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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

6 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
7 absence of memory for the list items, Gallo and Seamon (2004) report a new experiment that they claim
8 shows that conscious activation of a related lure during study is not necessary for its subsequent recog-
9 nition. We critically evaluate their conclusion and argue that the evidence clearly shows that false recog-
10 nition is critically dependent on the conscious recollection of one or more of the list items. Thus, this as well
11 as the previous experiments show no evidence for nonconscious processes in producing false memories.
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1. Introduction

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

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

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

47 Gallo and Seamon (2004) now claim that the use of a 20 ms presentation rate was not really
48 crucial for their conclusions: “the goal was not to eliminate the perception of the list words, but to
49 minimize the conscious processing of those list words” (p. 6). They even go as far as to assume
50 that Zeelenberg et al. (2003) did not obtain a false memory effect precisely because the “pre-
51 sentation rates were so rapid that even the necessary minimal amount of processing did not oc-
52 cur” (p. 7). However, in the abstract of their 1998 article, they wrote that they “found that the
53 subjects falsely recognized semantically related nonstudied words in all conditions, even when
54 they were unable to discriminate studied words from unrelated nonstudied words.” (Seamon et al.,
55 1998, p. 20; see also the title of their article). Although their present position comes close to our
56 conclusion that a false memory effect cannot be obtained under conditions where “the list items
57 are presented for such a short time that they cannot be identified” (Zeelenberg et al., 2003, p. 412),
58 it is still remarkable that we also did not find any effect at a presentation rate of 40 ms, i.e., twice
59 as long as the 20 ms presentation rate that Seamon et al. (1998) claimed to have used in their
60 experiment. We agree with Gallo and Seamon, (2004, p. 4) that there must have been “imper-
61 fections” in the techniques that they used for stimulus presentation.

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

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

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

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

99 3. New experiment of Gallo and Seamon (2004)

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

113 memory may have become more fuzzy, especially in a test situation in which the subjects have to
114 choose between two items both of which were not presented on the study list.

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

122 4. Conclusions

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

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