YCCOG 667 ARTICLE IN PRESS No. of pages: 4
DISK / 17/10/03 / Gomti(CE) / Jayanthi (TE) DTD 4.3.1/SPS

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Consciousness and Cognition xxx (2003) xxx–xxx

Consciousness and Cognition

www.elsevier.com/locate/concog

Evaluating the evidence for nonconscious processes in producing false memories: Reply to Gallo and Seamon (2004)

Abstract

In response to the failure of Zeelenberg, Plomp, and Raaijmakers (2003) to replicate the results of Seamon, Luo, and Gallo (1998) regarding their purported finding of a reliable false memory effect in the absence of memory for the list items, Gallo and Seamon (2004) report a new experiment that they claim shows that conscious activation of a related lure during study is not necessary for its subsequent recognition. We critically evaluate their conclusion and argue that the evidence clearly shows that false recognition is critically dependent on the conscious recollection of one or more of the list items. Thus, this as well as the previous experiments show no evidence for nonconscious processes in producing false memories.

1. Introduction

The initial study of Seamon, Luo, and Gallo (1998) attracted our attention because they claimed to have obtained a reliable false memory effect even when the subjects "were unable to discriminate studied words from unrelated nonstudied words" (Seamon et al., 1998, p. 20). There were two main reasons why we were surprised by the conclusions that Seamon et al. drew from their studies. First, although they claimed to have obtained false memory effects "even when memory for list items was essentially absent" (p. 25), their data did in fact consistently show higher hit rates than false alarm rates. Second, they claimed to have presented the items for 20 ms per list item. Based on previous, unrelated, experiments that we had performed using masked perceptual identification, we thought it highly unlikely that subjects could have identified any of the list items at such brief presentation times. In view of the fact that performance on the list items was in fact above chance, we thought it likely that their subjects might have occasionally identified one or more of the list items (perhaps because their equipment was not suitable for such brief presentation times). If that was indeed the case, then these identifications might have been responsible for the observed false memory effects rather than the "nonconscious processing" that they believed was responsible.

1053-8100/$ - see front matter © 2003 Published by Elsevier Inc.
doi:10.1016/j.concog.2003.10.002

In the experiments that we reported in the Zeelenberg, Plomp, and Raaijmakers (2003) paper, we tried to replicate the Seamon et al. (1998) results using better calibrated equipment for controlling the presentation durations of the stimuli. We reasoned that if nonconscious processing of the list items could indeed lead to false recognition, we should be able to obtain such an effect using a more carefully controlled stimulus presentation procedure even when such a procedure would not lead to conscious activation of list items. Recognition performance for both the presented list items as well as the nonpresented critical lures was at chance level for stimulus durations of 20 ms and, somewhat to our surprise, even for stimulus durations of 40 ms. However, a veridical recognition memory effect as well as a substantial false memory effect were obtained for the same items when longer stimulus durations (2000 ms) were used.

In order to explain the difference between our results and those of Seamon et al. (1998), we speculated that "in the Seamon et al. studies due to the combination of software and hardware used words were (sometimes) being presented for more than 20 ms and that as a result subjects could occasionally identify the list items." (Zeelenberg et al., 2003, p. 410), a not unreasonable speculation given the fact that it is very difficult to accurately control presentation times using the kind of operating system that they used.

Gallo and Seamon (2004) now claim that the use of a 20 ms presentation rate was not really crucial for their conclusions: "the goal was not to eliminate the perception of the list words, but to minimize the conscious processing of those list words" (p. 6). They even go as far as to assume that Zeelenberg et al. (2003) did not obtain a false memory effect precisely because the "presentation rates were so rapid that even the necessary minimal amount of processing did not occur" (p. 7). However, in the abstract of their 1998 article, they wrote that they "found that the subjects falsely recognized semantically related nonstudied words in all conditions, even when they were unable to discriminate studied words from unrelated nonstudied words." (Seamon et al., 1998, p. 20; see also the title of their article). Although their present position comes close to our conclusion that a false memory effect cannot be obtained under conditions where "the list items are presented for such a short time that they cannot be identified" (Zeelenberg et al., 2003, p. 412), it is still remarkable that we also did not find any effect at a presentation rate of 40 ms, i.e., twice as long as the 20 ms presentation rate that Seamon et al. (1998) claimed to have used in their experiment. We agree with Gallo and Seamon, (2004, p. 4) that there must have been "imperfections" in the techniques that they used for stimulus presentation.

2. False memories at fast presentation rates: Evidence for nonconscious processes?

Although Gallo and Seamon (2004) now seem to believe otherwise, it is worth emphasizing that in our view the logic of the evidence for the nonconscious processing conclusion is critically dependent on the assumption that the list items are not consciously identified during study. The finding of a false memory effect when fast presentation rates are used for list items during study in and of itself does not mean that the false memory effect is due to nonconsious processes. If one or more of the items are in fact identified, the obtained false memory effect can be explained in a variety of ways that do not involve the assumption of nonconscious storage of the critical lure during study. For example, subjects might think about related words (and hence the critical lure) immediately after the list has been presented (even when only a few of the list items have been identified).

Alternatively, and perhaps more likely, the obtained false memory effect might be simply due to the fact that at the time of test the familiarity for the related critical lure would be higher than for an unrelated item. Such an effect would be predicted by many models for recognition memory, including global familiarity models such as SAM, TODAM, REM, and MINERVA2 (see, for example, Criss & Shiffrin, in press). According to these models, a recognition judgment is based on the match between the test item and *all* (list) items in memory. Because the match depends on the similarity between the test item and the items in memory, subjects are more likely to make an 'old' recognition judgment if semantically or orthographically similar items were presented on the study list. Thus, global familiarity models predict false memories without assuming that the critical lure was (consciously or nonconsciously) stored in memory.

Gallo and Seamon (2004) argue that the relative sizes of the false and veridical memory effects provide additional support for the role of nonconscious processes. They argued that: "Even if subjects had consciously processed a few list items, and had used this knowledge to generate a related lure at study, it is unclear why false memory for this internally generated word would be greater than accurate memory for those list words that were actually perceived" (p. 5). However, it is not at all clear that the results of Seamon et al. (1998) did in fact show this pattern of results. If only a few list items are consciously perceived, it may very well be the case that the *average* recognition performance for *all* list items (identified and nonidentified) is not very high although the recognition performance for those few items that were actually identified is in fact very high or at least higher than the false recognition performance. Unfortunately, the Seamon et al. data do not allow such an analysis since we have no information *which* list items were actually perceived during the initial list presentation. Consequently, it is unknown what proportion of the identified list items were recognized on the later memory test. Note that this interpretation assumes that the probability of (false) recognition for the critical lure will be higher than for the nonidentified list items. Such an assumption follows quite naturally from global recognition models since the critical lure will be more strongly related to the identified list items (since it was selected on the basis of the associations to the list items).

3. New experiment of Gallo and Seamon (2004)

In their article Gallo and Seamon (2004) report a new experiment (although apparently still using the same equipment) in which DRM lists were briefly presented during study. Immediately after each list, subjects were asked to report any word they had seen. In this immediate recall test subjects rarely generated the related critical lure. At a later two-alternative forced-choice recognition test, however, subjects choose the related lure with a probability of 58% (where the other alternative is an unrelated control lure corresponding to a different, nonpresented category). Gallo and Seamon claim that this is strong evidence for their assumption that the related lure was not generated during the initial list presentation. However, this is again open to alternative interpretations since it may very well be the case that subjects did think of the lure but were able to decide at the immediate test that this was not one of the list items. After all, in regular free recall experiments subjects will also think of many other words, yet one rarely sees large numbers of intrusions on an immediate recall test. Thus, subjects may have thought of the critical lure even though it was not reported at the immediate recall test. At the later recognition test, however, memory may have become more fuzzy, especially in a test situation in which the subjects have to choose between two items both of which were not presented on the study list.

Maybe more important, the results of the new experiment clearly show that the false memory effect depends on the number of list items recalled on the immediate test. The more items were recalled at the immediate test the larger was the false memory effect at the later recognition test. No false memory effect was obtained for those lists for which no list items were recalled at the immediate test. These results are consistent with our speculation that in the original experiments of Seamon et al. (1998) subjects did consciously perceive some of the list items and that this was responsible for the obtained false memory effects.

4. Conclusions

Given the fact that there are many other explanations for the occurrence of false memory effects when some of the list items are in fact consciously perceived that do not rely on the assumption of nonconscious processes, we see no reason to change our conclusion that these experiments fail to provide evidence for such an assumption. Thus, even though Gallo and Seamon now admit that "the evidence is mixed as to whether conscious recollection of the list items is necessary" (p. 15) for false recognition, we believe that even that conclusion is not justified given the strong evidence from their own data that clearly show no false recognition unless at least one list item is (consciously) recalled.

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Jeroen G.W. Raaijmakers
University of Amsterdam
Amsterdam, The Netherlands
E-mail address: raaijmakers@psy.uva.nl

René Zeelenberg
Indiana University
Bloomington, USA
Erasmus University Rotterdam
Rotterdam, The Netherlands