The Effects of Conformity on False Recognition in the Deese-Roediger-McDermott paradigm

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This study examined whether a confederate's response can affect false recognition in the Deese-Roediger-McDermott (DRM) paradigm. After the participants studied a long list of 75 word (five 15-word DRM sublists), they received three successive five-word recognition tests (old/new); each test comprised all (critical) non-presented words. The participants were tested individually during the initial and final recognition tests, whereas a confederate was present during the second test. In the latter test, half of the participants always made a judgment aloud after the confederate's response (all "old" or all "new"). The remaining participants always made the first response aloud with the confederate responding second. The results showed that conformity affects recognition memory: the confederate's correct responses (all "new") decreased the participant's false recognition of words regardless of the order of response (i.e., participant first or second). These results are discussed within the context of the source monitoring framework.

Over the past decade, false memories have been the object of numerous studies. One popular paradigm for false memory research was developed by Roediger and McDermott (1995), based on earlier research by Deese (1959), and now known as the Deese-Roediger-McDermott (DRM) paradigm. In the DRM paradigm, participants learn lists of words that are all semantically associated with the same critical non-presented word. Each list is composed words related to one critical non-presented word. For example, a list for the critical non-presented word '*sleep*' is: *bed, rest, awake, tired, dream, wake, night, blanket, doze, slumber, snore, pillow, peace, yawn,* and *drowsy*. Experiments using this paradigm have revealed remarkable levels of false recognition of critical non-presented words, and numerous studies have focused on the boundary conditions that affect these false memories (for reviews, see Gallo, 2006; Roediger, Balota, & Watson, 2001; Roediger, McDermott, & Goff, 1997; Roediger, McDermott, & Robinson, 1998).

The study described here was motivated by one simple question: Does social influence, such as social conformity, affect false recognition in the DRM paradigm? Several researchers have investigated social conformity effects using recognition paradigm (Itsukushima, Hanyu, Okabe, Naka, Itoh, & Hara, 2006; Meade & Roediger, 2002; Schneider & Watkins, 1996; Wright, Mathews, & Skagerberg, 2005; Wright, Self, & Justice, 2000). In one of the first studies to address this question, Schneider and Watkins (1996, Experiment 2) demonstrated conformity involving a single confederate in a standard recognition test. After the participant studied a long list of words, he or she, along with a confederate, received an oral recognition test. For each test word, the participant and the confederate took turns in responding aloud. Sometimes the confederate responded first; other times the participant responded first. The initial response of the confederate increased both hit and false alarm rates of the participant's second response. In sum, this study provides strong evidence that recognition judgment can be affected by a confederate's response.

However, some researchers (Reysen, 2005; Roediger, Meade, & Bergman, 2001) have pointed out that Schneider and Watkins's (1996) results could be due to public conformity. That is, participants may simply attempt to

conform to a confederate's responses in a group or public setting, but do not accept them privately. To determine whether a confederate's responses actually influence the participant's memory, we must assess the participant's performance on the individual recognition test. In the present study, therefore, the participants received three successive recognition tests, all of which comprised critical non-presented words. The initial and final recognitions were individual (private), whereas the second test occurred with a confederate present (public). The critical dependent measure was the participant's measure on the final individual recognition test.

In fact, Reysen (2005) demonstrated private conformity effects on recognition memory using individual tests with a virtual confederate. Therefore, we might expect that participants' final recognition performance would be influenced by responses generated by a confederate. Accordingly, the presented study manipulated confederate's word response order vis a vis the participant's response (i.e., first or second) and response type (i.e., all "old" or all "new") as between-participants variables. We should expect to see more conformity when a participant's responses follows a confederate's responses than when the confederate follows the participant. Based on the persistence of false recognition in DRM paradigm (McDermott, 1996), we predict that the confederate's response of all "old" would produce more false recognitions than the all "new" response.

Method

Participants.

The participants were 96 female undergraduate students aged 18 to 28 (M=19.7, SD=1.4). They were randomly assigned to each of four experimental conditions. Eight additional participants were excluded when they expressed suspicion about the confederate.

Design.

A 2 (confederate's response order: first or second) X 2 (confederate's response type: all old or all new) X 3 (test type: first, second, or third recognition) mixed factorial design was used, with confederate's response

order and type manipulated between participants and test type manipulated within participants.

Procedure.

One real true participant and 1 female confederate participated together. Both members of this pair were told to remember words, which would be presented by an audio tape player, in the study list in preparation for a subsequent recall memory test.

Presentation. List words were presented at the rate of one word per second. First, a recorded male voice read each of five study lists, speaking at the rate of one word per second. The lists were composed of 15 Japanese words each, and were the *devil, stairs, listen, electric wave,* and *peace* lists from Miyaji and Yama (2002). All of the words from each list were followed immediately by all of the items from the next list, until all five lists were presented. The order of the five lists was consistent.

Filler task. Immediately after the lists were presented, both people took part in a 5 min filler task consisting of addition problems on a sheet of paper. They were instructed to complete as many problems as possible.

Initial individual recognition test. After the filler task, participants took a 5-word recognition test consisting only of critical non-presented words. Both the participant and the confederate received a response sheet. On each of five test trials, the experimenter visually presented a test word. Each test trial asked for two types of written responses. The first response was a "yes" or "no" corresponding to whether or not the participant thought the test word had been in the study list. The second response was a confidence rating ranging from one ("practically certain") to five ("practically guessing").

Group recognition test. After a 5 min filler task that was identical to the previous filler task, there was a surprise group recognition test, identical to the individual recognition test except that a each participant was tested in the presence of a confederate. On each of five trials, the confederate gave the same response ("old" or "new"). Half of the participants always made a judgment aloud after the confederate's response (all "old" or all "new"). The remaining participants always made the first response aloud, which was followed by the confederate's response (all "old" or all "new").

Final individual recognition test. After the group recognition test, everyone took part in another a filler task that was identical to the previous filler task (5 min). Finally, they took a second individual recognition test, which was identical to the first individual recognition test. After this test, participants were debriefed.

Results

False recognition.

Table 1 shows the mean proportions of false alarms for each confederate's response order and type on the initial individual recognition test. In the initial test, 79% and 87% of the critical non-presented words were falsely recognised, a rate similar to that observed by Roediger and McDermott (1995).

The difference between initial individual test and group test—a measure of public conformity—showed that participants paired with a confederate responding all "new" conformed more than those paired with a confederate responding all "old." This pattern was true regardless of the order of responding. More importantly, performance on the final individual test—a measure of private conformity—showed that conforming on the group test affected a subsequent individual recognition performance. Again, this pattern was true, regardless of the order of responding.

More specifically, a 2 (confederate's response order: first or second) X 2 (confederate's response type: all old or all new) X 3 (test type: first, second, or third recognition) mixed analysis of variance (ANOVA) was performed on the false alarm scores. All analyses were considered as significant at the $p=.05$ level or better unless otherwise noted. The result revealed that there was a significant main effect of test, F (2, 184) = 6.40, $MSE=.01$, *partial eta squared* = .070. More interestingly, there was a significant interaction between test and confederate's response type, F (2, 184) = 12.42, $MSE=.01$, *partial eta squared* = .135. No other effects approached significance.

Neither the main effect of confederate's response order nor interactions of response order with other variables were significant. Therefore, results were collapsed across the confederate's response order. A 2 (confederate's response

type: all old or all new) X 3 (test type: first, second, or third recognition) mixed ANOVA revealed significant main effects of both confederate's response type and of test with F (1, 92)=2.77, MSE=.13, *partial eta squared*=.029 and F (2, 184)=6.49, MSE=.01, *partial eta squared*=.065, respectively. We also found a significant interaction between confederate's response type and test, F (2, 184)=12.59, MSE=.01, *partial eta squared*=.118. A Tukey's honestly significant difference test revealed that participants in the all "new" condition (falsely) recognized more critical words in initial recognition (M=.83) than in group recognition (M=.74) or in final recognition (M=.74). By contrast, participants in the all "old" conditions tended to recognize a similar proportion of critical words regardless of whether in initial recognition (M=.83), in group recognition (M=.83) or in final recognition (M=.85).

In short, participants' initial performance working with a confederate altered their subsequent false recognition. However, such pattern was observed for a confederate's correct (i.e., all "new") responses, not for a confederate's incorrect (i.e., all "old") responses.

Table 1 Mean proportions of false alarms as a function of confederate's response order and types on the three recognition tests.

	Initial individual test	Group test	Final individual test
Confederate's first			
All "old"	.82	.82	.85
	(.19)	(.26)	(.24)
All "new"	.87	.78	.76
	(.14)	(.20)	(.24)
Confederate's second			
All "old"	.84	.85	.86
	(.18)	(.19)	(.19)
All "new"	.79	.71	.72
	(.23)	(.24)	(.26)

Note. Standard deviations are in parentheses.

Confidence ratings.

Table 2 presents mean confidence ratings for each confederate's response

order and type on initial individual recognition test. As the table show, levels of confidence ratings were extremely high, ranging from a low of 4.03 to a high of 4.44. A similar 2 (confederate's response order: first or second) X 2 (confederate's response type: all old or all new) X 3 (test type: first, second, or third recognition) mixed ANOVA was performed on the confidence ratings. There were no main effects of confederate's response order, F (1, 92)=0.21, MSE=1.12, *partial eta squared*=.002, confederate's response type, F (1, 92)=2.32, MSE=1.12, *partial eta squared*=.025, or test type, F (2,184)= 1.84, MSE=.20, *partial eta squared*=.020. In addition, none of the interactions of these variables were significant. However, given the very high level of confidence ratings, this null result should be treated with caution, as a genuine effect may have been masked by a ceiling effect. As such, I do not consider it further.

Table 2 Mean confidence ratings as a function of confederate's response order and types on the three recognition tests.

	Initial individual test	Group test	Final individual test
Confederate's first			
All "old"	4.23	4.42	4.44
	(.44)	(.44)	(.44)
All "new"	4.32	4.30	4.22
	(.49)	(.40)	(.52)
Confederate's second			
All "old"	4.33	4.20	4.37
	(.46)	(.62)	(.58)
All "new"	4.14	4.03	4.03
	(.56)	(.48)	(.55)

Note. Standard deviations are in parentheses.

Discussion

This study shows a private conformity effect on false recognition in the DRM paradigm: a confederate's all "new" responses decreased false recognition not only in the group setting but also in a subsequent (private) recognition

tests. This pattern was true regardless of whether participants responded first or second. By contrast, there was no private conformity effect with respect to confederate's all "old" response. However, given the very high level of false alarms, this result should be treated with caution, as a genuine effect on bias may have been masked by a ceiling effect. In sum, the present finding is consistent with previous research, in which the private conformity effects on recognition memory have been demonstrated (Meade & Roediger, 2002; Raysen, 2005; Roediger et al., 2001).

Why did confederate response order have no effect on public conformity in the group recognition test? According to the distinction between normative and informative influence (Deutsch & Gerard, 1955; see also Walther, Bless, Strack, Rackstraw, Wagner, & Werth, 2002), normative influence is not contingent on uncertainty, whereas the amount of informational influence increases as confidence (i.e., certainty) decreases. In the DRM paradigm, participants often report similar phenomenological experiences for both list items and the critical non-presented items (Roediger & McDermott, 1995). In other words, participants' certainty of occurrence for non-presented items seems to be very high. Because participants tended to have high certainty, they may reflect normative influence, which determined group recognition performance in the public situation. In the present research, however, normative influence seems to be not so strong because a confederate was almost same-aged female. Therefore, confederate response order would have no effect on conformity in the group recognition test.

Why should social pressure in a group recognition test carry over to a final individual recognition test? One possible explanation may involve forced confabulation. The forced confabulation effect refers to the phenomenon that pressuring participants to provide made-up accounts of events creates false memory for them (Ackil & Zaragoza, 1998; Zaragoza, Payment, Ackil, Drivdahl, & Beck, 2001). For example, Ackil and Zaragoza (1998) forced participants to answer questions about events that never happened in the video. One week later, these participants demonstrated false memories for the details they had fabricated earlier. One largely accepted interpretation—that is, the source misattribution interpretation—posits that people are prone to

confusing the source of the information that they actually experienced with the source of information they made up (Johnson, Hashtroudi, & Lindsay, 1993; Mitchell & Johnson, 2000, 2009). In the present research, because social pressure forced participants to conform to a confederate's response in the group recognition test, it is likely that participants could invent responses. In other words, it is possible that similar source misattribution errors occur in the present case as found in situations requiring forced confabulation and memory conformity. Although this explanation is highly speculative, it suggests an interesting direction for future research.

In conclusion, the present experiment demonstrated a private conformity effect on false recognition in the DRM paradigm. Perhaps, the best explanation is that conformity effect on false recognition results from forced confabulation, which pressuring participants to provide made-up accounts of events creates false memory for them.

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Notes

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