaffer, 1978; Spalding & Ross, 1994). Remindings in problem solving influence which prior examples are used to solve current problems and what generalization may be induced (e.g., Reeves & Weisberg, 1994; Ross & Kennedy, 1990). Remindings are influenced by the surface similarity of problems, context, learners' expertise, and problem difficulty (Gentner et al., 1993; Gick & Holyoak, 1983; Ross, 1984). Remindings play a significant role in categorization and problem solving; however, their role in encoding and interpreting stimuli remains less well explored.

One study has suggested that remindings impact how stimuli are initially encoded and bias how ambiguous stimuli are interpreted. In Ross and Bradshaw (1994), learners read several stories, some which had two possible interpretations. An unimportant, superficial detail cued the learners to earlier stories that could bias the interpretation of the current ambiguous story. Learners' interpretation of the ambiguous story

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depended upon which cue they received and, hence, which prior story they were reminded of. This prior episodic, and unrelated, information of which learners were reminded biased learners' interpretation of complex ambiguous events. Here, we investigate whether remindings influence interpretation of different, simpler stimuli in a novel paradigm.

While research in higher cognition shows how earlier episodes proactively affect later processing, reminding theory suggests that later episodes retroactively influence memory for earlier items as well. Recent mnemonic theories of reminding suggest that later presentations of associated stimuli encourage retrieval of earlier episodes and that the act of retrieval modifies the memory trace of the earlier item (Benjamin & Tullis, 2010). Through the reminding process, memory is enhanced for the items in an associated pair (Tullis, Benjamin, & Ross, 2013a), for the order of the associated items (Tzeng & Cotton, 1980; Winograd & Soloway, 1985), and for the spacing between associated items (Hintzman, Summers, & Block, 1975). Remindings may also determine the shape of the lag function seen in spacing functions (Tullis, Benjamin, & Ross, 2013b). Across most of the memory literature, remindings are assumed to occur because final mnemonic performance is greater for items that encourage remindings than for other items. For example, remindings are thought to happen because memory performance for the individual members of an associated pair (i.e., *king–queen*) is greater than members of unassociated pairs (i.e., *radish–queen*; Tullis et al., 2013a; see also Bruce & Weaver, 1973). The mnemonic benefits of remindings have also been assessed by asking learners whether a reminding has occurred (Wahlheim & Jacoby, 2013). Self-report procedures rely upon learners' awareness of remindings; furthermore, procedures involving self-reports of remindings encourage learners to strategically look back during study for prior related items, which may obscure the stimulus-driven nature of more natural reminding processes. Unlike prior reminding studies that used self-reports or final mnemonic performance as an indicator of remindings, the present paradigm provides an independent metric of whether a reminding has likely occurred.

In the present study, we investigate whether remindings influence our interpretation of ambiguous stimuli (homographs), using a novel paradigm. Subjects studied a list of single words, including homographs and cues that biased the interpretation of those homographs, presented on distinct backgrounds. Remindings were encouraged by presenting cues and homographs on the same backgrounds. Subjects were asked to write a sentence using each word during the study trial, and we used their sentences to evaluate how learners interpreted the ambiguous words. Finally, subjects took a free recall test on all of the studied items. If remindings influence word interpretation, the meaning of the homographs in the sentences will be consistent with the meaning of the prior biasing cue more when reminding is likely (i.e., when the backgrounds are repeated) than when it is less likely. In addition, if remindings influence memory, mnemonic performance should be enhanced for items of which learners were reminded.

Method

Subjects

Sixty introductory-level psychology students from the University of Illinois at Urbana-Champaign participated in exchange for partial course credit.

Materials

Twenty-four homographs, each with a dominant meaning (one that occurred at least 50 % of the time according to the University of South Florida Free Association Norms (Nelson, McElvoy, & Schreiber, 1998)), were collected. A cue word was selected from the Free Association Norms so as to bias the meaning of each homograph toward its nondominant meaning. Cue words were almost always synonyms of the homograph (e.g., *hit* and *ram*) but were sometimes antonyms (e.g., *sick* and *well*) or disambiguating associates of the homograph (e.g., *tennis* and *court*). Additionally, 17 words that were not related to any of the homographs or cue words were collected to be used as fillers throughout the lists. To counterbalance the ordering of the within-subjects conditions, three different list structures of 65 slots each were created. Across the three list structures, the homographs appeared in the same list positions, while the context cues and filler items shifted positions. For the backgrounds, 49 distinct high-resolution photographs were collected from various Internet sources. Their content included landscapes, art, furniture, animals, architecture, and technology. Examples of study screens are displayed in Fig. 1.

Design

The experiment included three within-subjects conditions: same, different, and reverse. In the *same* condition, the biasing context cue appeared three items before its homograph on the same background as the homograph. In the *different* condition, the biasing context cue appeared three items before its homograph on a different background than the homograph. Finally, in the *reverse* condition, which served as a baseline condition, the biasing context cue appeared three items after its homograph on the same background as the homograph. The *reverse* condition included the same words and backgrounds as the *same* condition, but the homograph and cue were presented in the reverse order from the *same* condition.

While the positions of the homographs remained constant across the three list structures, the order of conditions assigned

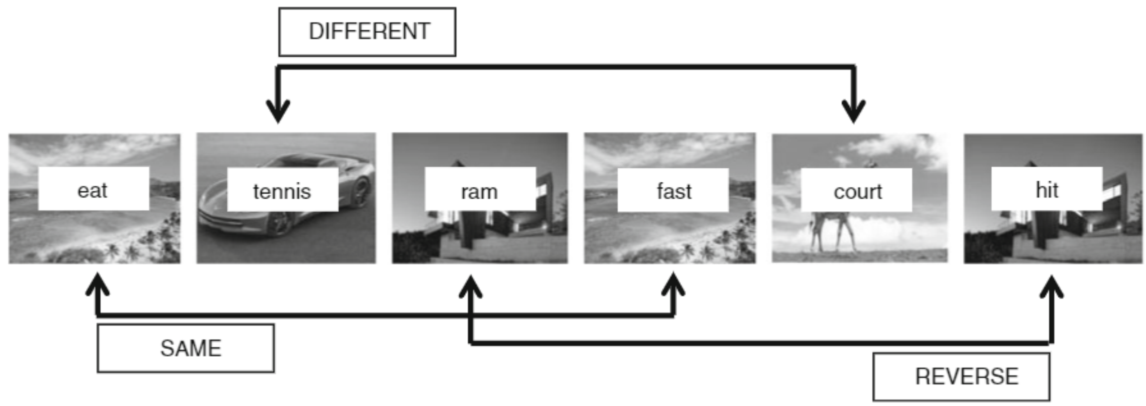

Fig. 1 Examples of possible stimuli

to each homograph was counterbalanced across subjects in order to mitigate against item and order effects. For each list structure, the homographs were assigned alternatively to the three different conditions (i.e., the first homograph was assigned to the *same* condition, the second to the *different*, the third to the *reverse*, the fourth to the *same*, and so on). Subjects were alternatively assigned to each of the three different list structures. Background images were randomly paired with words, with the constraint that they repeated between context cue and homograph when demanded by the conditions in the list structure.

Procedure

Subjects were tested individually on computers programmed with PsyScope. They were instructed that they would see a list of words presented on a variety of background images and that they would be asked questions about the backgrounds. Subjects were also informed that their memory for the words would be tested, and to improve their memory for the words, they were instructed to type a sentence including the word after studying each word. After reading through the instructions, subjects viewed the sequence of 65 presentations of backgrounds and words.

During each trial, a background image was displayed across the full screen for 4 s. Then the question "Have you seen this background before?" was superimposed over the picture in 12-point black font. We asked this question because remindings, and subsequent memory effects, are enhanced by explicitly asking subjects to look back through their memory for related items (Jacoby, 1974). However, a difference between this study and that past work is that learners were never asked about prior words, only prior backgrounds. Subjects responded "yes" or "no" by pressing the "y" or "n" key. Once a subject responded to that question, a target word was superimposed on the background in 48-point black font in a white box placed in the center of the screen. The word was displayed for 2.5 s before a blank white screen appeared, and the subject was asked to type in a sentence using the word they had just studied. After studying the list of presented words, subjects were immediately given a free recall test on paper, where they were asked to write down any words they remembered studying. No time limits during the test phase were enforced, and subjects usually completed the experiment within 50 min.

Results

All statistics reported here are significant at an $\alpha < .05$ level unless otherwise noted. Performance on the background recognition question was very high and consistent across the three conditions (mean = 0.95). Because we wanted to avoid item selection effects and because the patterns of data for correctly recognized backgrounds did not differ from those for misremembered backgrounds, we will analyze all data without regard to the accuracy of this response.

Homograph interpretation

The sentences generated by the subjects were coded for the meaning of the homograph by two researchers blind to the items' condition. The authors initially agreed on 93 % of classifications and resolved disagreements through discussion. For 6 % of the sentences, the meaning of the homograph could not be classified, and these trials were discarded. The nondominant meaning is expected more often when people use the cue to interpret the homograph. The proportion of sentences using the nondominant meaning of the homograph by condition is displayed in Fig. 2. A 3 (condition: same, different, or reverse) repeated measures ANOVA on the percentage of nondominant meanings used revealed that condition significantly affected the use of nondominant meanings, $F(2, 118) = 16.04$, $\eta^2 = .21$. Follow-up *t*-tests revealed that the nondominant meaning was produced in the *same* condition ($u_{same} = 0.40$) more frequently than in the *different* ($u_{different} = 0.27$), $t(59) = 3.63$, Cohen's $d = 0.49$, and *reverse* ($u_{reverse} = 0.25$), $t(59) = 4.70$, $d = 0.73$, conditions. The proportion of sentences using the nondominant meaning of the homograph

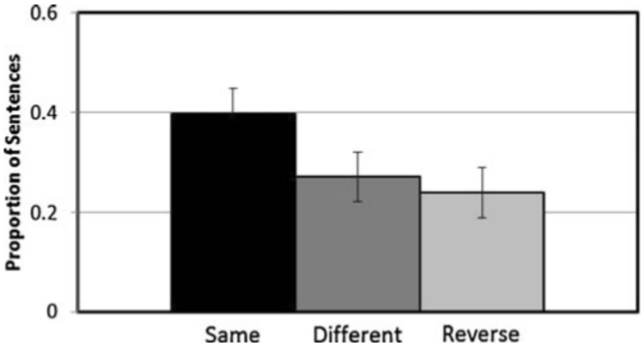

Fig. 2 Proportions of homographs interpreted using their nondominant meaning based upon condition. Error bars show the within-subjects 95 % confidence intervals (see Benjamin, 2003; Loftus & Masson, 1994)

in the *different* and *reverse* conditions did not significantly differ from each other, $t(59) = 0.53$, $p = .50$, $d = 0.15$.

The frequency with which subjects included the associated context cue in the sentence with the homograph was also calculated. Subjects were not instructed to include the related context cue in the sentence with the associated homograph, but it often appeared in the learner-generated sentence for the homograph. Counting the frequency of this provides an interpretation-free measure of homograph meaning and is more conservative than the interpretation measure reported above. Condition significantly affected the proportion of sentences using the context cue, $F(2, 118) = 17.19$, $\eta^2 = .23$, as is shown in Fig. 3. Subsequent *t*-tests showed that related context cues were used in the homographs' sentences more frequently in the *same* condition ($u_{\text{same}} = 0.21$) than in the *different* ($u_{\text{different}} = 0.09$), $t(59) = 3.73$, $d = 0.49$, or *reverse* ($u_{\text{reverse}} = 0.05$), $t(59) = 4.79$, $d = 0.62$, conditions. Additionally, the *different* condition included more context cues than did the *reverse* condition, $t(59) = 2.30$, $d = 0.30$, because, in the *reverse* condition, the cue had not been presented in the list yet.

Free recall

In addition to the interpretation of ambiguous stimuli, we also assessed the influence of reminding on memory. We

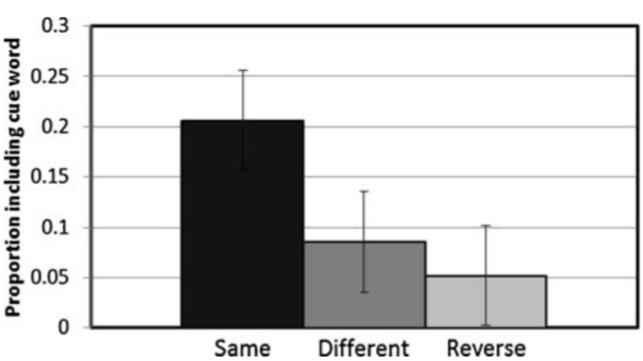

Fig. 3 Proportions of sentences for homographs including the biasing cue based upon condition. Error bars show the within-subjects 95 % confidence intervals across conditions (see Benjamin, 2003; Loftus & Masson, 1994)

assessed learners' recall of the homographs and biasing cues and the output order of these items. On the final recall test, learners recalled 32 % of the homographs from the study list. Reminding is expected whenever two associated stimuli are presented on the same background, so enhancements in recall should be apparent in the *same* and *reverse* conditions, but not in the *different* condition. As is shown in Fig. 4, condition did affect homograph recall, $F(2, 118) = 9.76$, $\eta^2 = .13$. Learners recalled more homographs in the *same* ($u_{\text{same}} = 0.38$) and *reverse* ($u_{\text{reverse}} = 0.34$) conditions than in the *different* condition ($u_{\text{different}} = 0.25$), $t(59) = 4.09$, $d = 0.54$, and $t(59) = 2.93$, $d = 0.34$, respectively, but the number recalled in the *same* and *reverse* conditions did not differ, $t(59) = 1.36$, $p = .15$, $d = 0.23$. Condition also affected how many cues were recalled, $F(2, 118) = 11.03$, $\eta^2 = .17$, as is also shown in Fig. 4. Learners recalled more cues in the *same* ($u_{\text{same}} = 0.38$) and *reverse* ($u_{\text{reverse}} = 0.34$) conditions than in the *different* condition ($u_{\text{different}} = 0.24$), $t(59) = 4.37$, $d = 0.62$, and $t(59) = 3.51$, $d = 0.39$, respectively, but the number of cues recalled in the *same* and *reverse* conditions did not differ, $t(59) = 1.19$, $p = .20$, $d = 0.24$. The percentage of trials on which both the cue and homograph were recalled followed the same pattern as homograph and cue recall; it was greater in the *same* ($u_{\text{same}} = 0.24$) and *reverse* ($u_{\text{reverse}} = 0.23$) conditions than in the *different* condition ($u_{\text{different}} = 0.10$), $t(59) = 4.51$, $d = 0.60$, and $t(59) = 4.07$, $d = 0.48$, respectively, but these two conditions did not differ from one another, $t(59) = 0.41$, $p = .69$, $d = 0.11$. When both the cue and homograph were recalled, there was some evidence that the lag between production of those items was shorter in the *same* ($u = 2.24$) and *reverse* ($u = 3.08$) conditions than in the *different* condition ($u = 6.35$), but this trend reached only marginal significance, $F(2, 46) = 2.35$, $p = .11$, $\eta^2 = .09$. This analysis has lower power than the others reported here because only 23 subjects contributed data to all conditions.

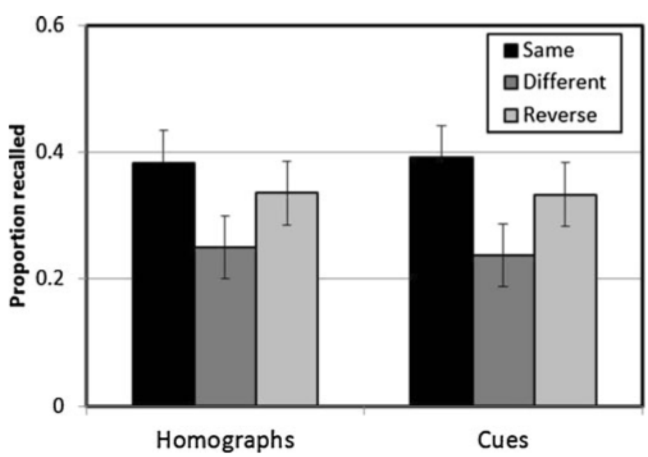

Fig. 4 Proportions of homographs (left side) and cues (right side) recalled on the final free recall test per each condition. Error bars show the within-subjects 95 % confidence intervals across the homograph analysis and the cue analysis (see Benjamin, 2003; Loftus & Masson, 1994)

In order to determine whether remindings caused a boost in recall, we additionally compared memory performance for homographs for which there is evidence of reminding during study with memory performance for ones for which that evidence was absent. We used homograph interpretation as an index of reminding. In the *same* condition, remindings caused some proportion of the nondominant interpretations of homographs; therefore, a mnemonic benefit might be apparent for homographs for which nondominant interpretations were accorded during learning. In the *different* and *reverse* conditions, however, nondominant interpretations of homographs were unlikely to have been caused by remindings, and we predicted no mnemonic differences between homographs accorded a nondominant and homographs accorded a dominant meaning. To test this, we performed a 2 (meaning: dominant vs. nondominant) × 2 (condition: same vs. reverse and different) repeated measures ANOVA on the proportion of homographs recalled. The data are shown in Fig. 5, and the ANOVA revealed a significant interaction between meaning and condition, $F(1, 55) = 16.93$, $\eta^2 = .23$. Memory for homographs interpreted in the nondominant manner was significantly greater than memory for ones given a dominant interpretation, but only in the *same* condition, $t(59) = 4.40$, $d = 0.51$. This pattern was numerically in the opposite direction for the *different* and *reverse* conditions and did not reach significance, $t(59) = 0.23$, $p = .82$, $d = 0.05$. The power to detect an effect the same size as in the *same* condition is large (power = 0.97). This pattern of results suggests that the process of reminding enhances free recall (see also Tullis et al., 2013a).

Discussion

Remindings influence the interpretation of ambiguous stimuli. The meanings of the sentences generated for homographs were more consistent with the biasing cues when the cue was presented first and was presented on the same background than when it was presented on a different background or after the ambiguous stimulus. Remindings also influenced mnemonic performance, such that cues and homographs in conditions that promoted remindings (the *same* and *reverse* conditions) were better remembered than those in the *different* condition.

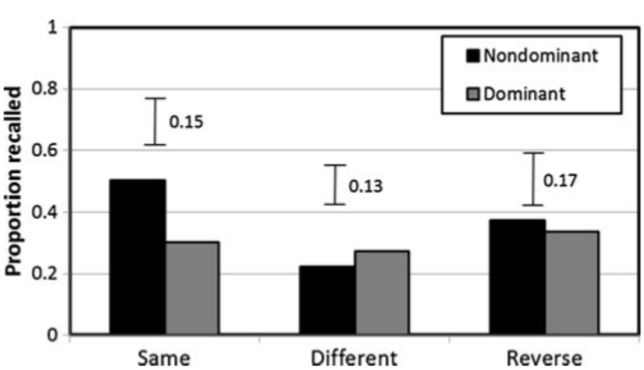

Fig. 5 Proportions of homographs recalled on the free recall test conditionalized upon their condition and their interpretation during study. Error bars and values show the width of within-subjects 95 % confidence intervals of the difference between dominant and nondominant interpretations. Error bars are not placed on the means themselves, because they show the within-subjects variability of the differences between interpretations

That remindings can influence the interpretation of homographs provides a new perspective on the influence of reminding because, in the ordinary course of language comprehension, we are frequently unaware of a word's multiple possible meanings (Dixon & Twilley, 1999; Yates, 1978). Resolving the lexical ambiguity of homographs may happen very quickly, and yet, remindings play a part in resolving the ambiguity of the homographs studied. This suggests that remindings may very quickly influence how we interpret the world.

Remindings enhance free recall performance for both P1 and P2, in addition to influencing how we interpret the world. Memory for homographs and cues is enhanced when they are presented on the same background, as compared with when they are presented on different backgrounds. In the *reverse* condition, presenting the biasing cue on the same background after the homograph cannot influence the interpretation of the prior homograph, but it enhances memory for the homograph nonetheless. The results from conditionalizing memory performance upon the initial interpretation of the homograph provide more evidence that remindings enhance memory: When a nondominant interpretation of the homograph is likely due to a reminding (in the *same* condition), memory for homographs interpreted in the nondominant manner was significantly greater than that for the homographs interpreted in a dominant manner. The memory effect is not caused just by interpreting the homograph in a nondominant manner, since recall performance for dominant and nondominant items does not differ in the other two conditions. Reminding, then, must underlie this difference.

According to Benjamin and Tullis (2010), remindings enhance memory performance because the retrieval of reminded information enhances memory for the earlier presented information. Whether and why memory for P2 is enhanced is debated. Memory for P2 may be enhanced because the context for P1 has been incorporated into the memory trace for P2 and, thus, has made it more variable and elaborate (Hintzman, 2010). Other research suggests that the enhancements in free recall performance for P2 results from strategic control that learners exercise during output (Tullis et al., 2013b). Increased recall of P1 may lead learners to output P2 more often, and memory enhancements for P2 may reflect reminding only during retrieval, rather than during encoding. For a more thorough discussion of how remindings affect memory for individual presentations in a reminded pair, see Tullis et al. (2013a).

The present study also reveals that the mnemonic benefits of reminding are not caused exclusively by semantic priming effects. In other studies (e.g., Tullis et al., 2013a), remindings are encouraged by presenting related items in a list. Memory is then compared between a condition where an associate was presented (i.e., *king–queen*) and a condition where no associate was presented (i.e., *radish–queen*). In these cases, the earlier associated item may semantically prime learners to better remember the later associated item. However, in the present study, the same biasing cue is presented in both the *same* and *different* conditions, yet mnemonic benefits are apparent only in the *same* condition. Only when the biasing cue is presented on the same background as the later homograph do large mnemonic benefits appear, which suggests that more than semantic priming plays a role in the benefits of reminding.

In this study, as in previous studies (Jacoby, 1974; Wahlheim & Jacoby, 2013), instructions encouraged learners to "look back" through the prior studied episodes during encoding. Such instructions may remove some of the spontaneous, stimulus-driven qualities of real-world reminding. However, similar effects of remindings can be found in more spontaneous, stimulus-driven situations. For example, in recent work, learners studied a list of words in which some words were highly associated to others (Tullis et al., 2013b). Memory performance was enhanced for the related items, as compared with the same unrelated items, even though learners were not instructed to look back through the list. Stimulus-driven remindings may be more spontaneous than in the conditions analyzed here and may better reflect how remindings spontaneously happen in the real world. However, the enhancement in free recall for both P1 and P2 is consistent across instruction-driven and stimulus-driven reminding experiments.

Remindings reduce the temporal distance between items and enable distant events to influence each other. Whether through superficial relationships (like the consistent background pictures used here) or through semantic relationships, remindings connect events distant in time and subsequently influence both their interpretation and how well they are remembered. Connecting distant events in time, remindings may prompt learners to compare segregated items, generalize across distinct events, form schemas, and make predictions about new situations.

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References

Benjamin, A. S. (2003). Predicting and postdicting the effects of word frequency on memory. *Memory & Cognition, 31*, 297–305.

Benjamin, A. S., & Ross, B. H. (2010). The causes and consequences of reminding. In A. S. Benjamin (Ed.), *Successful remembering and successful forgetting: A Festschrift in honor of Robert A. Bjork* (pp. 71–88). New York, NY: Psychology Press.

Benjamin, A. S., & Tullis, J. G. (2010). What makes distributed practice effective? *Cognitive Psychology, 61*(3), 228–247.

Brooks, L. R., Norman, G. R., & Allen, S. W. (1991). Role of specific similarity in a medical diagnostic task. *Journal of Experimental Psychology. General, 120,* 278–287.

Bruce, D., & Weaver, G. E. (1973). Retroactive faciliatation in short-term retention of minimally learned paried associates. *Journal of Experimental Psychology, 100*, 9–17.

Dixon, P., & Twilley, L. C. (1999). Context and homograph meaning resolution. *Canadian Journal of Experimental Psychology, 53,* 335–346.

Gentner, D., Rattermann, M. J., & Forbus, K. D. (1993). The roles of similarity in transfer: Separating retrievability from inferential soundness. *Cognitive Psychology, 25,* 524–575.

Gick, M. L., & Holyoak, K. J. (1983). Schema induction and analogical transfer. *Cognitive Psychology, 15,* 1–38.

Hintzman, D. L. (2010). How does repetition affect memory: Evidence from judgments of recnecy. *Memory & Cognition, 38*, 102–115.

Hintzman, D. L., Summers, J. J., & Block, R. A. (1975). Spacing judgments as an index of study-phase retrieval. *Journal of Experimental Psychology: Human Learning and Memory, 1,* 31–40.

Jacoby, L. L. (1974). The role of mental contiguity in memory: Registration and retrieval effects. *Journal of Memory and Language, 13*(5), 483–496.

Loftus, G. R., & Masson, M. E. J. (1994). Using confidence intervals in within-subject designs. *Psychonomic Bulletin & Review, 1*, 476–490.

Medin, D. L., & Schaffer, M. M. (1978). A context theory of classification learning. *Psychological Review, 85,* 207–238.

Murphy, G. L. (2002). *The big book of concepts*. Cambridge, MA: MIT Press.

Nelson, D. L., McEvoy, C. L., & Schreiber, T. A. (1998). The University of South Florida word association, rhyme, and word fragment norms. http://www.usf.edu/FreeAssociation/

Reeves, L. M., & Weisberg, R. W. (1994). The role of context and abstract information in analogical transfer. *Psychological Bulletin, 115,* 381–400.

Ross, B. H. (1984). Remindings and their effects in learning a cognitive skill. *Cognitive Psychology, 16,* 371–416.

Ross, B. H., & Bradshaw, G. L. (1994). Encoding effects of remindings. *Memory & Cognition, 22,* 591–605.

Ross, B. H., & Kennedy, P. T. (1990). Generalizing from the use of earlier examples in problem solving. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 16,* 42–55.

Ross, B. H., & Makin, V. S. (1999). Prototype versus exemplar models. In *The concept of cognition*. Cambridge, MA: MIT Press.

Ross, B. H., Perkins, S. J., & Tenpenny, P. L. (1990). Reminding-based category learning. *Cognitive Psychology, 22,* 460–492.

Spalding, T. L., & Ross, B. H. (1994). Comparison-based learning: Effects of comparing instances during category learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20,* 1251–1263.

Tullis, J. G., Benjamin, A. S., & Ross, B. H (2013a). The reminding effect: Presentation of associates enhances memory for related words in a list. Manuscript submitted for publication.

Tullis, J. G., Benjamin, A. S., & Ross, B. H (2013b). The shape of reminding: How pair similarity affects the complex relationship between lag and memory. Manuscript in preparation.

Tzeng, O. L., & Cotton, B. (1980). A study-phase retrieval model of temporal coding. *Journal of Experimental Psychology: Human Learning and Memory, 6,* 705–716.

Wahlheim, C. N., & Jacoby, L. L. (2013). Remembering change: The critical role of recursive remindings in proactive effects of memory. *Memory & Cognition, 41*, 1–15.

Winograd, E., & Soloway, R. M. (1985). Reminding as a basis for temporal judgments. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11,* 262–271.

Yates, J. (1978). Priming dominant and unusual senses of ambiguous words. *Memory & Cognition, 6,* 636–643.