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Can intentional forgetting reduce false memory? Effects of list-level and item-level forgetting

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Abstract

This study examined whether false memory produced by the learning of lists of categorized and associative materials could be reduced by directed forgetting. The number of items within a list that participants were asked to remember or forget was manipulated, while the length of the list remained constant. Experiment 1a used categorized lists and Experiment 1b used associative lists; the participants performed immediate free recall and cued recall tests. For both the categorized and associative lists, the rate of false recall increased upon increasing the proportion of "forget" (F) words. After removing the immediate recall test, Experiment 2 found that intentionally forgetting part of the studied list reduced false memory, whereas forgetting the whole studied list did not. The results are discussed in terms of the list-level-vs.-item-level inhibition in semantic activation and the role of monitoring in reducing false memory.

PsycINFO classification: 2340; 2343

Keywords: DRM paradigm; Directed forgetting; Semantic activation; Part-list cuing; Cued recall

1. Introduction

Studies on directed forgetting have shown that forgetting can be intentional and controllable (see MacLeod, 1998, for a review). Can intentional forgetting also reduce false memory? The present study investigated this question using a list-learning paradigm to create false memory and an item method directed forgetting paradigm to induce forgetting. Two procedures are commonly used in directed forgetting research to present instructional cues to participants regarding items they should forget or remember. Under the item method, participants are given explicit cues for each to-be-forgotten item (F word), such as "forget", and each to-be-remembered item (R word), such as "remember." The memory cue is given after the relevant item to ensure that the participant had registered the words. The list method involves only one cue, usually an instruction to forget all of the preceding items, given in the middle of the list.

The directed forgetting effect describes the finding that F items are less well remembered than are R items, and sometimes interference on the R items followed by the F items is reduced. The occurrence of this effect depends on how memory is tested (e.g., Basden & Basden, 1998, Basden, Basden, & Gargano, 1993). When participants are tested with a recall test, both item and list methods produce a directed forgetting effect. When participants are tested, however, using a recognition test, rather than a recall test, only the item method produces such an effect (e.g., Block, 1971; MacLeod, 1975). Based on this and other findings, several studies have suggested that the item method fosters selective rehearsal favoring the R words, whereas the list method promotes inhibition of the F words (Basden & Basden, 1998, 1993; MacLeod, 1999; Wilson & Kipp, 1998). In the item method, the F words are less well rehearsed than are the R words and, thus, F words are not encoded as

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completely as are R words. This feature impairs both the recognition and recall of F words. In the list method, both the R and F words are encoded and stored in memory. The cue to forget affects retrieval access to F words. Consequently, the directed forgetting effect was found to occur only in the recall test and not in the recognition and indirect memory tests, in which active retrieval is not necessary (e.g., Basden et al., 1993).

One way to produce false memory for words is to use the DRM paradigm, adopted originally by Deese (1959) and recently by Roediger and McDermott (1995). In a typical experimental procedure, participants study a list of semantically related words (e.g., *bed*, *awake*, and *rest*), all of which are related to a critical word that is not presented (e.g., *sleep*). Later, participants falsely recall or recognize the missing critical word. High levels of false memory for lure items (e.g., *sleep*) have been demonstrated in tests such as free recall (Deese, 1959; McDermott, 1996; Payne, Elie, Blackwell, & Neuschatz, 1996; Roediger & McDermott, 1995) and recognition (McDermott, 1996; Payne et al., 1996; Roediger & McDermott, 1995; Underwood, 1965) tests. In addition to associative list materials used in the DRM paradigm, categorized lists have also been used to produce false memories (e.g., Seamon, Luo, Schlegel, Greene, & Goldenberg, 2000; Smith, Gerkens, Pierce, & Choi, 2002).

Several studies have used the list method to investigate the effect of directed forgetting on false memory. For example, Lee and Hsu (2000) used the standard list method to examine whether false recall still occurred when participants were instructed to forget the DRM lists. After studying an initial set of DRM lists, the forget-the-first-list-and-remember-the-second-list (FR) group was asked to forget them, whereas the remember-both-lists (RR) group was asked to remember them. All participants were then required to study and remember a second set of the DRM lists. In the final recall stage, all participants were asked to recall both sets of studied words. Notably, no difference was found between the FR and RR groups in terms of their false recall of critical lures semantically associated with the initial F lists. Moreover, this finding was replicated in Seamon, Luo, Shulman, Toner, and Caglar (2002). Their study showed that list-level directed forgetting instructions decreased the recall of studied words, but not the false recall of critical lures. Additionally, using the list method, Kimball and Bjork (2002) found typical directed forgetting effects for studied items and an inverse pattern for critical-item intrusions; that is, they found that the forgetting instruction was associated with impaired retrieval of studied items and increased critical-item intrusions. Although the results of these studies were not identical, they all suggested that directed forgetting did not reduce false memory.

The item method and list method differ not only in the procedures but also in the mechanisms that create the directed forgetting effect. The present study aimed to use the item method to examine the effect of intentional forgetting on false memory. In addition, this study also manipulated the number of F words within a list, including three types of study conditions: remembering the whole list (R list), forgetting the whole list (F list), and forgetting part of the list. The R list was used as a baseline. Manipulating the proportion of F words within a list allowed this study to investigate not only the effect of remembering vs. forgetting but also the effect of different degrees of forgetting on false memory. Moreover, forgetting the whole list, a list-level forgetting, might have a qualitatively different effect on false memory than forgetting part of the list, an item-level forgetting. It is important to note that false memory was influenced by the list length (Robinson & Roediger, 1997). To avoid this confounding, the list length remained constant across different types of study conditions.

It is well established that studying list items leads to an unconscious, rapid, and automatic spread of activation in a semantic network (e.g., Collins & Loftus, 1975; Seamon, Luo, & Gallo, 1998). According to the activation/monitoring framework (Roediger, Watson, McDermott, & Gallo, 2001), studying semantically related words in the DRM paradigm should automatically activate representations for non-presented critical words. Similarly, based on the implicit associative response theory (Underwood, 1965), studying list words causes implicit associative responses that produce semantic associates of the studied words, such as the critical word, into conscious awareness. The former theory suggests that false memory for the critical word is produced through a high level of semantic activation of critical words in conjunction with source confusion or monitoring failure. The fuzzy trace theory (Reyna & Brainerd, 1995) explains false memory in terms of memory trace. According to this theory, memory judgments can be based on verbatim or gist traces. Verbatim traces represent the surface details of physical stimuli, whereas gist traces represent the meaning or theme of the stimuli. In the DRM procedure, correct memory of list items is based on verbatim traces, whereas false memory of critical words is based on gist traces. The critical word is subsequently remembered because it is consistent with the gist representation. The recollection rejection monitoring mechanism based on verbatim trace, on the other hand, could be used to reject or accept the critical word (Odegard & Lampinen, 2005).

Based on the above theories, spread of activation among related items in a semantic network is an automatic process; thus, a cue to forget a list does not impair the semantic activation during study. However, a forget cue would impair access to episodic information that could be used to reject the critical-item. Thus, it was expected that forgetting the whole list (the F list) would not reduce and sometimes even increase false memory, a result similar to that obtained for the list method. As to the effect that forgetting part of the list would have on false memory, because all items within a list were semantically or thematically related, there might be within-list retrieval completion