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Source Misattributions and the Suggestibility of Eyewitness Memory

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Although the suggestibility of eyewitness memory is well documented, previous studies have not clearly established the extent to which misled Ss might come to believe they actually remember seeing the suggested details they report. To assess whether Ss confuse misleading suggestions for their "real memories" of a witnessed event, Ss were asked specific questions about their memory for the source of suggested items. The results of 5 experiments showed that misled Ss do sometimes come to believe they remember seeing items that were merely suggested to them, a phenomenon we refer to as the *source misattribution effect.* Nevertheless, the results also showed that the magnitude of this effect varies and that source misattributions are not an inevitable consequence of exposure to suggestions.

It is now well established that the accuracy of eyewitness testimony can be severely compromised by exposure to misleading postevent suggestion (Ceci & Bruck, 1993; Lindsay, in press; Loftus, 1979a, 1979b; Loftus & Loftus, 1980). Numerous studies have demonstrated that subjects can be led to report events different from those they actually witnessed. In this research we sought to answer a fundamental question about suggestibility phenomena: Do subjects come to believe that they actually remember *seeing* the suggested details they report?

Most of our knowledge about eyewitness suggestibility comes from laboratory studies of the "misinformation effect." In this experimental paradigm, subjects are first shown a film clip or slide show depicting a forensically relevant event and are later exposed to misinformation that contradicts selected aspects of the event. For example, in a well-known study by Loftus, Miller, and Burns (1978), subjects who had viewed a traffic accident involving a stop sign were later asked a series of questions, one of which incorrectly referred to the stop sign as a yield sign. Later, when asked whether they had seen a stop sign or a yield sign at the traffic accident, misled subjects were much more likely than control subjects (who had not been misled) to select the suggested item. Many other studies have replicated this effect (e.g., Bekerian & Bowers, 1983; Belli, 1989; Ceci, Ross, & Toglia, 1987; Christiaansen & Ochalek, 1983; Loftus, Donders, Hoffman, & Schooler, 1989; Loftus & Hoffman, 1989; McCloskey & Zaragoza, 1985a; Pirolli & Mitterer, 1984; Tousignant, Hall, & Loftus, 1986; Weinberg, Wadsworth, & Baron, 1983).

Subsequent research and theorizing about misinformation phenomena have been dominated by a concern with the "fate" of the original memory representation following exposure to misinformation. In particular, much attention has focused on the controversial claim that misinformation alters the original memory trace such that the originally stored memory is lost from memory (e.g., Loftus & Loftus, 1980). Some researchers have argued that misinformation does not erase originally stored information but merely renders it difficult to retrieve (Bekerian & Bowers, 1983; Belli, Windschitl, McCarthy, & Winfrey, 1992; Chandler, 1989, 1991; Christiaansen & Ochalek, 1983); still others have argued that misinformation does not impair retrieval of original memories at all but merely influences the reports of subjects who never encoded the original detail or who have forgotten it by the time they are misled (Bowman & Zaragoza, 1989; McCloskey & Zaragoza, 1985a, 1985b; Zaragoza, McCloskey, & Jamis, 1987; see also Zaragoza, 1987; 1989; and Zaragoza, Dahlgren, & Muench, 1992, for similar findings with preschool children). Currently, there is no consensus on the role of memory impairment in misinformation phenomena, and this issue continues to be the focus of considerable experimentation and debate (Belli, 1989; Belli et al., 1992; Ceci et al., 1987; Lindsay, 1990, in press; Loftus & Hoffman, 1989; Toglia, 1991; Tversky & Tuchin, 1989; Zaragoza & McCloskey, 1989).

Whether exposure to suggestion impairs the original memory, the fact remains that subjects can be easily led to report misinformation that has been suggested to them. Yet, there has been almost no research on the nature of subjects' memory for the suggested details that they report (see Schooler, Gerhard, & Loftus, 1986, for a possible exception). One particularly important question in this regard is whether people confuse the misleading suggestions for their "real memories" of the witnessed event. The misinformation effects reported in the literature do not provide a clear answer to this question because (a) it is possible that subjects report everything they believe to be true of the event, without regard to whether they have a specific memory of having seen it, and (b) there are several reasons to expect that subjects in the typical suggestibility study will believe that the suggested information is true. Studies by Gilbert (e.g., 1991) have shown that people automatically believe all that they comprehend and that rejection of ideas comes later as part of a more effortful process. These findings predict that subjects in the misleading situation will automatically accept suggestions as true and will

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later reject suggestions only if subsequent processing reveals a basis for doing so. Because misleading suggestions are typically presented as accurate descriptions of the original event by a source presumed to be both knowledgeable and credible (i.e., the experimenter), subjects may have no reason to distrust the suggested information unless they have a memory of their own that conflicts with the suggestion. Given that most evidence for suggestibility has been obtained in studies in which memory for the original event is weak (see McCloskey & Zaragoza, 1985a, for a more extensive discussion of this point), it is clear that misinformation effects have been obtained in situations in which subjects have had little basis for rejecting the suggested information and were therefore likely to accept it as true. When tested on their memory for the original event, subjects' desire to perform well is likely to lead them to report everything they believe happened at the original event without regard to whether they can specifically recollect it or whether they learned it from a postevent source. Thus, the finding that subjects report suggested information cannot be taken as evidence that subjects believe they actually remember seeing the suggested information at the original event.

Asking whether subjects misremember seeing suggested items is in essence a question about subjects' ability to monitor the *source* of their memories. The belief that one remembers seeing a suggested item is an example of a situation in which a memory derived from one source (e.g., leading questions provided by an experimenter) is misattributed to another source (e.g., the witnessed event), an error we refer to as a *source misattribution error.* Therefore, in order to assess whether subjects confuse misleading suggestions for their "real memories" of a witnessed event, it is necessary to use test procedures that more directly assess subjects' memories for the source of the items that they report.

Following the source monitoring framework of Johnson and colleagues (see Johnson, Hashtroudi, & Lindsay, 1993, for a recent review), we assume that memory for source is an *attribution* that is the product of a judgment process. From this view, information about the source of a memory is typically not directly encoded as some sort of "tag" or proposition. Rather, it is assumed that memory representations contain certain characteristics that reflect the conditions under which they were acquired (e.g., the mode and medium of presentation, contextual information, emotional reactions) and that judgments about source are made by evaluating the amount and nature of these characteristics. So, for example, if a memory contains a great deal of visual detail, an individual would likely attribute this memory to an event that he or she saw. This framework also assumes that source monitoring decisions may be influenced by reasoning that is based on additional information from memory. Thus, for example, even if a memory has characteristics that are typical of perceived events (e.g., visual detail), one may decide that the memory is not "real" on the basis of other knowledge one has (e.g., "I could not have seen Carol today because I know she is out of town"). Finally, we also assume that the accuracy of source monitoring judgments is likely to vary depending on the circumstances at the time of retrieval (i.e., the amount and nature of information retrieved, the reasoning processes and biases brought to bear on the judgment, the rememberer's current goals and agendas) as well as the characteristics of the underlying memory representations. Thus, the source monitoring framework predicts that subjects' tendency to confuse suggested items for those that they saw should be a function of (a) the extent to which the memory characteristics of the misleading episode are similar to those of the original episode and (b) the extent to which the circumstances at recall encourage retrieval of source-relevant information.

We could find only two published studies in the suggestibility literature in which a test procedure was used wherein subjects were asked to make overt judgments about their memory for the source of suggested items (Lindsay & Johnson, 1989; Zaragoza & Koshmider, 1989); both studies failed to find evidence that subjects misremembered the suggested items as being from the originally seen event. Interestingly, both studies also showed that they could replicate the misinformation effect reported in the literature when traditional recognition testing procedures were used. Hence, the same manipulation that led to substantial reporting of suggested items on a recognition test did not lead subjects to claim that they remembered seeing suggested items on a source test. This finding is consistent with our argument that subjects may report suggested items that they know they do not remember seeing simply because they believe them to be true.

In contrast to these findings, a study by Lindsay (1990) provides evidence consistent with the claim that misled subjects sometimes confuse suggested items for those that they saw. Lindsay found that misled subjects reported suggested items on a cued-recall test of the witnessed event even though they had been explicitly warned that all of the information they had read in the postevent narrative was wrong (i.e., definitely not in the event they saw). Thus, although subjects in this study were not asked overt questions about their memory for the source of suggested items, it is clear that these subjects could not remember the true source of the suggested items or they would have refrained from reporting them on the test. It should be noted, however, that Lindsay found evidence of source misattribution errors only in a condition that was designed to make the original and misleading episodes difficult to discriminate. For example, the original slides were accompanied by a tape-recorded narrative that was in the same female voice as the postevent narrative, subjects were explicitly instructed to form visual images of the events described in the postevent narrative, and the final test occurred after a 48-hr retention interval. Given that substantial suggestibility effects have been observed under conditions in which the two sources are much more discriminable (e.g., they occur in different modalities, subjects are tested immediately), it is important to determine whether source misattributions can be observed under less extreme conditions. It is also the case that Lindsay's procedure might have underestimated the incidence of source misattributions because it does not detect the proportion of subjects (if any) who believe that they both saw and read about the misleading suggestion.

The purpose of this research was to further explore the possibility that subjects do misremember seeing suggested items (i.e., they commit source misattribution errors) by using a test procedure in which subjects are asked to make overt judgments about their memory for source. In all of the

experiments to be reported here, we used misleading suggestions that supplemented, rather than contradicted, selected aspects of the originally seen event. We chose supplemental misinformation in order to disentangle source misattribution effects from possible memory impairment effects. Although source misattribution and memory impairment are separate processes (e.g., a misleading suggestion may impair memory for an originally seen item yet not lead subjects to believe they remember seeing the misleading item), it is possible that source misattribution and memory impairment interact. A second reason for using supplemental misinformation is to increase the likelihood of source misattribution errors. With contradictory misinformation subjects may be especially likely to detect a discrepancy between the misinformation and their memory for the event and thus be less susceptible to source misattribution errors (cf. Zaragoza & Koshmider, 1989).

Experiment 1

The two studies that failed to find evidence of source misattributions (Lindsay & Johnson, 1989; Zaragoza & Koshmider, 1989) both used a procedure in which the misinformation was presupposed in the context of a narrative description of the event that subjects read. We hypothesized that subjects may be more likely to commit source misattributions if the misinformation is encountered in the context of questions that subjects have to answer rather than in a narrative they simply read. Specifically, we proposed that the process of actively attempting to retrieve and reconstruct the original event when answering misleading questions would lead to a memory that is more similar to memories derived from the originally witnessed event than those that result from simply reading the misleading narrative.

In the first experiment, subjects viewed a slide sequence depicting an event and were immediately exposed to postevent information embedded in either a narrative they read or questions they answered. For each subject, the postevent questions–narrative contained five suggested items that were not in the original slide sequence. Following a 10-min filler task, subjects were given a surprise source memory test in which they were asked to indicate the source of each test item by selecting either "saw," "read," "both," or "neither" as a response. Of primary interest was the extent to which subjects in the two context conditions would come to believe that they remembered seeing the suggested items at the original event.

Method

Subjects. Subjects were 180 undergraduates who participated in the experiment in partial fulfillment of a course requirement. Of these, 90 subjects were randomly assigned to the questions and narrative conditions, respectively.

Stimuli and materials. The eyewitness event was a modified version of the slide sequence used by McCloskey and Zaragoza (1985a). The series of 79 slides depicted an incident in which a maintenance man enters an office, repairs a chair, finds and steals $20 and a calculator, and leaves. For six of the slides, a second version was constructed by deleting a single item depicted in the original slide. These six items were a rag, a paperback book, a jar of Folger's coffee, a Coke can, a pack of bubblegum, and a hammer. For each subject, only two of these six items appeared in the slide sequence he or she saw (and served as slide-only items). Of the remaining four items, two appeared in the postevent questions or narrative only (and thereby served as suggested items) and two did not appear in the context of the experiment at all (and thereby served as control items). Across subjects each of these six items served equally often as a slide only, read only (suggested), or new (control) item.

In addition to the six items just described, six more items were generated for use as misleading postevent suggestions. These were items that, although not present in any of the slides the subjects saw, were highly plausible within the context of the event depicted in the slides (i.e., they were "schema consistent"). These items were a coat rack, a wristwatch, a cigarette lighter, a newspaper, a xerox machine, and a wallet. For each subject, three of these items appeared in the postevent narrative–questions (thereby serving as suggested items), and the other three were not presented at all (thereby serving as control items). Across subjects each of these six items served equally often as a suggested or control item. Thus, across the experiment a total of 12 items were used as misleading suggestions, but for any one subject 5 of these served as suggested items, 5 as control items, and 2 as slide-only items.

In addition to the 12 items described earlier, an additional 13 items were generated for use as filler items on the final test. Of these, 5 were items that appeared in the slides only for all subjects, 7 were items that appeared in both the slides and postevent questions–narrative for all subjects, and 1 was new for all subjects. Thus, the final test contained approximately equal numbers of items from each of the four possible source categories: 7 slide-only items, 7 slide and postevent items, 5 suggested items, and 6 new items (5 control items and 1 filler item).

The postevent narrative consisted of 30 sentences that provided a detailed description of the incident depicted in the slides. For each subject 5 of the sentences were misleading in that they each presupposed the existence of an item that was not in the slide sequence the subject saw. The postevent questions were constructed by dividing the postevent narrative into 15 sections, each corresponding to one "question" that subjects had to answer. The narrative was divided such that each of the sections contained no more than one suggested item. The wording within each section was similar to that of the narrative with the exception that the last sentence was transformed into a question. For example, for subjects in the narrative condition, the suggested item "wristwatch" was presented in the following sentence encountered in the context of a paragraph: "When the man looked at his *wristwatch* before opening the door, he appeared very anxious." For subjects in the questions condition who were misled about a wristwatch, the misinformation was presented in the following context: "When the man looked at his *wristwatch* before opening the door, did he appear anxious?" Subjects for whom wristwatch was a control item read a highly similar narrative or question in which the word *wristwatch* was deleted (e.g., "When the man paused before opening the door, did he appear anxious?").

The source memory test consisted of a list of 25 items that were presented auditorily via a Toshiba RT-SX1 stereo cassette recorder. A single random ordering of the test items was constructed that conformed to the following constraints: (a) The 12 critical items appeared between Positions 4 and 21 on the list and (b) no more than 2 items from the same source appeared consecutively. The same list of 25 items was presented to all subjects. Hence, whether a particular critical item served as a suggested or control item was determined by the version of the postevent narrative–questions the subject had read.

Typed test instructions were given to subjects along with the answer sheet. The instructions for the source memory test read as follows:

> In this last phase of the experiment you will hear a list of 25 items played over this tape recorder. The items will be presented individually at 8 second intervals. Some of the items you will hear

named are items that you saw in the slides. However, some of the items you will hear named are items that you did not see in the slides, but that you did read about in the *questions you answered earlier* (narrative description that you read earlier). In addition, some of the items you will hear named are items that you both saw in the slides and read about in the *questions* (narrative). Finally, some of the items you will hear named are objects that were neither in the slides you saw nor mentioned in the *questions you answered earlier* (narrative you read earlier).

Your task will be to check the column on your answer sheet which best describes what you remember about the source of each test item. If you only remember seeing the item in the slides, you should put a check under the "SAW" column on your answer sheet. If you only remember reading about the item in the *questions you answered earlier* (narrative description you read earlier), you should check the "READ" column. If you both remember seeing the item in the slides and reading about it in the *questions* (narrative), you should check the "BOTH" column. Finally, if you do not remember seeing or reading about the item, you should check the "NEITHER" column. Please be sure to give a response for each of the 25 test items. You will have 8 seconds to respond to each item.

Procedure. Subjects were told that the experiment concerned people's interpretations of complex events and that their task would be to view a series of slides and attempt to determine what the incident depicted in the slides was about. Subjects viewed the slides presented at a rate of 4 s per slide. All subjects were then exposed to postevent information presented in the context of either questions they answered or a narrative description of the event that they read.

Subjects in the questions condition were instructed that all of the questions could be answered with one or two words and that they were to give an answer for each of the 15 questions, even if they had to guess. Subjects answered the questions at their own pace.

Subjects in the narrative condition were instructed to read the narrative at their own pace. After subjects had finished reading the narrative they were given a short questionnaire that contained two multiple choice questions about memory for verbal versus pictorial information (e.g., whether they believed that memory was superior for verbal information than visual information or vice versa). In addition to supporting the cover story about the purpose of the experiment, the questionnaire also served to better equate the amount of time between the slide presentation and the test for subjects in the two conditions.

Subjects in both conditions then engaged in a 10-min filler task followed by the source memory test. Subjects were instructed to read the test instructions while the experimenter read them aloud.

Results and Discussion

The question of primary concern in this and all other studies reported in this article was the extent to which exposure to postevent suggestion would lead subjects to believe that they remembered seeing the suggested items at the original event. We refer to situations in which subjects claim to remember seeing something they did not in fact see as *source misattribution errors,* and we restrict the use of the term to this particular case. Although other sorts of source confusions are possible (e.g., someone believing that he or she both saw and read about something he or she only saw), our research to date suggests that these are relatively rare.

Here and throughout, source misattributions were scored as the number of "saw" and "both" responses made to test items that subjects did not in fact see. The results are reported in proportions for ease of exposition. To assess whether exposure to suggestion leads to source misattribution, it is necessary to determine whether subjects claim to remember seeing the suggested items more often than they would had they not been misled. Consequently, in this and subsequent studies, the measure of interest will be the difference between source misattributions committed to suggested and control (i.e., new) items, a measure we refer to as the *source misattribution effect.*

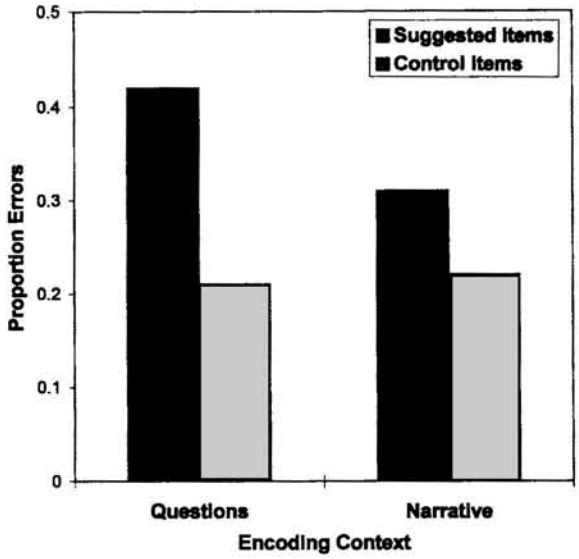

Figure 1. Mean proportion of source misattribution errors as a function of item type and encoding context. Source misattributions were calculated as the sum of "saw" and "both" responses.

The results of the first experiment are illustrated in Figure 1. Overall, subjects were more likely to claim that they remembered seeing suggested items than control items, $F(1, 178) = 52.1$, $p < .01$, $MS_e = 1.015$. However, as predicted, the magnitude of the source misattribution effect was greater in the questions condition than in the narrative condition, as evidenced by a significant interaction, $F(1, 178) = 9.2, p < .01$, $MS_e = 1.015$. Post hoc analyses confirmed that the questions–narrative manipulation had a substantial effect on the misattributions committed to suggested items, $F(1, 178) = 7.56, p < .01$, $MS_e = 1.8$, but had no effect on the misattribution errors committed to control items ($F < 1$). Moreover, post hoc analyses further revealed that the source misattribution effect was significant in both conditions, Fs(1, 178) = 52.54 and 8.9, ps $< .01$, MS_es = 1.5 and 1.5, for the questions and narrative conditions, respectively. When the data were analyzed with items, rather than subjects, as the random effect, the outcome was identical. In summary, the results of both sets of analyses converged in showing (a) that subjects exposed to misleading suggestions did come to believe that they remembered seeing the suggested items; (b) that this source misattribution effect was robust in the questions condition; but (c) was smaller, yet reliable, in the narrative condition.

It was of interest to assess how subjects' responses to suggested items differed from their responses to the items that they actually saw in the slide sequence. Given that there was a subset of 6 items that served equally often in the role of items that subjects had seen in the slides only (i.e., saw-only items),

Table 1
Distribution of Responses to Suggested and Control Items as a Function of Encoding Condition in Experiment 1

	Questions		Narrative	
Response	Suggested	Control	Suggested	Control
Saw	.07	.20	.10	.20
Read	.41	.01	.51	.01
Both	.35	.01	.21	.02
Neither	.17	.78	.18	.77

Note. Values represent the mean proportion of times subjects selected each response on the source test.

read about in the questions–narrative only (i.e., suggested items) or neither (i.e., control items), we were able to assess how subjects' memory for having seen these items varied as a function of their original source. Not surprisingly, subjects were much more likely to claim that they remembered seeing the items when they had actually seen them (*M*s = .67 and .63 for the questions and narrative conditions, respectively) than when they had simply been suggested to them (*M*s = .30 and .22 for the questions and narrative conditions, respectively), or when they had not seen or read about them at all (*M*s = .13 and .12 for the questions and narrative conditions, respectively).

Why does answering misleading questions lead to greater source misattribution errors than reading a misleading narrative? An examination of how subjects in the questions and narrative conditions distributed their responses to the control and misleading items (see Table 1) provides some insight into this issue. As is evident from Table 1, the questions–narrative manipulation had no effect on the distribution of responses to control performance, thus showing that the questions–narrative effect was specific to subjects' memory for the suggested items and was not attributable to a more general effect on test performance.

Inspection of performance on suggested items clearly revealed that the greater incidence of source misattributions in the questions group was attributable to the fact that these subjects were more likely to select the "both" response (and therefore less likely to correctly select the "read-only" response). Thus, answering misleading questions did not interfere with subjects' ability to remember reading about the suggested items (collapsing across "read" and "both" responses, the means were .76 and .72 for the questions and narrative conditions, respectively). Rather, it led them to believe that they also remembered seeing items that they correctly remembered reading about.

Another important aspect of the results was that the questions–narrative manipulation influenced source memory without affecting old/new recognition. In other words, subjects in the questions and narrative condition were equally likely to recognize the suggested items as "old" (i.e., not new) within the context of the experiment (collapsing across "saw," "read," and "both" responses, the means were .83 and .82 for the questions and narrative conditions, respectively). This finding is important because it shows a dissociation between source confusion and memory for occurrence. Hence, it is not the case that the greater incidence of source misattributions in the questions condition was simply attributable to differences in old/new recognition.[1] Moreover, this finding fits with the growing body of evidence that source judgments and old/new recognition judgments are often made on different bases (e.g., Dywan & Jacoby, 1990; Johnson, Foley, & Leach, 1988, Experiment 1; Schacter, Harbluk, & McLachlan, 1984; Shimamura & Squire, 1987).

We hypothesized that the increase in source misattributions evidenced in the questions condition was attributable to the fact that answering misleading questions led subjects to actively retrieve and reconstruct the originally witnessed events and that in so doing they incorporated the suggested items into their reconstruction. If this is the case, then any task that induces subjects to actively rehearse and reflect on the original event while processing the misinformation should also lead to greater source misattributions. We tested this hypothesis in Experiment 2.

Experiment 2

Subjects in this experiment first viewed the original slide sequence and were then given a scrambled version of the postevent narrative used in Experiment 1. Their task was to indicate the correct ordering of events. We hypothesized that this task would require subjects to actively review and reconstruct the original events in much the same way that answering questions requires, and assuming that subjects incorporate the suggested items in their rehearsals, the unscrambling task should also result in greater source misattribution errors than simply reading the misleading narrative.

Method

Subjects. Participants were 90 subjects from the same pool described previously.

Materials and procedure. The slides and source memory test were identical to those used in Experiment 1. To create the scrambled version of the postevent narrative, we divided the narrative from Experiment 1 into 15 sections that corresponded to the questions used in Experiment 1, and we randomly scrambled these sections. All subjects received the narrative in the same scrambled order. The 15 sections were labeled consecutively with the letters A through O. Subjects were given an answer sheet with 15 blank lines numbered from 1 to 15, wherein the numbers represented the ordinal position in the story. They were then told to indicate the correct sequence of events by placing the letters next to the appropriate number. Subjects were otherwise treated identically to subjects in Experiment 1.

Results and Discussion

A comparison of the results of the scrambled condition with the narrative and questions groups from Experiment 1 was

[1] Although answering questions did not affect the memory strength of the suggested items, it is possible that this task improved memory for the misleading episode as a whole. For example, it is possible that subjects in the questions condition would be better able than subjects in the narrative condition to free recall the series of events that they read about during the misleading episode. However, because this study assessed memory only for individual items, it was not possible to determine whether such effects occurred.

complicated by the fact that in the scrambled condition, the proportion of old responses to the misleading items (i.e., the proportion of subjects who selected either the "saw," "read," or "both" response) was lower (M = .69) than the proportion of old responses in the narrative and questions conditions of Experiment 1 (Ms = .82 and .83, respectively). Hence, fewer subjects in the scrambled condition recognized the suggested items as familiar. Fortunately, the proportion of subjects in the scrambled condition who correctly identified the control items as new (M = .76) did not differ from the narrative and question groups (see Table 1).

In order to compare performance across the three groups, we computed the source misattributions for each group as a proportion of the total number of suggested items that were recognized as old (i.e., P[saw] + P[both]/P[saw] + P[both] + P[read]). The adjusted source misattribution scores for the three groups were as follows: scrambled = .50, questions = .50, and narrative = .38. These results suggest that source misattribution errors were as prevalent in the scrambled condition as in the questions condition and are thus consistent with the hypothesis that active rehearsal of the originally seen event while processing the misinformation leads to source misattribution errors. However, a potential problem with this conclusion is the possibility that there is a relationship between memory strength and the tendency to misattribute source, such that items that are less well remembered are more likely to be misattributed. If this is the case, then the relatively high level of source misattributions in the scrambled condition may be a function of lower memory strength.

We therefore conducted an analysis of source misattributions on a subset of the data in which the groups were equated on old/new recognition performance. The subgroups were obtained by removing from the sample 30 subjects from each of the questions and narrative groups whose old/new recognition performance was at ceiling, and randomly selecting 60 subjects from the scrambled group (to facilitate comparison with the smaller samples in the other groups), with the constraint that counterbalancing was preserved in all groups. The old/new recognition of subjects in the resulting subgroups was nearly identical (.76, .74, and .74 for the questions, narrative, and scrambled groups, respectively), with approximately equal numbers of subjects whose recognition was at ceiling in the three groups. The outcome of the analysis on the subgroups was consistent with the previous analysis in suggesting that the unscrambling task, like the questions manipulation, increased the tendency to commit source misattribution errors. A significant Group × Item Type interaction was obtained, $F(2, 177) = 4.8, p < .01, MS_e = 0.931$. Because the three groups did not differ in errors committed to control items (Fs < 1), it is clear that the source of the interaction was differences in errors committed to the misleading items (Ms = .43, .25, and .35 for the questions, narrative, and scrambled groups, respectively), with greater source errors to misleading items in the scrambled group than in the narrative group, $F(1, 177) = 4.2, p < .05, MS_e = 1.67$. Moreover, the difference in source errors committed to misleading items in the questions and scrambled groups did not reach statistical significance, $F(1, 177) = 2.87, p = .09, MS_e = 1.67$.

In summary, unscrambling a misleading narrative led to more source misattributions than simply reading a misleading narrative, even though the same narrative was used in both groups. A likely explanation for the differences in source misattributions is that the unscrambling task, like answering questions, encourages subjects to actively reconstruct the original episode at the time they are misled. These results do reveal a trend (albeit not statistically significant) toward more errors in the questions condition than in the scrambled condition, leaving open the possibility that there may be some question-specific variables (e.g., linguistic form, the pragmatics of question answering) that contribute to source errors. Nevertheless, the finding that unscrambling and question answering led to comparable proportions of source misattributions suggests that actively reflecting on the original episode while processing the misleading suggestion is a potent variable in producing source misattribution errors.

Experiment 3

Our goal in Experiment 3 was to explore the role of retrieval conditions in source misattribution errors. Most previous studies of eyewitness suggestibility have used a procedure in which subjects are given a recognition test of their memory for the witnessed event and are not informed that the postevent information might have contained new information. We have argued that because subjects were led to believe that the postevent information accurately described the events that they saw, they might not have discriminated between the items that they specifically remembered seeing and those that they did not when reporting on the test. By contrast, the source test procedure used in the foregoing experiments explicitly calls attention to the fact that the postevent narratives–questions contained some information that was not in the slides and thus should encourage subjects to make this discrimination. In Experiment 3, we compared performance when the traditional test procedure was used (in this case a yes–no recognition test) with performance on the source memory test as a function of whether the misleading suggestions were encountered in the context of a narrative they read or questions they answered.

Method

Subjects. Subjects were 264 undergraduates from the same pool as before. Of these, 144 subjects were given a source test, and 120 subjects were given a yes–no test. Within each test group, equal numbers of subjects were randomly assigned to the questions and narrative conditions.

Materials and procedure. The materials were the same as those used in Experiment 1, except that several statements were modified slightly to maximize the similarity in linguistic structure between the questions and their corresponding narrative statements.

The procedure for subjects in the source test group was identical to that used in Experiment 1. The procedure for subjects in the yes–no test group was also the same, except that subjects were instructed to make a yes–no recognition judgment, rather than a source judgment, for each of the 25 test items. The yes–no subjects were instructed that they were being tested on their memory for the material they saw in the slides and that their task was to decide for each test item whether the item was present in the slides they saw.

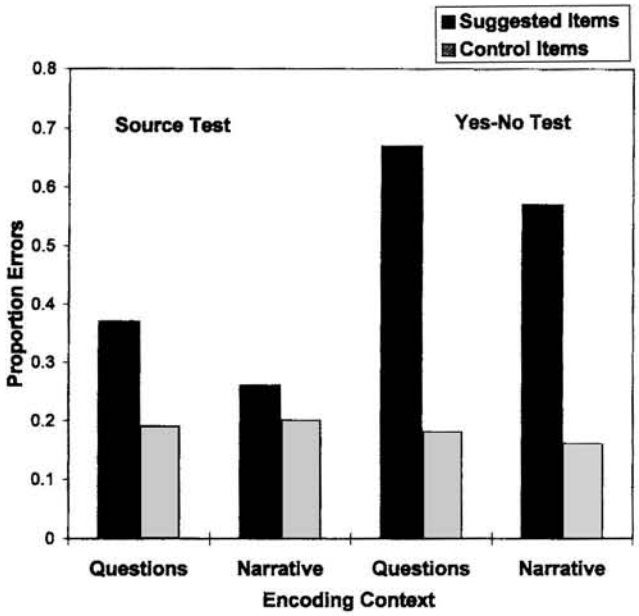

Figure 2. Mean proportion of source misattribution errors as a function of item type, encoding context, and test.

Results and Discussion

Figure 2 illustrates the proportion of subjects in each test group who incorrectly claimed to remember seeing the suggested items (i.e., the proportion of subjects who responded yes on the recognition test and the proportion who selected either the "saw" or "both" response on the source test) as a function of condition (questions vs. narrative) and item type (suggested vs. control).

Considering first the results from the source test group, it is clear that the major findings of Experiment 1 were replicated: Although subjects were overall more likely to commit source misattributions to suggested items than control items, $F(1, 142) = 25.9, p < .01, MS_e = 0.97$, the interaction between condition and item type was once again highly significant, $F(1, 142) = 7.3, p < .01, MS_e = 0.97$, thus confirming that the magnitude of the source misattribution effect was greater in the questions condition than in the narrative condition. Post hoc analyses confirmed that the questions–narrative manipulation affected the errors committed to suggested items, $F(1, 142) = 7.1, p < .01, MS_e = 1.6$, but not control items ($Fs < 1$). Moreover, post hoc analyses further revealed that the source misattribution effect was significant in the questions condition, $F(1, 142) = 30.3, p < .01, MS_e = 0.97$, but not in the narrative condition, $F(1, 142) = 2.9, p > .05$. When the data were analyzed with items as the random effect, the outcome was identical.

Examination of how subjects distributed their responses to the suggested and control items once more replicated the major findings of Experiment 1 (see Table 2). Namely, the questions–narrative manipulation did not affect the proportion of subjects who recognized the suggested items as old ($Ms = .85$ and .80 for the questions and narrative conditions, respectively), $F(1, 142) = 2.6, p > .05$, nor did it affect the proportion of subjects who remembered reading about the suggested items ($Ms = .75$ and .72 for the questions and narrative conditions, respectively). Once more, the increase in misattribution errors among subjects in the questions group was attributable almost entirely to a belief that they both saw and read about the suggested items.

In contrast to the results obtained in the source test group, in the yes–no test group substantial misinformation effects were observed in both the questions and narrative conditions. For subjects in the yes–no test group, the overall main effect of item type was highly significant, $F(1, 118) = 214.9, p < .01, MS_e = 1.4$; however, the Condition × Item Type interaction was not, $F(1, 118) = 1.7, p > .05$. Hence, unlike the pattern of results observed on the source memory test, on the yes–no recognition test subjects in the questions condition were not more influenced by the misinformation than subjects in the narrative condition.

As is obvious from Figure 2, the most striking aspect of the results is that subjects given a source monitoring test were much less likely to attribute suggested items to the original event than subjects given a yes–no test, a result that converges with those of Lindsay and Johnson (1989). Although it is difficult to make direct comparisons between performance on these two tests because they differed in the number of response alternatives, and so forth (and for this reason we did not attempt to compare them directly in a single analysis), the two tests were similar in that the chance probability of making a source misattribution was 50% on both tests. Moreover, given the dramatic differences in performance on suggested items, it is striking that control performance was so similar across the two tests ($Ms = .20$ and .17 for the source test group and yes–no test group, respectively).

Taken together, the results clearly show that responses on the yes–no and source tests were made on much different bases. Because subjects in the yes–no test group were led to believe the postevent narratives–questions were accurate descriptions of the slides, it is likely that they adopted a much more lenient criterion on the test, relying on highly accessible information such as familiarity as the basis for their judgment (cf. Lindsay & Johnson, 1989). There is now considerable evidence that access to familiarity information is automatic and unintentional, whereas recollection of source information requires more effortful and controlled processing (e.g., Begg, Anas, & Farinacci, 1992; Jacoby & Kelley, 1987; Jacoby, Woloshyn, & Kelley, 1989; Johnson, Kounios, & Reeder,

Table 2
Distribution of Responses to Suggested and Control Items on the Source Test as a Function of Encoding Condition in Experiment 3

	Questions		Narrative	
Response	Suggested	Control	Suggested	Control
Saw	.10	.18	.08	.17
Read	.48	.05	.54	.02
Both	.27	.01	.18	.03
Neither	.15	.76	.20	.78

Note. Values represent the mean proportion of times subjects selected each response on the source test.

1992). Thus, it seems reasonable that reliance on familiarity would be the default strategy. Given that the suggested items should have seemed highly familiar to subjects (they had been exposed to them only minutes before the test), attributing familiar items to the original event would have produced the high incidence of misattributions observed here.

The much lower incidence of source misattributions among subjects in the source test group shows that subjects can distinguish between suggested and originally perceived events to a much greater extent than performance on the yes–no test implies. When the task directed subjects to retrieve source information, subjects' ability to accurately discriminate between suggested and "real" memories greatly improved, even though they were not able to avoid source misattributions altogether.

Finally, the results support our contention that performance on the yes–no test is not related to performance on source memory tests in a straightforward way. The most salient example of this is our failure to find evidence of a source misattribution effect in the narrative condition with the source test, even though the same materials yielded a robust misinformation effect on a yes–no recognition test.

Experiment 4

One possible alternative explanation of the source misattribution effects we observed in Experiments 1–3 is that subjects claimed that they remembered seeing suggested items not because they truly believed they remembered seeing the suggested item, but because they believed it was true and felt it was desirable to show that they "remembered more" (see Lindsay, 1990, for a more extensive discussion of this concern). In the foregoing experiments, we attempted to minimize any demand pressures by telling subjects before the test that some of the items on the test they had only read about. Second, by including "read only" as a response option on the test, we reinforced the fact that some of the test items were items that subjects should remember only reading about. Finally, the demand hypothesis does not explain why we obtained large misattribution effects with misleading questions but small or no effects with misleading narratives. Nevertheless, in order to assess whether demand was playing a role in the misattribution effects we observed, we conducted a study wherein we varied the instructions subjects received at the time of testing. One group of subjects (no-warning condition) were not explicitly informed that some of the test items had appeared in the postevent questions only. A second group of subjects (explicit-warning condition) received a set of instructions that contained an explicit warning that the questions they answered contained inaccuracies. If demand characteristics play a role in the tendency to commit source misattributions following misleading suggestions, subjects in the no-warning condition should commit more source misattributions than subjects in the explicit-warning condition.

Method

Subjects. Subjects were 132 undergraduates from the same pool as described before. Equal numbers of subjects were randomly assigned to the two conditions.

Materials and procedure. With the exception of the final test instructions, the materials and procedure were identical to those used in the questions condition of Experiment 1. For subjects in the no-warning condition, the instructions were identical to those used in Experiment 1, except that the section informing subjects that the test list contained items from each of the four response categories (saw only, read only, both, and neither) was deleted. For subjects in the warning condition, the following sentence was added to the instructions used in Experiment 1: "You should be aware that some of the items mentioned in the questions you answered were not in the slides you saw." The warning sentence was underlined, and no sentences were deleted. Thus, the fact that the test list contained items that subjects had read about only was mentioned twice for subjects in the explicit-warning group.

Results and Discussion

The results of this experiment were clear-cut. The presence or absence of a warning had absolutely no effect on the accuracy of subjects' performance or the magnitude of the source misattribution effect. The mean proportion of source misattribution errors for the suggested and control items, respectively, was .30 versus .16 in the no-warning condition and .35 versus .15 in the explicit-warning condition. As is obvious from the data, the main effect of type of instruction was not significant ($F < 1$), nor did the magnitude of the source misattribution effect differ as a function of type of instruction, $F(1, 130) = 1.5, p > .05$. The main effect of item type was once more highly significant, $F(1, 130) = 50.5, p < .01, MS_e = 0.90$, thus replicating once again the finding that answering misleading questions produces a reliable source misattribution effect. These results thus converge with those of Lindsay (1990) in providing evidence of source monitoring failures in the eyewitness suggestibility paradigm that cannot be attributed to demand characteristics.

Experiment 5

In the foregoing experiments, the source misattribution effect was attributable almost entirely to an increase in "both" responses to suggested items relative to control items; the proportion of "saw-only" responses to suggested and control items did not differ. We have interpreted this finding as evidence that subjects came to believe that they remembered seeing items that they nevertheless remembered reading about. It is not surprising that subjects remembered reading about the suggested items given the short (10-min) retention interval. However, it is also possible that some subjects selected the "both" response because they were unsure of the suggested item's source and the "both" response category provided a compromise option. To test this alternative explanation, in Experiment 5 we used a test procedure that (a) did not have "both" as a response option and (b) asked subjects to rate their confidence in their answer, thereby giving subjects the opportunity to indicate when they were unsure about an item's source. If subjects believe they remember seeing items that were merely suggested to them, a source misattribution effect should be observed even when subjects are given the opportunity to indicate that they are unsure of the suggested item's source.

Table 3
Distribution of Responses to Source Questions for Suggested and Control Items in Experiment 5

Source question/item	Response						
	Definitely yes	Probably yes	Maybe yes	Unsure	Maybe no	Probably no	Definitely no
Saw in slides?							
Suggested	.24	.09	.09	.14	.05	.08	.31
Control	.06	.04	.07	.17	.04	.12	.50
Read in questions?							
Suggested	.57	.02	.02	.04	.02	.04	.29
Control	.04	.01	.01	.05	.01	.09	.79

Subjects. Subjects were 92 subjects from the same pool as described previously.

Materials and procedure. With the exception of the final test, the materials and procedure were identical to the procedure used in the questions condition of Experiment 1.

As in the foregoing experiments, the test instructions first indicated that the test list contained items from each of four sources (slides, questions, both, and new) and that they were to answer each question with the response that best described what they remembered about each test item. Subjects were then asked to answer two questions for each of the 25 test items: (1) saw in slides? and (2) read in questions? Subjects indicated their responses to each question on a 7-point scale that had the following values: 1 = definitely yes, 2 = probably yes, 3 = maybe yes, 4 = unsure, 5 = maybe no, 6 = probably no, and 7 = definitely no. Subjects were given 8 s to make both responses to each test item.

Results and Discussion

The results provide strong evidence that subjects came to believe that they remembered seeing suggested items. Specifically, even though a substantial proportion of subjects selected the "unsure" response, we obtained a robust source misattribution effect comparable in size to that obtained in the foregoing experiments. Moreover, a majority of the subjects claimed to be definitely sure they remembered seeing the suggested items.

To facilitate comparison with the previous experiments, in the first analysis we ignored confidence information and collapsed across the 1, 2, and 3 responses to get an overall measure of yes responses to the "saw in slides" question for both suggested and control items. The results reveal that subjects were significantly more likely to claim that they remembered seeing suggested items ($M = .42$) than control items ($M = .17$), $F(1, 91) = 75, p < .01$. It is of interest to note that the proportion of subjects who claimed that they both remembered seeing and reading about the suggested items (by selecting a yes response to both questions) was .32, a value comparable to the incidence of "both" responses obtained in the corresponding conditions of Experiments 1 and 3 (.35 and .27, respectively).

Turning now to the confidence data, Table 3 shows how subjects distributed their responses to each question as a function of item type. Of particular interest was the confidence associated with subjects' claims that they remembered seeing suggested and control items in the slides. One could perhaps argue that subjects who claim they either "probably saw" or "maybe saw" a suggested item are not making a true source misattribution. In this regard, it is important to note that the majority of the source misattributions made to suggested items were given the highest confidence rating (i.e., definitely yes). By contrast, less than one third of the source misattributions made to control items were "definitely yes" responses. Moreover, if one restricts the definition of source misattributions to "definitely yes" responses, a robust source misattribution effect is nevertheless obtained: Subjects were much more likely to claim that they definitely remembered seeing suggested items than control items, $F(1, 91) = 57.7, p < .01$ (see Table 3).

These results establish that the tendency for subjects to claim that they both saw and read about the misleading suggestions was not attributable to the fact that they were unsure of the suggested item's source. In this experiment, subjects who were given the opportunity to indicate they were unsure of a test item's source claimed they both remembered seeing and reading about the suggested items to the same extent as subjects in the foregoing experiments. Finally, by demonstrating that a source misattribution effect of comparable magnitude was obtained when a much different test procedure was used, these results provide further evidence for the validity and reliability of the source misattribution effect.

General Discussion

The results of the five experiments reported here clearly demonstrate that misled subjects do sometimes come to believe that they remember seeing the items that were merely suggested to them, a finding we refer to as the source misattribution effect. Experiments 4 and 5 demonstrate that these effects cannot be attributed to demand characteristics or to response biases among subjects who are unsure of the item's source. Nevertheless, we have also shown that the magnitude of this effect varies and that source misattributions are not an inevitable consequence of exposure to suggestions (cf. Lindsay, 1990; Lindsay & Johnson, 1989; Zaragoza & Koshmider, 1989). Specifically, answering misleading questions and unscrambling a misleading narrative reliably produced robust source misattribution effects, whereas simply reading a misleading narrative led to smaller, less reliable effects. Given that the misleading questions and misleading narratives used in our experiments contained almost identical information, these results suggest that the tendency to commit source misattributions will depend heavily on the reflective and elaborative thought processes subjects engage in when encoding the suggestions, not just the content of the suggestions themselves.

Our results also show that it is not necessary for subjects to have poor memory for the actual source of the suggested items (i.e., having read about them) in order to misattribute them to the original event. For example, in Experiments 1 and 3, subjects in both the questions and narrative conditions indicated they remembered reading about the suggested items between 72% and 76% of the time (see Tables 1 and 2). Moreover, the results of Experiment 5 (see Table 3) revealed that subjects were highly confident of the actual source, with almost 60% of the responses in the "definitely read" category. In fact, in all of the experiments reported here, subjects incorrectly claimed that they had seen but not read the suggested items less than 11% of the time. The results also show that answering misleading questions increased the incidence of source misattributions (relative to reading the narrative) without impairing memory for the original source of the suggested items. In both Experiments 1 and 3, the difference in performance on suggested items in the narrative and questions conditions was attributable entirely to a shift from "read only" to "both" responses. These are important findings in light of the fact that the only previous evidence of source misattributions (Lindsay, 1990) was obtained with subjects who were tested after a 2-day retention interval and could not remember the original source of the suggestions. Thus, our results show that accurate memory for the original source of the suggestions does not necessarily protect subjects from coming to believe that they also remember seeing it and that the tendency to commit such source misattributions can vary independently of accurate memory for the original source. Of course, given Lindsay's results, it is also likely that source misattributions will increase as memory for the original source fades and that retention interval affects the prevalence of source misattribution errors in important ways. Nevertheless, the contribution of our studies is the finding that subjects can commit substantial source misattribution errors even under conditions of immediate testing when memory for the actual source of the suggestions is good.

Why did answering misleading questions increase source misattributions relative to reading a misleading narrative? One may posit that the greater incidence of source misattributions in the questions condition is attributable to the fact that presenting suggested items in the context of questions leads to better memory for these items, perhaps because the suggested items are processed more deeply (e.g., Craik & Lockhart, 1972). If a greater number of subjects remember suggested items, one may expect a greater number of source misattributions as well. The results reveal, however, that this explanation is not correct. In both Experiments 1 and 3, the proportion of suggested items that were recognized as old did not differ as a function of the context (questions or narrative) in which the misleading suggestions were encountered. Thus, it seems reasonable to conclude that answering misleading questions influenced the qualitative characteristics of memories for the suggested items without influencing memory for occurrence per se (see, e.g., Johnson, Foley, Suengas, & Raye, 1988; Suengas & Johnson, 1988, for additional evidence that qualitative characteristics of memories play an important role in source judgments). The elaborative and imaginal processes subjects engage in when encoding misleading suggestions likely varies as a function of context, and these processes will in turn affect the characteristics of the resulting memory record. For example, one possibility is that subjects in the questions condition were more likely to form a visual image of the suggested items when reviewing and rehearsing the originally seen events. A clear prediction of the source monitoring framework is that memories of suggested items will be confused with perceived details to the extent that they include visual information (albeit imagined) about what the suggested details look like (see Carris, Zaragoza, & Lane, 1992, and Lindsay, 1990, for results consistent with this prediction).

The cognitive and metamemorial processes subjects engage in when encoding the misinformation will also vary as a function of the task, and records of these processes may serve as cues for accurately identifying the source of information in memory. For example, it is possible that when subjects were asked to read a narrative description of the event they attempted to assess how well it agreed with their own memory and in so doing were more likely to notice that they had no memory of the suggested items. If this is the case, subjects in the narrative group should have been more likely to explicitly encode this discrepancy in memory, thus facilitating later attempts at source monitoring. By contrast, in the questions and scrambled conditions, subjects were reading the misleading suggestions in service of another task, thus perhaps discouraging detection of the discrepancy.

In summary, our findings suggest several likely hypotheses about the specific mechanisms responsible for the source monitoring failures and successes that varied as a function of encoding context. Given that source judgments may be based on multiple sources of information (Johnson et al., 1993; Johnson & Raye, 1981; Lindsay, in press), we suspect that no single factor was responsible for the pattern of results we observed. Moreover, given that the context manipulation might have influenced cognitive processing in more than one way, the results of our experiments do not permit clear conclusions about the mechanisms underlying these effects. Hence, an important issue for future research is to identify those memory characteristics that support accurate source monitoring in a suggestibility situation and to identify those that lead to source misattribution errors.

The results of our study also provide evidence for the critical role of retrieval factors in source monitoring performance, as evidenced by a comparison between performance in the yes–no test and source test conditions of Experiment 3. The results of Experiment 3, like those of Lindsay and Johnson (1989), showed that the extremely robust suggestibility effects observed in the yes–no test condition can be dramatically reduced (as in the case of the questions condition) or even eliminated (as in the case of the narrative condition) when subjects were given a four-alternative, forced-choice source memory test. In Experiment 5, wherein subjects were asked whether test items came from each of two sources with a yes–no test format, the magnitude of the suggestibility effect was comparable to that obtained with the four-alternative, forced-choice source memory test. Thus, the results show that source monitoring performance will improve under test conditions that require subjects to determine whether the source of the suggested items is the original event or the verbal postevent

information (or both), regardless of the format of the test (i.e., yes–no or forced choice).

Although a comparison of the yes–no and source test results clearly shows that retrieval conditions affected source monitoring performance, it is less clear to what extent retrieval conditions affected the incidence of genuine source misattributions. The problem with making this inference is the possibility that some subjects responded yes on the yes–no test because they believed the suggestions were true and wanted to perform well on the test, in spite of the fact that they did not believe they remembered seeing them. On the other hand, it is also possible that a belief in the accuracy of the postevent suggestions could have increased the tendency for subjects to believe that they remembered seeing the suggestions. A key assumption of the source monitoring framework is that memory is an attribution that is as much a function of the circumstances at the time of recall as it is a function of the underlying memory records (also see Jacoby, Kelley, & Dywan, 1989). From this view, memory for source is a judgment process that is heavily dependent on the amount and nature of source-relevant information that is accessible at the time the judgment is made and on the decision processes and criteria that are brought to bear on the judgment. As we have argued, subjects who believe that the suggested information is true are likely to attribute all familiar items to the original event and simply fail to retrieve the source-relevant information that would allow for more accurate source discriminations.

The previous discussion underscores the difficulty of assessing the nature of subjects' memory for the suggested details they report when traditional test procedures are used. The source test procedure used in our experiments overcomes some of these difficulties by providing a more direct measure of the extent to which subjects believed that they remembered seeing items they did not in fact see. However, the results of Experiment 5 also call attention to the fact that not all source misattribution errors are experienced the same way. We suspect that in addition to variations in the confidence associated with source misattributions (see Experiment 5), the subjective experience of source misattributions is likely to vary in its qualitative characteristics as well. More detailed information on how misattributed items were subjectively experienced could potentially be obtained by asking subjects to rate or describe the suggested items they claim to remember seeing (see, e.g., Johnson et al., 1988; Schooler et al., 1986, for examples of how this may be done). Thus, assessing how misattributed memories are subjectively experienced remains an important issue for future research.

The studies reported here document a set of conditions that reliably produce robust source misattribution effects and identify conditions under which the magnitude of these errors vary. Having established that these errors occur, our findings suggest a number of new directions for future research. Not only is there much to be learned about the boundary conditions of this phenomenon, but an understanding of these effects promises to have important theoretical implications as well. To date, much of the theorizing about suggestibility phenomena has centered on their implications for theories of forgetting and issues related to the permanence of memory (e.g., Brainerd, Reyna, Howe, & Kingma, 1990; Loftus & Loftus, 1980). Although it is certainly important to understand forgetting that results from exposure to suggestion, it is equally important to understand the inaccuracies in memory that exposure to suggestion may cause. From our view, the tendency for people to believe that they remember seeing items that were in fact only suggested to them is at the core of what it means for memory to be suggestible.

Our results also demonstrate the need for a source monitoring approach to complement traditional approaches to the study of suggestibility. As we have shown, the source misattribution effect is not easily accommodated by the theoretical frameworks that have dominated suggestibility research. Moreover, a clear advantage of the source monitoring approach is that it suggests very different sorts of questions for research: What memory characteristics facilitate and hinder people's ability to accurately monitor the source of original and misleading episodes in memory? What is the nature of the decision processes subjects use in making these source judgments? These questions have not yet been addressed in the study of suggestibility phenomena, even though they have proved fruitful in understanding source monitoring in other domains.

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