Source attributions and false memories: A test of the demand characteristics account

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When lists of related words are presented to subjects, they sometimes recall or recognize nonpresented words related to those lists (critical lures). In fact, subjects sometimes claim to remember which of two speakers said the critical lures. We examined whether this finding could be accounted for by demand characteristics. If subjects' willingness to make source attributions to critical lures reflects experimental demand, one would predict that subjects should be willing to change and should have little confidence in these attributions. Subjects made more attributions, were less likely to change their attributions, and were more confident in their attributions for critical lures than for unrelated distractors. Subjects had even more confidence in the attributions that they made for words that had actually been presented, and they were even less likely to change these attributions. These findings suggest that false memories are quite compelling but that they are also subtly different from true memories.

Considerable recent research has focused on the question of how false memories are created and on the relative phenomenological characteristics of true and false memories (see Lampinen, Neuschatz, & Payne, 1997, for a review). Some researchers have found evidence that true and false memories are often substantially similar (Payne, Elie, Blackwell, & Neuschatz, 1996; Roediger & McDermott, 1995). Other researchers, however, have provided evidence that there are subtle differences between true and false memories (Mather, Henkel, & Johnson, 1997; Norman & Schacter, 1997). The research reported in this article provides additional evidence that true and false memories can be experienced in a subjectively compelling fashion but that true and false memories also differ in subtle ways.

We examined the subjective nature of false memories by using a paradigm originally introduced by Deese (1959) and popularized by Roediger and McDermott (1995). In this paradigm, subjects are presented with lists of thematically related words such as *pin*, *thread*, *thimble*, and so forth. On later memory tests, subjects often claim to remember the critical lure *needle*, even though it has never actually been presented. One account of these findings is provided by the source monitoring framework (SMF; Johnson, Hashtroudi, & Lindsay, 1993). According to this account, false memories are produced when memory records for internally generated events (e.g., inferences) are confused with memory records for externally generated events (e.g., perceptions). The SMF claims that memories for internally generated events (e.g., false memories) will differ from memories for externally presented events in that the former will include fewer perceptual, emotional, and

contextual details and more details about cognitive operations used to generate the items. However, because surface details and cognitive operations are used by the system as decision criteria for deciding whether an item has actually been presented, true memories and false memories will also often be substantially similar because they both must pass the same threshold levels of these memory attributes.

Several sources of evidence suggest that false memories are often subjectively compelling (for reviews, see Lampinen et al., 1997). For instance, subjects are highly confident that the critical nonpresented items have been presented (Payne et al., 1996; Roediger & McDermott, 1995), and they claim to select nonpresented items on the basis of conscious recollection rather than mere familiarity (Payne et al., 1996; Roediger & McDermott, 1995). Other researchers have found evidence for subtle differences between true and false memories in terms of their qualitative characteristics. For instance, Mather et al. (1997) found that subjects rated true memories higher than false memories in terms of perceptual and emotional detail, and Norman and Schacter (1997) have obtained similar results.

One novel approach that has been used to examine the subjective nature of false memories has been to examine whether subjects are willing to attribute a source to their false memories. For instance, Payne et al. (1996) showed subjects a videotape of two speakers reading lists of thematically related words. Later, subjects took three consecutive recall tests, and after the last test, they were asked to indicate, if they could remember, which speaker had said each of the recalled words. The subjects were encouraged not to guess and to indicate a speaker only if they were certain. Nonetheless, subjects were willing to attribute a source to the nonpresented critical lures 87% of the time, only slightly less often than they attributed a source for presented items (94%).

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The goal of the present research was to extend the use of the source attribution method to recognition data and to make the source attribution method more sensitive by exploring the certainty with which subjects make source attribution judgments. We addressed three major questions in this research. First, we examined a demand characteristics interpretation of the finding that subjects will make source attributions for nonpresented critical lures. Although the subjects in Payne et al.'s (1996) study were explicitly told not to guess when making source attributions, it is possible that they succumbed to demand characteristics and made source attributions even when they did not believe that they were recollecting a source. If this demand characteristics account is correct, subjects should be able to effectively discriminate source attribution decisions that are based on actual source recollection from those that are made in response to demand characteristics. To test this possibility, we told subjects that several of their source judgments were incorrect and asked them to change a specified number of the judgments. If the source decisions for the critical nonpresented items are made in response to demand characteristics, subjects should change these attributions at a rate that is similar to the rate at which they change their source attributions for unrelated words, because the attributions in both cases would be based merely on guessing.

Second, we examined whether any differences might be found in the confidence with which subjects attribute sources to presented items and critical nonpresented items. To test this possibility, we compared subjects' willingness to change attributions made to presented items with attributions made to critical nonpresented items. The extent to which subjects are more willing to change their attributions for critical nonpresented items as opposed to studied items would suggest that the phenomenological experience of these items differs.

Third, we examined whether subjects were willing to make source attributions for critical nonpresented items in a recognition testing paradigm. Although Mather et al. (1997) asked subjects to make source attributions in a recognition testing paradigm, their procedure was different from Payne et al.'s (1996) procedure. In the paradigm used by Payne et al., the crucial issue was the degree to which subjects were willing to claim that they had a memory for the source, given that they believed the item had been presented. This information was not available in Mather et al., because subjects were not given the option of responding that the item had been presented but that they did not remember the source.

In addition to the issues already discussed, subjects in the present experiment performed an interpolated recall or arithmetic task immediately following the presentation of every list. Research conducted by Roediger and McDermott (1995) demonstrated that the false recognition rate on a final test could be increased by having subjects perform a recall test immediately after list presentation. We

were interested in what influence this task would have on the source attribution rate for true and false items.

EXPERIMENT 1

Method

Subjects. Forty-five State University of New York, Binghamton, introductory psychology students participated in partial fulfillment of a course requirement for laboratory or library research.

Design. The experiment conformed to a 2 (item type: targets, critical nonpresented) $\times$ 2 (task: recall, math) within-subjects design.

Materials. The target list consisted of 10 sublists of 10 items each that were selected from the 24 lists used by Roediger and McDermott (1995). Ordering of the words within each sublist was held constant as the items were presented in order of decreasing association with the critical lure. An example of the set used for the critical nonpresented word *sleep* comprised *bed, rest, awake, tired, dream, snooze, blanket, doze, slumber, snore*. The sublists were blocked by set, so that all 10 words related to a critical nonpresented item were always presented together. The 10 sublists were presented in one of two orders, with the ordering of sublists in Presentation Order 2 being simply the reverse of Presentation Order 1. Another list of 10 sublists served as the distractor list.

Presentation of the study items involved videotaping a female and male confederate as they read the study items. In the video, the speakers had clearly different voices and appearances and appeared side by side against a neutral background. Each confederate read five of the words out of every list, and within each list, the speaker reading each word was randomly determined, with the restriction that neither confederate read more than three study items consecutively.

The recognition test consisted of 80 words presented in the same order for each subject. There were four types of items on the test: targets, critical nonpresented items, true distractors, and critical nonpresented distractors. Target items were items that had been presented in the study list. Three target items were taken from each of the 10 studied lists (the 1st, 4th, and 8th items from each sublist), making 30 in all. There were 10 critical nonpresented items, which were the nonpresented items to which all the presented words were related. The 30 true distractors were 3 items from each of 10 lists that were not presented during the study phase. As was the case for the target items, these items were also the 1st, 4th, and 8th items of each list. Finally, the 10 critical nonpresented distractors were the nonpresented items to which all the distractors were related.

Procedure. The subjects were tested individually and were told that they would be presented with a videotape showing a man and a woman reading a list of words. The subjects were instructed to pay very close attention both to the words in the list and to which person said each word because their memory for the list words and for who read each word would be tested. The subjects were also told that, after the presentation of each list, they would be asked either to recall the items that they had just heard or to complete some math problems. The experimenter indicated which task they would perform after each list was presented by saying either "math" or "recall." The order of these tasks was counterbalanced across subjects. The subjects were given 90 sec to complete each task. After the subjects had been informed about the recall/math task, the videotape was played.

After the subjects had completed the final recall or math task, there was a 5-min filler task in which they were asked to read an article from a popular magazine. This interpolated task was followed by the old/new recognition test. The subjects were instructed to circle "old" next to test items that they remembered as having been presented during the study phase and to circle "new" for any items on the test that they did not remember as having been presented dur-

Table 1
Proportions Recognized, Attributed, and Changed

Condition	Proportion of "Old" Responses		
	Recognized	Attributed	Changed
Studied Items			
Study recall	.86	.83	.20
Study math	.83	.83	.22
<i>M</i>	.85	.83	.21
Critical Nonpresented			
Study recall	.77	.73	.24
Study math	.80	.74	.34
<i>M</i>	.78	.74	.29
True Distractors			
	.12	.51	.46
Critical Nonpresented Distractors			
	.22	.52	.47

ing the study phase. The subjects were told to turn over their tests when they were done. At the end of the recognition test, the subjects were instructed to go back over the words that they called "old" and to try to remember which experimenter had read the word during the study phase, writing an "F" if the female had said the word, an "M" if the male had said the word, or a "?" if they could not remember who had said the word. The experimenter emphasized that the subjects should not guess, but should only make a source attribution if they really remembered who had said the word.

After the source monitoring task, the experimenter collected the test sheets and indicated that she would go into another room to score the test. The experimenter left the room for a period of 2 min and tabulated the number of source attributions made and multiplied that number by 0.25. The experimenter then wrote on the top of the subjects' test, "Change exactly *N* source attributions," where *N* was replaced by the number just calculated rounded up to the nearest whole number. The experimenter then returned to the room and explained that, like most people, the subjects had made several mistakes on the source attribution part of the test and that they should change the specified number of source attributions. The subjects were instructed to change only judgments in which they had indicated that either the man or the woman had read the item, and they were told that they could change the attribution to either the other person or to the question mark response alternative. After changes to the source attribution section of the test had been made, the recognition sheets were collected, and the subjects were given a brief five-item questionnaire about the article that they had read earlier. The subjects were then thanked and debriefed.

Results and Discussion

Recall. The subjects completed a recall test for 5 of the 10 lists that they studied. Across the 5 lists, the subjects recalled an average of 6.1 items per list, for a mean proportion of .61. In terms of critical nonpresented items, the subjects recalled 1.8 out of 5 possible, for a mean proportion of .36. The proportion of critical nonpresented items recalled was lower than both the .55 reported by Roediger and McDermott (1995, Experiment 2) and the .45 reported Payne et al. (1996, Experiment 1). There are two possible explanations for these differences. First, the study lists used in the present research contained only 10 items per list as opposed to the 15 items per list used in the other two studies. Several authors have suggested that studying more related items should lead to more illusory

memories (Deese, 1959; Robinson & Roediger, 1997). Second, whereas Roediger and McDermott and Payne et al. gave subjects 2 min to recall items, the subjects in the present study were given only 90 sec. There is evidence from the Roediger and McDermott and Payne et al. studies that the critical nonpresented items tend to be recalled late in the recall period.

In terms of intrusions other than the critical nonpresented item, the subjects produced an English word other than the studied items or critical lures on 1.5 of the 5 lists on the average. This rate (.31) of intruding extra list intrusions is comparable to the 27% reported by Payne et al. (1996, Experiment 1). Interestingly, many of these extralist intrusions were related to the study lists. For example, several subjects produced the nonpresented words *snore* and *nap* when they recalled the sleep list. This suggests that to consider only the critical lure may be to understate the size of the false memory effect.

Recognition. We first consider the probability of calling an item "old" and then the source attribution data followed by the source attribution change data. As can be seen in Table 1, the subjects recognized a slightly higher proportion of targets than of critical nonpresented items ($M = .85$ and $.78$, respectively), which replicates the findings of Roediger and McDermott (1995) and Payne et al. (1996). A 2 (item type: target, critical nonpresented) $\times$ 2 (task: recall, math) $\times$ 2 (order: 1, 2) mixed-factors analysis of variance (ANOVA) of the proportion of items called "old" revealed a significant main effect of item type [$F(1,43) = 4.36$, $MS_e = .03$]. There were no other significant effects or interactions. It also is important to note that the mean proportions of studied and critical nonpresented items called "old" were much higher than the proportions of true distractors and critical nonpresented distractors called "old" [$t(44) = 28.53$, $p < .05$, and $t(44) = 16.40$, $p < .05$, respectively].

Source attributions. Also presented in Table 1 are the results from the source attribution task. We compared the proportion of source attributions made for the studied and critical nonpresented items that were called "old" in a 2 (item type: target, critical nonpresented) $\times$ 2 (activity: recall, math) within-subjects ANOVA. This analysis revealed a main effect of item type [$F(1,44) = 11.28$, $MS_e = .03$], which was due to the fact that the attribution rate for studied items was significantly greater than the attribution rate for critical nonpresented items (.83 and .73, respectively). This is consistent with our previous research, in which we have found small differences in attribution rates for presented items and critical nonpresented items (Payne et al., 1996).

Importantly, the attribution rate for critical nonpresented items was much higher than the attribution rate for true distractors [$t(39) = 5.05$, $p < .05$] and critical nonpresented distractors [$t(39) = 4.24$, $p < .05$]. This finding is inconsistent with a demand characteristics interpretation. If subjects were merely supplying a source for items because they felt obliged to because of experimental demand, one would expect the same rate of attributions

Table 2
Proportions Recognized and Attributed,
and Confidence in Attribution

Proportion of "Old" Responses			
Condition	Recognized	Attributed	Confidence
Studied Items			
Study recall	.82	.83	2.29
Study math	.76	.76	2.14
<i>M</i>	.79	.80	2.22
Critical Nonpresented			
Study recall	.80	.70	2.04
Study math	.77	.70	1.95
<i>M</i>	.79	.70	2.00
True Distractors			
	.23	.40	1.44
Critical Nonpresented Distractors			
	.22	.46	1.37

for all nonpresented items. The fact that the subjects were more likely to provide attributions for critical nonpresented items than they were for either type of distractor suggests that the subjects really believed that they were retrieving source information.

Attributions changed. The SMF predicts that subjects should be more willing to change attributions made to critical lures than attributions made to target items because the memory records for critical lures should be less perceptually rich. Inspection of Table 1 reveals that these predictions were supported. The subjects changed their attributions more often for critical nonpresented items ($M = .29$) than for studied items ($M = .21$). A 2 (item type: target, critical nonpresented) $\times$ 2 (task: recall, math) within-subjects ANOVA confirmed that the subjects were more likely to change their attributions for critical lures than for targets items [$F(1,38) = 4.04$, $MS_e = .04$].

It is also important to note that the subjects were less likely to change their source judgments for critical nonpresented items ($M = .29$) than they were for distractors ($M = .46$) [$t(28) = 2.08$, $p = .055$] and critical nonpresented distractors ($M = .47$) [$t(28) = 1.86$, $p = .073$]. Although these differences are large in absolute terms, the differences were not significant at conventional levels. However, if the findings could be replicated with a more sensitive measure, this would provide further evidence against a demand characteristics interpretation of subjects' willingness to make source attributions for critical lures. Indeed, although memories for critical lures and presented items do appear to differ phenomenologically, the pattern of results found in this experiment suggests that memories for critical lures are much more like memories for presented items than they are like memories for distractors.

EXPERIMENT 2

Rather than a dichotomous decision as in Experiment 1 (i.e., change or no change), the subjects in Experiment 2 provided confidence ratings for the attributions that they made. We assumed that the confidence ratings would pro-

vide us with a more sensitive measure of how committed subjects were to their attributions and allow us to test further whether distinctions would be found between the attributions made for targets and critical lures and between critical lures and distractors. If the attributions that subjects make for distractors are made with less confidence than the attributions that they make for critical lures, this would provide further evidence against a demand characteristics account of why subjects are willing to attribute a source to critical nonpresented items.

Method

Subjects and Design. Forty-six State University of New York, Binghamton, introductory psychology students were recruited from the same source as in Experiment 1. The experiment conformed to a 2 (item type: target, critical nonpresented) $\times$ 2 (task: recall, math) within-factors design.

Materials and Procedure. The materials and procedures were as in Experiment 1, with three exceptions. First, in the present experiment, the subjects were run in groups of 6 or less. Second, we counterbalanced lists so that the distractor list from Experiment 1 sometimes served as the target list in Experiment 2, and vice versa. Third, in Experiment 2, the subjects were given confidence instructions after all their attributions were made, rather than the change instructions from Experiment 1. That is, the subjects were asked to rate how confident they were that each source attribution that they had made was correct on a scale of 1–3, in which 1 = *somewhat confident*, 2 = *moderately confident*, and 3 = *extremely confident*. It was emphasized to the subjects that this rating was meant to indicate how confident they were about the source attribution, not how confident they were about the item itself.

Results and Discussion

Recall. Across the five lists, the subjects recalled an average of 5.6 (56%) studied items per list and 1.7 critical nonpresented items out of 5 possible (34%). This pattern replicates that reported in Experiment 1. The subjects on the average produced other intrusions on 1.2 of the 5 lists, or 24%, which is comparable to the 31% found in Experiment 1. As in Experiment 1, many of the intrusions were words that were related to the theme but were not actually said by the experimenter.

Recognition. As can be seen in Table 2, the subjects recognized very large and nearly identical proportions of studied items and critical nonpresented items ($M = .79$ and $.78$, respectively). The subjects were also somewhat more likely to call an item "old" when the studied list was followed by a recall test as opposed to a math task. Consistent with the conclusions above, a 2 (item type: target, critical distractor) $\times$ 2 (task: recall, math) $\times$ 2 (list: A, B) $\times$ 2 (order: 1, 2) mixed-factors ANOVA conducted on the proportion of items called "old" revealed a main effect of task [$F(1,43) = 5.47$, $MS_e = .03$], but no effect of item type [$F(1,43) = .041$, $MS_e = .03$, $p = .84$]. There were no other significant main effects or interactions.

Source attributions. Also presented in Table 2 are the results from the source attribution task. As in Experiment 1, we conducted a 2 (item type: target, critical nonpresented) $\times$ 2 (activity: recall, math) within-factors ANOVA in order to compare the proportions of source attributions made for the studied and critical nonpresented

items that were called "old." The analysis revealed a main effect of item type [$F(1,45) = 9.63$, $MS_e = .04$], which replicated the effect of item type found in Experiment 1. It is interesting to note that in both experiments, subjects were willing to attribute a source for 70% of the critical nonpresented items that they had recognized. As in Experiment 1, the attribution rate for critical nonpresented items was much higher than the attribution rates for true distractors [$t(37) = 6.74$, $p < .05$] and for critical nonpresented distractors [$t(37) = 2.61$, $p < .05$]. This finding provides further evidence against a demand characteristics interpretation of why subjects are willing to make attributions of sources for critical nonpresented items.

Confidence. Table 2 also includes the subjects' confidence ratings for the items that subjects attributed to one of the speakers. Inspection of the table suggests that the subjects were more confident in their attributions for studied items ($M = 2.22$) than they were in their attributions for critical nonpresented items ($M = 2.00$). However, the confidence judgments were much lower for the true distractors ($M = 1.44$) and critical nonpresented distractors ($M = 1.40$) than they were for the critical nonpresented items. As in Experiment 1, the subjects appear to have experienced critical nonpresented items as being more similar phenomenologically to targets than to unrelated distractors.

A 2 (item type: target, critical nonpresented) $\times$ 2 (task: recall, math) within-factors ANOVA confirmed these conclusions. There was a main effect of item type: The subjects were more confident in their attributions for targets than in those for critical nonpresented items [$F(1,43) = 13.83$, $MS_e = .23$]. The subjects were also more confident that their source attributions were correct for critical nonpresented items than for true distractors [$t(27) = 3.97$, $p < .05$] and critical nonpresented distractors [$t(23) = 5.54$, $p < .05$]. These findings are consistent with the pattern of attribution change results reported in Experiment 1. The fact that the subjects made more source attributions and were more confident in their attributions for critical nonpresented items in comparison with the other distractors is again inconsistent with the demand characteristic interpretation of the finding that subjects are willing to provide a source for critical nonpresented items.

GENERAL DISCUSSION

As in previous research, subjects recalled and recognized a substantial number of critical lures (Payne et al., 1996; Roediger & McDermott, 1995). In addition to recognizing a large proportion of nonpresented critical lures, subjects were quite willing to attribute a source to items that they had never in fact heard. This finding replicates what we have found in our previous research (Payne et al., 1996) and extends that result to recognition testing paradigms.

Importantly, the results of these experiments are inconsistent with a simple demand characteristic account of subjects' source attributions for false memories. The demand

characteristics account suggests that subjects should change their attributions for all nonpresented items at similar rates and that subjects should be as confident in their attributions for thematically related false items as they are for unrelated items. By contrast, subjects made more attributions, changed fewer attributions, and were more confident in their attributions for critical nonpresented items than in those for related distractors. Across all of these measures, memories for critical nonpresented distractors seem to be more similar to memories for presented items than to memories for unrelated distractors.

The findings of the present study also qualify our previous research on source attributions and false memories. Although the source attributions made for critical nonpresented items were similar to the attributions made for presented items, they were not identical. The subjects in Experiment 1 made somewhat fewer source attributions for critical nonpresented items and were more likely to change those attributions once they were made. In Experiment 2, the subjects made source attributions for presented items with more confidence than they made source attributions for critical nonpresented items. These findings are consistent with the predictions of the SMF (Johnson et al., 1993) as well as recent empirical research (Mather et al., 1997; Norman & Schacter, 1997).

The subjects sometimes falsely recognized distractors that were unrelated to the target lists. Interestingly, the subjects were often willing to attribute a source to even these items. It is important to note, however, that the rates of attribution reported here are conditional on the item's having been recognized. This high rate of attribution even for unrelated distractors may simply reflect that subjects may have required some threshold level of evidence before they were willing to claim that they had heard any of the items. Thus, while the rate at which distractors were recognized was low in comparison with that for presented items and critical lures, the subjects made attributions for a substantial proportion of these items, although they did so at lower levels of confidence.

This research joins other recent research demonstrating that false memories can often be subjectively compelling (Lampinen et al., 1997). It does not, however, answer the ultimate question of how memories for events that have never occurred gain their subjectively compelling experiential quality. How does someone come to have a memory for a never presented word as having been spoken by a particular speaker? Lampinen (1996) has suggested a familiarity plus corroboration account of how vivid false memories are produced. According to this account, high familiarity levels associated with false memories cause subjects to search their memory for corroborating details. These corroborating details are borrowed from actually presented items and are bound to the false memory trace. Thus, according to this account, false memories are often subjectively compelling because false memory content is borrowed at retrieval from actually presented items. Reyna and Titcomb (1996) have independently made a similar proposal.

Our memory for events is far from perfect. Part of that imperfection lies not only in the way that we remember events that have never happened but also in our ability to generate details about those events that tend to support them. The present research provides evidence that these illusory details are not merely the consequence of experimental demand. Yet the research also shows that although false memories are quite similar to true memories, there are subtle differences between them.

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