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Can false memories be created through nonconscious processes?[☆]

René Zeelenberg,^{*,1} Gijs Plomp,² and Jeroen G.W. Raaijmakers

Department of Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands

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Abstract

Presentation times of study words presented in the Deese/Roediger and McDermott (DRM) paradigm varied from 20 to 2000 ms per word in an attempt to replicate the false memory effect following extremely short presentations reported by Seamon, Luo, and Gallo (1998). Both in a within-subjects design (Experiment 1) and in a between-subjects design (Experiment 2) subjects showed memory for studied words as well as a false memory effect for related critical lures in the 2000-ms condition. However, in the conditions with shorter presentation times (20 ms in Experiment 1; 20 and 40 ms in Experiment 2) no memory for studied words, nor a false memory effect was found. We argue that there is at present no strong evidence supporting the claim for a nonconscious basis of the false memory effect.

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1. Introduction

How illusive are our memories? Can we learn things that we do not consciously perceive? Although we can in general be reasonably sure that our memories of events are quite accurate, recent research seems to indicate that under certain circumstances we cannot be entirely sure

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* Corresponding author. Fax: 1-812-856-5217.

E-mail address: rzeelenb@indiana.edu (R. Zeelenberg).

¹ Present address: Psychology Department, Indiana University, Bloomington, IN 47405, USA.

² Present address: The Laboratory for Perceptual Dynamics, RIKEN BSI, Japan.

about what we think we remember (Roediger & McDermott, 1995) and that learning can occur under conditions where words are almost invisible (Seamon et al., 1998). Deese (1959) has shown that it is possible to create illusory memories for words that subjects did not previously study. Deese's subjects studied lists of words (e.g., *thread, pin, eye*, etc.) that were semantically associated to a nonpresented word, the critical lure (e.g., *needle*). On an immediate free recall test, subjects tended to reproduce not only the studied list items but also the nonstudied critical lure. Roediger and McDermott (1995) have brought these false memories again to our attention by replicating and extending Deese's original findings. They found that in a recognition test, subjects indicated to recognize nonstudied critical lures at a rate that was comparable to the hit rate for studied list items. Together these findings constitute a powerful illusion of memory.

Elaborating on the Roediger and McDermott (1995) findings, Seamon et al. (1998) reported false recognition of critical lures even when study items were presented for extremely short presentation times. In these experiments, subjects studied lists for a presentation time ranging from 20 to 2000 ms per word. On a subsequent recognition memory test, subjects indicated whether a presented word was previously studied or not and displayed false memories for critical lures in all presentation time conditions. In the 20-ms condition, a false memory effect was obtained even for subjects who appeared not to be able to discriminate studied list items from distractors. These results were obtained in both a between-subjects and a within-subject design. In other studies Seamon and colleagues (Seamon, Luo, Schlegel, Greene, & Goldenberg, 2000; Seamon et al., 2002) have replicated the finding of a false recognition effect in the 20-ms condition. It seems that we must draw the quite amazing conclusion that we do not only 'remember' words that were never presented, but also that we 'remember' nonpresented words without any memory for the words that give rise to this 'memory.'

Seamon et al. (1998) explained their results by assuming that the false memory effect can occur as a result of conscious as well as nonconscious processes. A key role in their explanation is the notion of implicit activation. On this account, the presentation of multiple associated words can result in the repeated conscious or nonconscious activation of associatively related words. Such indirectly activated words could later be perceived as genuine memories, due to their relatively strong level of activation. Seamon et al. (1998) argued that their results indicate that false memories can be based on nonconscious activation of semantic concepts during list presentations.

The finding of false memories at a presentation time of only 20 ms is quite surprising. At a speed of 20 ms per word subjects are generally not able to identify the words they are being shown on the display. As no conscious attention can be given to these words, memory for them should be very poor or absent (e.g., Crabb & Dark, 1999; Fisk & Schneider, 1984). That the nonconscious activation of words that are associatively related to these very shortly presented stimuli can yield long-term memories seems at odds with theories of memory that generally assume that long-term memory depends on conscious attention (Craik & Tulving, 1975; Raaijmakers & Shiffrin, 1981; Shiffrin & Schneider, 1977).

In our view, however, the conclusion that nonconscious processes are (partially) responsible for the false memory effect is premature and cannot be drawn from the results reported by Seamon et al. (1998, 2000, 2002). One problem with this conclusion is that subjects were still able to discriminate studied items from nonstudied items in the 20-ms condition. Seamon et al. (1998) observed hit rates for studied list items in the different 20-ms conditions that were consistently higher than the false alarms rates for nonstudied list items. Depending on the memory load

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