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Influence of Postevent Information in the Recall of Central and Peripheral Details of an Eyewitnessed Event

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Previous research has shown that misleading postevent information can alter the report of a previously witnessed event. The present experiment extends on this research by investigating whether central and peripheral details are affected differentially by misleading postevent information. Sixty-four undergraduate students were shown a series of slides depicting a theft from a convenience store. They were then exposed to a taped narrative which contained some misinformation and some neutral information about two central and two peripheral critical details. Finally, the subjects' memory for the original event was tested using recognition and source questions. The accuracy data replicated the misinformation effect \( p < .05 \). Central and peripheral details of the original event were not affected differentially by the misinformation. The response latency results supported Loftus's substitution theory.

The Influence of Misleading Postevent Information in the Recall of Central and Peripheral Details of an Eyewitnessed Event.

Numerous studies have repeatedly demonstrated that new information presented after witnessing an event can cause changes in the ability to report that event. When this new information is misleading, it can cause errors in the accuracy of the eyewitnesses report. This phenomenon is known as the misinformation effect.

Most of the research on the accuracy of eyewitness testimony involves a three-stage procedure (e.g., Belli, 1989; Lindsay, 1990; Lindsay & Johnson, 1989; Loftus, Donders, Hoffman & Schooler, 1989; Loftus, Weingardt & Lindsay, 1995; McCloskey & Zaragoza, 1985; Tversky & Tuchin, 1989). First, subjects witness a visual event. Next, they receive verbal or written information that includes either neutral or misleading information about particular details of the original event. Typically, subjects who are misinformed about a detail report things that did not occur in the original event (e.g., if the subjects see a Pepsi in the witnessed event and then they hear 7-Up in the postevent, the subjects may be more apt to report that the 7-Up was in the original event). Although there is little doubt that the misinformation effect can be obtained, the interpretation of why it occurs has gained less consensus.

Several theories have been proposed to account for the misinformation effect. For example, Loftus (e.g., Loftus et al. 1989; Loftus & Hoffman, 1989; Loftus et al. 1995) proposed the Substitution/Integration hypothesis which states that when we receive misleading information about a previously stored memory, we substitute and integrate the new information with the old, thus preventing access to the original information. Although there has been a lack of distinction between the integration (e.g., Lindsay & Johnson, 1989a; Lindsay & Johnson, 1989b) and the substitution mechanisms (Belli, 1989) in the literature, it is important to differentiate between the two because they provide different explanations for the misinformation effect. The integration theory suggests that both memories for the original information and the misleading postevent information “integrate” thus resulting in a conjunction or blend of both memories. However, the substitution hypothesis predicts that the misleading postevent information overwrites the memory for the original event which thus prevents access to the original information.

In contrast, according to the accessibility hypothesis (Bekerian & Bowers, 1983), when new
information is presented the misleading postevent information does not alter the previously formed memory; rather, the two memories coexist separately with the most recent information (misleading postevent) being the most accessible. Lindsay & Johnson (e.g., Johnson, Hashtroudi & Lindsay, 1993; Lindsay, 1990; Lindsay & Johnson, 1989) proposed a source-misattribution hypothesis which states that the memories for both the original and misleading postevent information also coexist, but that subjects confuse the source of each memory. Response bias can also influence the way a subject responds (Christiansen & Ochalek, 1983). If the subject assumes that the experimenter obviously knows the content of the story, the subject may not question the accuracy of the postevent information and therefore, feel a pressure to report it regardless of his/her memory for the original event.

What none of these explanations addresses is whether misleading information affects all the details of the original scene to the same degree. It is not clear whether someone can be misled not only about details of secondary importance, but even on the most critical details. Investigators working in the area of reading comprehension have found differences in the memorability of different aspects of discourse. Readers’ free-recall generally includes the primary or more important details rather than the secondary details. This difference between primary and secondary details increases with the retention interval between text reading and the recall test and with the numbers of reproduction intents (e.g., Bartlett, 1932; Hunt & Love, 1972). Similarly, it may be possible that when people witness an event, the peripheral (secondary) details are forgotten, thus allowing the misinformation to take their place in memory. Because subjects’ memory about the event might be formed predominantly by central (primary) details of the scene, central features may be less affected by postevent misinformation. This would imply that the reports of details pertaining to the perpetrators of the crimes may not be so accurate. Past research in eyewitness testimony has shown one kind of dissociation; arousal affects the recall of central and peripheral details differentially (e.g., Christiansen & Loftus, 1987; Clifford & Scott, 1978; Deffenbacher, 1983; Leippe, Wells & Ostrom, 1978). For example, Christiansen & Loftus (1987) have found that the theme of a traumatic event (central detail) is remembered better than peripheral details. Therefore, there is a reason to suspect that misinformation also influences differentially the details that have various degrees of relevance in the original scene. This possibility would certainly make the consequences of the misinformation effect less aggravating in the court.

The purpose of the present experiment was threefold: a) to investigate whether subjects’ memory for an eyewitnessed event is better for the central (more important) details than for the peripheral details, b) to find out whether misleading postevent information affects central and peripheral details differentially, and finally, c) to test between the integration and substitution hypotheses and contrast our results against the accessibility, source monitoring, and bias hypotheses.

In order to investigate these questions, the present experiment had subjects view a target event and then listen to a taped narrative with postevent information which was either neutral or misleading about critical details. Lastly, the subjects were given a memory test which consisted first of a recognition yes/no question about a particular scene in the event followed by a confidence rating for their answer. Next, they were instructed to indicate the source from where they remembered perceiving the item or event, followed by a confidence rating for this source answer. Then central and peripheral details in both the slide and narrative combinations included these four critical items: jacket, money, soda, box.

In order to differentiate between the integration vs substitution hypotheses, besides including the original and the misleading event as response options, subjects were also given a blend or
conjunction option and a totally novel option on the memory test for the yes/no questions. For example, if the original slide showed that the thief was wearing a blue jacket and the misleading postevent narrative reported that the thief was wearing a red jacket, the memory test asked subjects to indicate whether or not the thief was wearing: (a) a blue jacket (original option), (b) a red jacket (misleading option), (c) a purple jacket (conjunction option), and (d) a yellow jacket (novel option). Because the integration hypotheses predict that the memory for both the original and misleading memory would be combined thus resulting in a new integrated memory, subjects that are misled about an item would be predicted to choose this option (purple jacket) significantly more than those subjects that receive neutral information. Also, subjects would choose the conjunction item more often than the totally new item (yellow jacket). In contrast, because the substitution hypothesis predicts that there would be an “overwriting” of the original memory, the conjunction option would not be selected. Instead, the misleading postevent information would be chosen (the red jacket). Also, subjects would be expected to choose the substitution item more often than the novel item (yellow jacket).

To reduce the likelihood of response bias, subjects were warned that the information they heard in the taped narrative may or may not have been an accurate description of the slides. This was to discourage subjects from choosing the postevent option only because they assumed that the experimenter’s account expressed in the narrative should be correct, regardless of their own memories.

By measuring response latencies and confidence levels besides accuracy, the present experiment compared and contrasted different predictions from each of the other four hypotheses. First of all, it was hypothesized (a) that central details would be recalled better than peripheral details for both the recognition and the source questions, (b) that central details would be responded to faster than peripheral details when measuring both recognition and source reaction times. Finally it was hypothesized that (c) subjects would be more confident about the central than about the peripheral details of the eyewitnessed event. The substitution, integration, accessibility, and source hypotheses all predicted that subjects should be less accurate when identifying critical items in the misleading condition compared to the control neutral condition.

In addition, both the substitution and the integration hypotheses would expect subjects to be equally fast and equally confident in both conditions, because in both cases, there would be only one memory. In contrast, according to the accessibility hypothesis, subjects would respond faster to the yes/no questions in the misleading condition than in the neutral condition, because the misleading postevent information, being the most recent, would be more accessible. According to the source-misattribution hypothesis, subjects in the misleading condition would be more accurate in the source questions than in the yes/no recognition questions because the original memory would still be accessible after being misled when forced to focus their attention on the source of each event. However, subjects’ responses would be slower in the misleading condition in both the yes/no and the source questions, because they would have to still differentiate where each memory comes from at the time of reading the question. Finally, according to the response bias hypothesis, the misleading condition should be equal to the neutral condition in all responses. This is because we controlled for bias by explicitly warning subjects about the possible inaccuracy of the taped narrative.

Method

Subjects

Sixty-four undergraduate students from two Midwest colleges participated in this experiment to earn extra credit for their psychology courses. The subjects consisted of 45 females and 19 males with an average age of 28 years old, who had a variety of majors. All were native English-speakers and had normal or corrected-to-normal vision, as indicated by a Snellen test applied at the beginning of the experimental session.

Materials and Design

The original event consisted of a sequence of 41 color slides which depicted the following burglary witnessed by a customer. A man entered a convenience store. While shopping, he wandered through the store, picked up a few items and eventually stole either a soda or some dollar bills. All the while a handyman was doing some maintenance work. There were four versions of the slides in which all but four slides were the same. The four critical slides that changed, displayed one
of two possible options: (a) soft drink (Pepsi or 7-Up), (b) dollar bills (four $20 bills or eight $20 bills), (c) jacket color (red or blue), and (d) box size (large or small). One fourth of the subjects saw each version of each critical item.

The postevent consisted of a professionally taped narrative containing approximately 426 words. It accurately described the details of the event except for the critical items. For a given subject, the narrative mentioned two critical items in a misleading way and two in a neutral way. There were 16 combinations of slide versions (1 to 4) and postevent information (neutral or misinformation). Four subjects were randomly assigned to each of the 16 slide-narrative combinations. Each critical item appeared equally often as either a central or peripheral detail. As an example, half of the subjects saw the thief wearing the blue jacket (central detail), whereas the other half saw the maintenance man wearing the blue jacket (peripheral detail). Each version of each of the critical items was included in the control condition for half of the subjects and in the misleading condition for the other half. For example, from subjects who saw a blue jacket on the thief in the slides, half received a narrative referring to it as a red jacket (misleading condition). Furthermore, for each version of each critical item, the alternative version was used equally often as misleading information. Except for the necessary modifications with the critical items, the narrative was the same for all subjects.

The subjects’ memory was tested using a 55SX IBM compatible computer attached to a color monitor with a VGA adapter. The test was programmed using a Schneider’s (1990) Micro Experimental Laboratory Program (MEL) software package version 1.0. The subjects were presented with explicit instructions about the test on the screen. At that point, they were also warned that some of the information that they had previously heard in the narrative may or may not have been an accurate description of the actual event. There were four types of questions asked for each of the four critical items and for each of the 21 noncritical items. The subjects were instructed to answer each question as quickly and as accurately as possible. The word “Ready” preceded each set of questions so that the subjects would know where to fixate their gaze. The subjects were then first given a yes/no recognition question, regarding the items that were presented to them in the slides. The task of the subjects was to press the blue key on the keyboard for a “yes” response or the red key for a “no” response (e.g., Was the thief wearing a blue jacket?). The YES and NO keys were designated by sticking a colored label on the / and z keys on the bottom row of the keyboard. The subjects were also given a question about the source where they remembered perceiving the item they were to respond by pressing the numerical keys (1=slide, 2=narrative, 3=both, 4=neither) at the right side of the keyboard (e.g., Where do you remember perceiving the item or event from?). After each of these questions, the
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subject entered his/her confidence about the selected answer on a 5-point rating scale, where 1=absolutely confident and 5=absolutely unsure. The response latency and the accuracy of the responses were registered by the computer for each trial. The students were required to complete a series of six practice trials to ensure that they understood the available options and were correctly answering the questions. Each experimental session lasted approximately 70 minutes.

Results

The data obtained in the yes/no recognition and the source questions were analyzed separately, pooled over three of the four critical items. The "box" item was excluded due to subjects' report about the subjectiveness of its size (small vs large).

Yes/No recognition test. Figure 1a shows the accuracy data on the yes/no recognition memory test. As can be observed, subjects were significantly less accurate when identifying the critical items in the misleading condition (M=.665) than in the control condition (M=.805), F(1,63) = 40.42, p<.000. Therefore, not surprisingly, the misinformation effect was replicated. However, the central items were not recalled significantly better than the peripheral items, F(1,63) = 0.67, p>.05. The interaction between narrative and relevance was not significant either, F(1,63) = 0.01, p>.05.

Figure 2a shows the reaction time data for the yes/no questions. The results showed that subjects responded equally fast in both the misleading (M=3.70s) and control (M=3.417s) conditions, F(1,63) = 1.06, p>.05. Thus, we have no evidence to support neither the accessibility nor the source misattribution hypotheses. These hypotheses imply that misinformation produces a conflict that must be resolved during recall on the memory test, thus resulting in longer reaction times for the misleading condition.

In order to test the integration vs. substitution hypothesis, the postevent (neutral) information and the four response options (original, misleading, conjunction, new) were submitted to a 2x4 within subjects ANOVA. The results indicated a main effect of postevent, \( F(1,189)=16.32, p<.000 \), a main effect of response option, \( F(3,189)=104.80 \), and a postevent by response option interaction, \( F(3,189)=29.73, p<.000 \). More specifically, the number of times that people selected the misleading option in the

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misleading condition ($M=0.69$) was significantly greater than in the control condition ($M=0.09$), $F(1,63)=69, p<.05$. Misled subjects selected the misinformation option ($M=0.69$) as often as the original event option ($M=0.61$) and both significantly more often than the conjunction option ($M=0.14$), $F(1,63)=55.16, p<.001$, while never selecting the totally novel option ($M=0.00$). Therefore, as can be observed in Figure 3, these results tend to support the substitution hypothesis over the integration hypothesis. Regarding response latency as a function of item relevance, there was a significant relevance by postevent interaction, $F(1,63)=3.88, p<.05$. In the misled condition, subjects responded significantly slower to peripheral details ($M=4.29$) than in the control condition ($M=3.45$). However, for the central details, subjects responded equally fast in both the misleading ($M=3.11$) and the control ($M=3.38$) conditions, $F(1,63)=3.88, p<.05$.

Finally, the statistical analysis of the confidence ratings for the yes/no recognition test indicated that subjects were significantly more confident in their responses in the misleading condition ($M=1.81$) than in the control condition ($M=1.50$), $E(1,63)=1.03, p>.05$. However, by separately analyzing the correct responses, subjects were significantly less confident in the misleading condition ($M=2.75$) than in the control condition ($M=1.58$), $E(1,63)=4.77, p<.03$. For the incorrect responses, subjects in the control condition were significantly more confident about peripheral details ($M=1.40$) than about the central details ($M=1.64$); whereas, in the misleading condition, the relevance of the details did not influence the confidence ratings, $E(1,63)=4.90, p<.03$.

Two final one-way ANOVAs were computed to check the equivalence in memorability of the four slide sequences and the sixteen taped narratives. Subjects' accuracy did not significantly differ across the particular slide sequence that the observers watched and the narrative that they heard, $E(1,63)=1.03, p>.05$, except for one slide sequence.

**Discussion**

In summary, this research yielded three important findings. First, consistent with past research, the misinformation effect was replicated since subjects were much less accurate on the recognition questions when they were misled than when they were not. Second, our research seemed to indicate that central and peripheral details of an eyewitnessed event were either recalled differentially

![Figure 3 - Probability of a "yes" response for each of the four response options as affected by neutral and misleading postevent information.](image)
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or affected by misinformation in a different manner. One possible explanation for the obtained results is that in fact, eyewitnesses recalled all details with equal accuracy. An alternative explanation is that misinformation affected different items differentially. That is, for some items, being a central part of the story made them less susceptible to misinformation than being peripheral. However, other items showed the opposite pattern, and thus canceled each other out in the averages. Another possibility may have been the differences in the quality of the slides that the subjects viewed. Some slides were lighter than others and this may have influenced what the subjects remembered seeing. This was especially evident after further analysis indicated that subjects' accuracy across the particular slide sequences that they viewed differed significantly, which resulted in poorer accuracy of one of the four slide sequences. Future research would need to control for this by duplicating slides with the exact amount of lighting in each.

Third, out of all the proposed theories to explain the misinformation effect, the substitution hypothesis gain the most support. First of all, the bias hypothesis (e.g., Christiansen & Ochalek, 1983) was not supported because subjects were not equally accurate even though bias was eliminated or at least greatly reduced in our experiment. The integration hypothesis (e.g., Lindsay & Johnson, 1989; 1989b) was not supported either because subjects did not choose the conjunction option significantly more often in the misinformation condition than in the control condition. Likewise, no evidence was found for the accessibility hypothesis (e.g., Bekerian & Bowers, 1983) since subjects responded to the item questions equally fast in both the misleading and control conditions. Subjects were not faster at reporting the postevent because of being more recent and accessible.

The results did not support the source misattribution hypothesis either (e.g., Lindsay & Johnson, 1989; Johnson, Hashtroudi & Lindsay, 1993; Lindsay, 1990), since subjects responded equally fast to the source test in the misleading and the control condition, and also because subjects in the misleading condition were much less rather than more accurate on the source test in comparison to the recognition test. In contrast, the substitution theory (e.g., Belli, 1989) was upheld because subjects responded equally fast to the item yes/no questions. This suggests that subjects only had one memory at the time of the test. In addition, subjects in the misleading condition reported witnessing the misleading items significantly more often than the original, conjunction, and new response options. However, future research is needed to address a problem with the source questions. It appeared that when subjects responded to these questions, they did not use all of their options and maybe misunderstood their meanings despite a thorough explanation. It would be interesting to see if the same effect could be obtained using different wording to ask the source questions.

Taken together, this research implies that a witness to a crime can actually be influenced by misleading postevent information. The reason for this influence, as found in our research, seems to be that once people are confronted with conflicting information, they are no longer able to access what was originally witnessed even when made to focus on the source of both the original and postevent information. This may therefore lead to a report which may contain false information. These findings may be considered devastating, especially considering the fact that someone can be convicted based solely on eyewitnesses testimony.

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