Misleading Suggestions Can Impair Eyewitnesses' Ability to Remember Event Details

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The hypothesis that misleading suggestions can impair recollection was supported in a study inspired by Jacoby and Kelley's (1988) "logic of opposition" and Lindsay and Johnson's (1989a) hypotheses about source memory. Tendency to report suggested details was set in opposition to ability to remember their source by telling subjects not to report anything from the narrative. Conditions were manipulated so that in the high- but not the low-discriminability condition it was easy to remember the suggestions and their source. At test, subjects were told (truthfully) that any information in the narrative relevant to the questions was wrong. Suggested details were more often reported on misled than control items in the low- but not the high-discriminability condition, yet suggestions impaired accurate recall of event details in both conditions.

Loftus and her colleagues (e.g., Loftus, Miller, & Burns, 1978) developed a three-stage procedure for studying eyewitnesses' susceptibility to misleading suggestions. Subjects first view a visual event, then receive verbal information that includes misleading suggestions about details in the event, and then take a test of memory for those details. For example, subjects might view a slide sequence that includes a photograph of a man holding a hammer; some subjects would later read a narrative description of the event which mentions that the man was holding a wrench, whereas others would read a narrative that does not mention the kind of tool (McCloskey & Zaragoza, 1985a). In the standard suggestibility test, subjects are later asked whether they saw a hammer (the suggested detail) or a wrench (the suggested detail) in the slides. Subjects more often err on misled items (i.e., event details about which misleading suggestions were given) than on control items.

This phenomenon is well-established, but its interpretation is not. Two issues have been debated: (a) whether suggestions impair subjects' ability to remember event details and (b) whether subjects actually believe they saw the suggested details. Each of these issues is reviewed below.

Memory Impairment

Two different types of mechanisms for memory impairment have been proposed. Loftus (e.g., 1981, 1989) argued that the suggested detail "updates" the previously formed memory of the visual event such that the memory trace of the event detail is "overwritten" and destroyed and the representation of the suggested detail becomes an inseparable part of the original memory. Other theorists (e.g., Bekerian & Bowers, 1983; Chandler, 1989; Christiaansen & Ochalek, 1983; Pirolli & Mitterer, 1984) have described memory impairment as a retroactive interference effect (see Crowder, 1976, for a review) in which retrieval of the relatively accessible memory of a suggested detail interferes with retrieval of the corresponding event detail (see also Morton, Hammersley, & Bekerian, 1985). Both trace-impairment and retrieval-impairment hypotheses posit that misleading suggestions reduce subjects' ability to remember event details.

McCloskey and Zaragoza (1985a, 1985b) pointed out that subjects would perform more poorly on misled items than control items on the Loftus test even if suggestions have no effect on ability to remember event details. Drawing on McCloskey and Zaragoza (1985a) and Belli (1989a), I describe three alternatives to the memory impairment hypothesis: (a) demand characteristics, (b) higher rates of correct guessing of event details on control items than on misled items, and (c) lower response criteria for reporting recollections of event details on control items than on misled items.

As defined here, the term demand characteristics refers to any judgment process that would lead subjects to base their test responses on information they know was obtained from the narrative. As McCloskey and Zaragoza (1985a) pointed out, subjects might trust the veridicality of the narrative and their recollections of it and so base their test responses on the narrative, even if they also recall contradictory information from the slides (see also Belli, 1989a). Alternatively, subjects might know that the narrative was wrong yet nonetheless base their test performance on it in order to play along with the perceived desires of the experimenter. In either case, poorer performance on misled items than control items would occur independent of any effect of suggestions on ability to remem-
ber event details—subjects would simply be demonstrating memory of the narrative.

Higher rates of correct guessing of event details on control items than misled items might also spuriously contribute to apparent memory impairment effects. For example, misled subjects who failed to encode the event detail might recollect the suggested detail and base their test responses on it; relative to other subjects who also failed to encode the event detail but who had no recollection of the suggested detail, such subjects would less often correctly guess the event detail. Thus, as McCloskey and Zaragoza (1985a) pointed out, poorer performance on misled items than control items may be due to lower rates of correct guessing on misled items.

Differential response criteria for report of event details on control and misled items could also account for apparent memory impairment. Subjects may be less likely to base their test responses on a recollection of an event detail if they also remember the corresponding suggested detail than if they remember only the event detail. For example, a subject who vaguely remembers that both “hammer” and “wrench” had been presented in the course of the experiment might be less likely to rely on the recollection of the event detail than would a subject who has an equivalent recollection of only the event detail. Thus it may be that suggestions do not impair ability to remember event details but merely increase the criterion at which subjects will base their test responses on them.

Loftus and others have attempted to eliminate such counterexplanations to memory impairment in a number of recent experiments (Belli, 1989a, 1989b; Ceci, Ross, & Toglia, 1987; Chandler, 1989; Lindsay, 1989; Lindsay & Dworsky, 1989; Lindsay & Johnson, 1989a; Loftus, 1989; Loftus, Donders, Hoffman, & Schooler, 1989; Loftus & Hoffman, 1989; Tversky & Tuchin, 1989). For example, Loftus (1989) showed that misled subjects were highly confident of the accuracy of their inaccurate responses. Unfortunately, this finding is not germane to the memory impairment issue, because subjects might confidently espouse memories of a suggested detail even if their ability to remember the event detail had not been impaired. The other studies cited above are not reviewed here; suffice it to say that McCloskey and Zaragoza (1985a, 1985b; Zaragoza & McCloskey, 1989) have argued that all of the evidence in favor of the hypothesis that verbal suggestions cause memory impairment in adult subjects can be explained in terms of either (a) demand characteristics to select the suggested detail even though subjects know they are remembering it from the postevent narrative, (b) higher levels of correct guessing on control items than misled items, or (c) higher response criteria for recollections of event details on misled items than control items.1

Source Monitoring Confusions

Whereas most of the controversy in this area has revolved around the memory impairment issue, Marcia Johnson and I (Johnson & Lindsay, 1986; Lindsay & Johnson, 1987, 1989a, 1989b; see also Schooler, Gerhard, & Loftus, 1986, and Johnson & Suengas, 1989) have focused on the question of whether or not misled subjects sometimes genuinely believe they saw suggested details. Regardless of whether or not suggestions impair ability to remember event details, the question of whether or not subjects misremember suggested details as things they saw in the event is an interesting and important one.

As McCloskey and Zaragoza (1985a, 1985b) pointed out, misled subjects might base their test responses on information they know they obtained from the postevent narrative. For example, when asked what kind of tool was shown in the slides, a subject might think, “I don’t remember what tool was shown in the slides, but I do remember that the narrative said it was a wrench; I assume the narrative was accurate, and I want to show that I paid attention to the slides, so I’ll say I remember seeing a wrench.”

Do misled subjects ever really believe they saw something that was only suggested to them? Johnson and I (Johnson & Lindsay, 1986; Lindsay, 1987; Lindsay & Johnson, 1989a, 1989b) argued that subjects do indeed experience such confusions, which we termed source monitoring errors (see also Hashtroudi, Johnson, & Chrosniak, 1989). According to the source monitoring account, every event memory has a source defined by the conditions under which that memory was acquired (where and when the event occurred, in what media and through what modalities it was apprehended, etc.). We proposed that the sources of event memories are identified via decision-making processes performed in the course of remembering (source monitoring processes). Most source monitoring decisions are made quickly and without conscious deliberation, but reflective processes are sometimes involved (i.e., people sometimes consciously struggle to identify the source of a recollection).

Source monitoring errors occur when a memory derived from one source is misattributed to another source—for example, I remember something I heard Kathy say and mistakenly believe that the speaker was Liz. According to the source monitoring hypothesis, the likelihood of source monitoring errors varies with the clarity of the recollection, the discriminability of potential sources, and the decision processes and criteria used during remembering. Thus, for example, I am more likely to think that Liz said something that I actually heard from Kathy’s lips if the recollection is vague than if it is clear, if the two women are similar to one another than if they are dissimilar, or if the source attribution is made quickly and automatically rather than with careful deliberation. These ideas about memory-source confusions are consistent with earlier research in a number of areas: interference theory in general and list differentiation in particular (e.g., Crowder, 1976; Winograd, 1968), memory for physical characteristics

1 McCloskey and Zaragoza (1985a) reported six experiments in which misleading suggestions had no effect on subjects’ ability to discriminate between the event detail and a new distractor (the modified test). Ceci, Ross, and Toglia (1987) and Schreiber (personal communication, November 18, 1989) found that misleading suggestions did impair performance on the modified test under some conditions. Note that to the extent that the effect of misleading suggestions is to lead subjects to reject the event detail as a response, demand characteristics could account for suggestibility effects on the modified test. That is, misled subjects given the modified test might think, “The narrative said the tool was not a hammer, so I better choose “screwdriver” instead.”
(e.g., Fisher & Cuervo, 1983; Geiselman & Bellezza, 1976; Hintzman, Block, & Inskemp, 1972), source amnesia (e.g., Shimamura & Squire, 1987), and reality monitoring (e.g., Johnson, 1989; Johnson & Raye, 1981).

The source monitoring issue is orthogonal to the memory impairment issue, but source monitoring processes and memory impairment mechanisms may interact. For example, subjects who recall a suggested detail before they recall the corresponding event detail may be less likely to continue searching memory if they misidentify their memory of the suggested detail as a memory derived from the event itself (i.e., source monitoring confusions may contribute to retrieval impairment). Conversely, subjects may be more likely to make source monitoring errors if they recollect only the suggested detail than if they recollect both the suggested and event details (because in the latter case they may be more likely to deliberate about the sources of those memories).

Consistent with the idea that source monitoring confusions are involved in eyewitness suggestibility, Lindsay and Johnson (1989a) found that a suggestibility effect obtained among subjects tested with a recognition test was eliminated among subjects tested with a source monitoring test that required them to identify the sources of their memories of each test item. Whereas subjects given the recognition test often claimed to have seen suggested items in the event, those given the source monitoring test correctly attributed their memories of suggested items to the narrative. We viewed these findings as support for the hypothesis that subjects given recognition tests sometimes misidentify memories of the narrative as memories of the slides. Zaragoza and Koshmider (1989), on the other hand, interpreted similar results as support for the demand characteristics hypothesis (i.e., they argued that the source monitoring test reduced demands to report having seen suggested details).

Recently, Zaragoza and Muench (1988, 1989) and Lindsay (1989) obtained suggestibility effects among subjects given source monitoring tests. Zaragoza (e.g., Zaragoza & Muench, 1989) concluded that misled subjects really do experience recollections of suggestions as recollections of details seen in the event. Unfortunately, although they may well reduce demand, source monitoring tests do not eliminate the possibility that demand characteristics contribute to apparent source monitoring confusions. Subjects are led to believe that the narrative is accurate, and they may wish to show that they are attentive subjects who remember the suggested details from both the event and the narrative. Consistent with this demand characteristics explanation, subjects in these studies very rarely attributed suggested details to the event alone. Rather, either they correctly attributed suggested details to the narrative or they attributed them to both the narrative and the event. Perhaps this is because subjects knew their memories were from the narrative alone and believed that conscientious subjects would have also noticed and remembered these details in the event. In any case, the important point in the current context is that demand characteristics may affect performance on source monitoring tests. Thus whether or not misled subjects sometimes genuinely believe that they saw suggested details in the event remains an open question.

The Logic of Opposition

The design used in the current study was inspired by Jacoby and Kelley’s (1988; Jacoby, Woloshyn, & Kelley, 1989; see also Heretl, 1982) “logic of opposition” paradigm. The opposition paradigm is an ideal method for determining the extent to which demand characteristics contribute to an effect. In the study described here, ability to remember the source of suggested details was set in opposition to the tendency to report those suggestions. Simply put, immediately before taking the memory test, subjects were told that any relevant information presented in the narrative was wrong and should not be reported on the test. Under opposition instructions, demand characteristics would work against the hypothesis of genuine memory effects, because subjects are told not to report suggested details. Acquisition conditions were manipulated such that remembering the suggested details and identifying their source would be easy in the high-discriminability condition and difficult in the low-discriminability condition. Performance in the high-discriminability condition provided an index of whether subjects accepted the opposition instructions. If subjects understand and follow the injunction against reporting information obtained from the narrative, those in the high-discriminability condition should rarely report seeing suggested details (even though, relative to those in the low-discriminability condition, these subjects would be more likely to remember the suggested details). On the other hand, source monitoring theory predicts that subjects in the low-discriminability conditions will sometimes misidentify memory information derived from the narrative as memory information derived from the slides and will therefore report seeing suggested details even though they are trying to report only details seen in the slides. Finally, if misleading suggestions impair ability to remember event details, then correct reports of event details may be reduced by suggestions in both conditions (i.e., although subjects in the high-discriminability condition should be able to suppress report of suggested details, their ability to remember the event details may be impaired).

Method

Overview

Subjects were tested in two sessions, with 48 hr between sessions. In the low-discriminability condition, subjects viewed a slide sequence and studied a postevent narrative in Session 1 and completed a memory test in Session 2. In the high-discriminability condition, subjects only viewed the slide sequence in Session 1 and studied the narrative and completed the memory test in Session 2. Thus, relative to subjects in the low-discriminability condition, at test subjects in the high-discriminability condition should be very good at differentiating between memories derived from the narrative and memories derived from the slides. On the other hand, subjects in the high-discriminability condition should be able to recall the misleading suggestions much more readily and with greater clarity than subjects in the low-discriminability condition.

The test consisted of questions about details that were either (a) not mentioned in the narrative or (b) described inaccurately in the narrative. The instructions strongly emphasized that the test questions...
had been selected so that any answer mentioned in the narrative was wrong and should not be reported.

Subjects

The subjects were 136 students attending 2- and 4-year colleges in northwestern Massachusetts and southern Vermont. The study was conducted as an optional classroom demonstration or as a scheduled extra-credit lab, with groups of from 5 to 24 students. Groups were assigned to condition and counterbalancing set according to a predetermined schedule. (An additional 37 subjects were also tested but were randomly deleted so that equal numbers of subjects were included in each counterbalancing group.)

Materials

The McCloskey and Zaragoza (1985a) slide sequence was used. This sequence of 79 color slides depicts an incident in which a maintenance man steals some money and a calculator from an office. There were two versions of each of six critical slides: brand of coffee (Maxwell House or Folgers), brand of cigarettes (Winston or Marlboro), kind of magazine (Glamour or Vogue), letter on mug (R or M), brand of soda (Seven-Up or Sunkist Orange), and kind of tool (screwdriver or wrench). Half of the subjects in each condition saw each version of the slide sequence.

A tape-recorded narrative, spoken in a woman's voice, accompanied the slide sequence. For the most part, this narrative commented only on the most salient aspects of each slide, but each critical detail was mentioned at a generic level (e.g., "The man reaches into his left shirt pocket . . . He pulls out a pack of cigarettes. . . ."). The tape recording that accompanied the slide sequence was the same in all conditions. The purpose of this tape was to decrease the discriminability of memories derived from the slides and memories derived from the postevent narrative.

The postevent narrative was a detailed description of the event depicted in the slides, essentially identical to that used by McCloskey and Zaragoza (1985a). Two versions of the narrative were written for each of the two versions of the slide sequence, and two versions of each of the four narratives were tape recorded, one in the same female voice used in the tape that accompanied the slide sequence and the other in a male voice. The female voice was used for the postevent narrative in the low-discriminability condition, and the male voice was used in the high-discriminability condition.

The test consisted of one cued recall question about each critical detail (three control and three misled items in a random order). Questions were of the following form: "What brand of cigarettes was shown in the slides?" The test was distributed in a three-page booklet that included an informed consent form, the test instructions, and the test items.

Design

The study used a 2 x 2 mixed-model design, with acquisition condition (high vs. low discriminability) as the between-subjects factor and item type (misled vs. control) as the within-subjects factor. The postevent narrative included misleading suggestions about three details in the slide sequence and superordinate control terms for three other details. Assignment of particular objects to conditions was fully counterbalanced so that each version of each object was used equally often in each condition (misled event detail, control event detail, and suggested detail). Seventeen subjects were tested in each of the eight counterbalancing cells. The test consisted of recall questions about the six critical details in the slide sequence (three misled and three control). Recall responses were scored as either suggested, correct, or other, and separate mixed-model analyses of variance (ANOVAs) were performed on the proportions of each kind of response on misled and control items.

Procedure

Low-discriminability condition. At the beginning of Session 1, the students were told that the study involved memory for details in a slide sequence. Those who wished to participate were asked to study each slide carefully in preparation for a memory test to be given during the next session. The slides and the tape-recorded narrative that accompanied the slides were then presented, with each slide shown for 4 s and with 1 s between slides. The postevent narrative (recorded in the same female voice as the narrative that accompanied the slides) was presented immediately after the slide sequence was shown while subjects continued to sit at their desks in the darkened room. Subjects were told that their memory of the postevent narrative would be tested and were instructed to imagine each object and event as it was described.

The test booklets were distributed 48 hr later, at the beginning of Session 2. Those who wished to participate completed an informed consent form. The test instructions (which the experimenter read aloud) informed subjects that although most of the postevent narrative was accurate, it had described a few objects in a way that contradicted the slides. Subjects were then told that they would be tested on their memory of the slides and were given an example of the format used for test questions ("The secretary was holding an umbrella. What color of umbrella was shown in the slides?"). The most important part of the test instructions was then presented:

For some of the questions, the detail in question was not mentioned in the story at all (that is, you saw the correct answer in the slide show, but the detail in question was not mentioned in the story). For other questions, the detail was mentioned, but it was described inaccurately (that is, you saw the correct answer in the slide show, but an incorrect answer was mentioned in the story). There is no question on this test for which the correct answer was mentioned in the story.

These instructions were rephrased and repeated several times. Subjects were also told to try hard to answer every question. As an incentive, they were told that a $1 reward would be given to each person who correctly answered at least five of the six questions. All subjects received the $1 reward at the end of the session regardless of their performance on the test.

High-discriminability condition. The procedure in the high-discriminability condition was identical to that in the low-discriminability condition except that (a) in Session 1 only the slide sequence and accompanying narrative were presented, (b) Session 2 began with presentation of the postevent narrative, and (c) the presentation of the postevent narrative differed in several ways from the low-discriminability condition: Subjects listened to the postevent narrative while standing in the fully lit classroom, they were instructed to mentally repeat each word of the narrative as they heard it (rather than to imagine the details and actions), and the tape recording was of a male voice. These manipulations were intended to increase the differences between memories of the slides and memories of the postevent narrative in the high-discriminability conditions. Immedi-
ately after listening to the postevent narrative, subjects returned to their seats and the memory test was administered with the same instructions as in the low-discriminability condition.

Results

Recall responses were scored as either suggested, correct, or other (guessed responses other than those used as suggested or event details). The proportions of responses of each kind are presented in Table 1. Separate mixed-model ANOVAs were performed on the proportions of each kind of response, with acquisition condition (high vs. low discriminability) as the between-subjects factor and item type (misled vs. control) as the within-subjects factor. The alpha level was set at .05.

**Suggested details.** As predicted, subjects in the low-discriminability condition significantly more often reported that they had seen suggested details on misled items ($M = .27$) than on control items ($M = .09$), $F(1, 134) = 24.64, MSe = 0.05$, whereas subjects in the high-discriminability condition equally often reported the suggested details on misled items ($M = .13$) and control items ($M = .10$), $F < 1$. For the interaction, $F(1, 134) = 9.21, MSe = 0.05$. Both main effects were also significant: for acquisition condition, $F(1, 134) = 5.59, MSe = 0.05$, and for item type, $F(1, 134) = 15.87, MSe = 0.05$. The important point is that only subjects in the low-discriminability conditions more often claimed that they had seen suggested details on misled items than control items.

**Event details.** Although only subjects in the low-discriminability condition more often reported seeing suggested details on misled items than control items, subjects in both conditions recalled fewer event details on misled items ($M = .42$) than on control items ($M = .49$), $F(1, 134) = 4.07, MSe = 0.08$. Acquisition condition had no effect on number of event details correctly recalled (means of .48 and .44 in the low- and high-discriminability conditions, respectively), $F(1, 134) = 1.12, MSe = 0.12, p > .25$, nor did acquisition condition and item type interact ($F < 1$). Thus, although subjects in the high-discriminability condition were able to identify the source of the misleading suggestions and so not report them, their ability to report the event details was nonetheless impaired by the suggestions. This conclusion is further supported by an internal analysis of subjects in the high-discriminability condition who did not report any suggested details; even among these subjects, correct recall was significantly greater on control items than misled items (means of .60 and .43, respectively, $t(34) = 2.59, p < .02$).

**Guesses.** Responses other than the suggested or event details (i.e., guesses) were significantly more frequent in the high-discriminability condition ($M = .38$) than in the low-discriminability condition ($M = .25$), $F(1, 134) = 14.46, MSe = 0.08$. Importantly, item type did not affect the frequency of these responses (means of .31 and .32 for misled items and control items, respectively, $F < 1$). The slight tendency toward an interaction between item type and acquisition condition did not approach significance, $F(1, 134) = 1.27, MSe = 0.06, p > .25$. These data suggest that the guessing rate for both misled and control items was higher in the high- than in the low-discriminability condition.

<table>
<thead>
<tr>
<th>Table 1: Mean Proportion of Responses of Each Kind by Acquisition Condition and Item Type</th>
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<tr>
<td>Condition</td>
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<td>Low discriminability</td>
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<td>Misled items</td>
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<td>Control items</td>
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<td>High discriminability</td>
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<td>Misled items</td>
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*Note. There were three items of each kind (misled and control). Responses do not sum to 1 because subjects sometimes gave no answer.*

Discussion

The suggestibility effects obtained in this study were probably not due to demand characteristics or response biases. It is clear that subjects understood and tried to follow the injunction against reporting information presented in the narrative, because those in the high-discriminability condition (who received the suggestions minutes before taking the test) did not report suggested details more often on misled items than control items. It follows that subjects in the low-discriminability conditions experienced genuine source monitoring failures when they claimed that they had seen suggested details in the slides.5

Although subjects in the high-discriminability condition who did not report seeing suggested details only when subjects could not identify the source of a remembered suggested detail. This is because if the source of a recollected suggested detail is identified, then that detail will not be used in lieu of a guess or in favor of a concurrently remembered detail. Thus, under opposition instructions, response biases such as differential rates of correct guessing or differential response criteria for control and misled items would occur only when subjects fail to identify the sources of recollected suggested details. It is clear that subjects in the high-discriminability condition usually correctly identified the source of their recollections of suggested details, because they did not report seeing suggested details more often on misled items than on

4 Thanks to Janice M. Keenan for suggesting this analysis.

5 This argument assumes that subjects in both conditions would equally often accept the instructions not to report details remembered from the narrative. If the two groups differed in this regard, however, it would most likely be because subjects in the low-discriminability conditions were more likely to detect misleading suggestions while listening to the narrative (because they heard the narrative immediately after seeing the slides) and therefore were more likely to accept the instructions. Thus any difference in the acceptance of the instructions between the two conditions would work against the hypothesis.
control items. Moreover, correct recall was significantly impaired even among a subset of subjects who never reported any suggested details. Thus it is clear that neither differential rates of correct guessing nor differential response criteria account for the lower level of recall of event details on misled items than control items in the high-discriminability condition.

The guessing rate (indexed by the frequency with which details other than those used as suggested or event details were reported) was higher in the high-discriminability condition than in the low-discriminability condition. This most likely reflects subjects' metamemory. Subjects in the low-discriminability condition were apparently cautious about reporting details that came to mind lest they err by reporting details from the postevent narrative.

The relatively low guessing rate in the low-discriminability condition has two important implications for the interpretation of other aspects of the results. First, subjects in the low-discriminability condition reported seeing suggested details despite the fact that they were apparently using relatively stringent source monitoring criteria. This increases the likelihood that subjects experienced source monitoring confusions (believing suggested details were seen in the event) rather than only source monitoring failures (being unable to identify the source of their recollections of suggested details). Second, suggestions reduced accurate reports of event details equally in the low- and high-discriminability conditions, even though subjects in the high-discriminability condition (a) were guessing more freely and (b) were more likely to guess correctly because they were less likely to use suggested details as guesses (because they were more likely to remember that those details were presented in the narrative). Thus it may be that higher rates of correct guessing on misled items than control items partially masked the memory-impairing effects of misleading suggestions in the high-discriminability condition.

In summary, this study produced three important findings. First, it provides strong support for the hypothesis that misled subjects sometimes forget the source of the misleading information. Second, consistent with the source monitoring model, the results show that memories of suggestions are less likely to be attributed to the event when the sources of event details and suggested details are highly discriminable. Third, and perhaps most important, the findings indicate that misleading suggestions impair subjects' ability to remember event details. Demand characteristics, differential rates of correct guessing, and differential response criteria have undoubtedly contributed to previously reported suggestibility effects, but the current results indicate that misleading suggestions can also genuinely reduce subjects' ability to recollect event details.6

The present study suggests a number of avenues for future research. One line of investigation could explore the qualitative aspects of subjects' recollections of suggested details (as Johnson & Suengas, 1989, and Schooler et al., 1986, have done). Subjects in the low-discriminability condition of the current study sometimes failed to identify the source of their memories of suggested details correctly, but they did not necessarily experience them as recollections of the slides. Future studies could explore the possibility that misled subjects sometimes experience vivid but inaccurate recollections of seeing things that were in fact only suggested to them.

In this experiment, several factors thought to affect source discriminability were piled together to maximize the difference between the high- and low-discriminability conditions. It is likely that the most important of these was the temporal relation between the event and the narrative, but other factors may also have played a role (e.g., the use of imagery instructions in the low-discriminability condition; Johnson & Raye, 1981). Indeed, the greater tendency to report suggested details in the low- than in the high-discriminability condition may have been due to the 2-day retention interval for suggested details in the low-discriminability condition rather than to the degree of similarity between the event and the narrative.7 Follow-up studies could systematically examine the factors that affect the likelihood of erroneously identifying recollection of suggestions as recollections of the event.

Finally, further research is needed to specify the mechanism (or mechanisms) by which misleading suggestions impair ability to remember event details. In light of previous findings and arguments (e.g., McCloskey & Zaragoza, 1985a, 1985b; Zaragoza & McCloskey, 1989), retrieval-impairment mechanisms such as blocking or response competition (McGeoch, 1942) appear to be more plausible than trace-impairment mechanisms. This issue is far from resolved, however, and may never be settled (Watkins, 1990). In any case, further study is needed to explore the relationship between source discriminability, delay, and memory impairment.

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6 In his review of an earlier version of this article, Robert F. Belli argued that the higher level of correct recall in the control condition than in the misled condition might be due to a facilitatory effect of encountering control terms (e.g., "tool") in the narrative rather than to an inhibitory effect of misleading suggestions (Belli attributed this idea to an anonymous reviewer of his own work). Although such a process might have played a role in the low-discriminability condition of the present study (and in many other published procedures), it is unlikely that it was involved in the high-discriminability condition, in which the narrative was presented minutes before the test, 2 days after the slides.

7 Thanks to both Elizabeth F. Loftus and Michael McCloskey, who independently noted this alternative interpretation in their reviews of an earlier version of this article.

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References


