

THE RELIABILITY OF EYEWITNESS REPORTS: THE EFFECT OF ACCURATE AND INACCURATE INFORMATION ON MEMORY AND BIAS

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Abstract:

The purpose of the present research, which involved two studies, was to examine potential factors that can influence eyewitness accuracy and bias. The goal of Study 1 was to determine the influence of leading questions on the accuracy of memory, and also to investigate the combined effects of question type (neutral, positive and negative leading), and background (criminal and non-criminal) and race of a perpetrator on attributions of guilt. Participants were shown a video of an ambiguous staged crime and upon its conclusion were presented with neutral or leading questions. The results indicated that the reinforcement of accurate memory in the form of positive leading questions increased accuracy and reduced biases related to criminal history. The second study explored whether the effects obtained in Study 1 could be explained by an activation-based account of memory. The data revealed that accurate post-event information can reduce biases related to criminal history, thus providing additional support for this theory. Practical implications for interrogation processes and courtroom proceedings are discussed.

Introduction

A considerable amount of research has established that exposure to leading or misleading suggestions can dramatically influence the accuracy of eyewitness reports. This phenomenon, commonly referred to as the “misinformation effect,” has been well documented in the literature and has implications for legal systems worldwide, which depend upon the reliability of eyewitness testimony in their search for justice (Rattner, 1988). The present research was initially an attempt to replicate the misinformation effect through the use of leading questions. Specifically, I was interested to determine the extent to which misleading suggestions influence not only the accuracy of eyewitness reports but also individual biases that may affect judgments related to guilt.

The wealth of misinformation research that exists in the literature spans decades and encompasses numerous studies that have employed varied designs (Ayers & Reder, 1998). In an experiment that laid the foundation for future misinformation research, Loftus, Miller, and Burns (1978) showed participants slides depicting a simulated accident involving a car and a pedestrian. In the critical slide, half the participants saw a red car turn a corner near a stop sign, while the other half of the participants saw the car pass a yield sign instead. Immediately following the slides, participants were asked several questions, one of which addressed the road sign depicted. For half the participants the question matched the actual scene presented, for the other half the question mentioned the existence of the sign they had not seen. Later, when participants were asked to identify which slides they had seen from sequential pairs, 75 percent of

those receiving consistent information selected the slide with the sign they had actually seen, whereas only 41 percent of those who had received inconsistent information chose correctly. This classic experiment serves as evidence of the powerful influence of inaccurate or misleading post-event information on recall. Subsequent studies have similarly demonstrated that participants can be led to report suggested events that they never actually witnessed (Bekerian & Bowers, 1983; Christiaansen & Ochalek, 1983; Kohnken & Brockmann, 1987; Lindsay, 1990; Loftus, 1975, 1978, 1979a, 1979b; McCloskey & Zaragoza, 1985; Pirolli & Mitterer, 1984; Smith & Ellsworth, 1987; Tversky & Tuchin, 1989; Zaragoza, & Mitchell, 1996).

Research on the misinformation effect has commonly employed a three-stage procedure in which participants first view a slide sequence or videotape depicting a forensically relevant event, such as an accident or theft. Participants are then exposed to misinformation about selected aspects of the event. Typically, these misleading suggestions are in the form of a narrative description of the event or embedded in questions to which participants' respond. Finally, a memory test is administered, which is intended to assess participants' memory for the event in general and also in regard to the suggested detail. Misinformation effects have been obtained in studies that have tested participant memory both immediately following the introduction of misinformation (Loftus, 1975; Weingardt, Loftus, & Lindsay, 1995) and also after a longer period of time, ranging from a day to several weeks (Lindsay, 1990; Wright, Loftus, & Hall, 2001). Although both designs have been utilized, the latter has been proven to generate a stronger effect.

The misinformation effect has been replicated in numerous studies through the use of leading questions. By definition, a leading question is one in which the direction of the expected answer is implied (Loftus, 1975). There is consensus among researchers that the form of a retrieval question can influence memory and suggestibility. Several studies that have investigated this effect have found that eyewitness reports are affected by subtle changes in wording, such as the form of the article that precedes an object (Loftus, 1974; Loftus & Zanni, 1975) or the relative strength of a verb used to describe an action (Loftus & Palmer, 1974). Laumann and Elliott (1992) developed a more complex paradigm to explore developmental differences in memory and suggestibility. The authors investigated the effect of various question types through the use of unbiased cued-recall questions (e.g. "What was the little girl doing?") and leading questions that were either consistent (e.g. "Did the little girl keep watching the movie?") or inconsistent (e.g. "Did the mommy grab the little girl and hit her?") with the events portrayed in a videotape. These various question types can alternatively be referred to as neutral, and positive and negative leading questions. Laumann and Elliott found that participant responses varied based on the type of question that was posed.

The finding that misinformation can undermine the accuracy of eyewitness testimony has spurred a body of research devoted to understanding the nature and causes of this effect. In the early decades of misinformation research, the most widely accepted explanation supposed that misleading information impairs the witness' ability to remember the original event. According to the memory impairment hypothesis, misled participants report misleading information more often than controls participants because exposure to misleading information impairs' participants ability to remember what they originally saw. One view supported by Loftus (1978; 1979a; 1979b) assumes that

misinformation can irreversibly distort a witness's memory of the original event. She proposed a mechanism called "overwriting," whereby suggested detail is incorporated into an integrated memory representation of the original event. Memory for the original event detail is destroyed, and the memory for the suggested detail becomes an integral part of the memory of the event itself. Proponents of this view point to studies that have demonstrated that participants exposed to misleading post-event information confidently report such misinformation on subsequent memory tests. For example, Loftus, Donders, Hoffman, and Schooler (1989) tested participants for their memories of what they saw in a series of slides depicting a burglary, and measured their reaction times and confidence levels. When participants were administered a recognition memory test that required them to choose between the event item and the misinformation item, misled subjects responded as quickly and confidently when choosing the incorrect misinformation response as they did when they chose correctly. The authors interpreted the results as evidence to support their theory that participants who have received misleading suggestions about an item come to genuinely believe that they have actually seen the item which had only been suggested to them.

An alternative version of the memory impairment hypothesis assumes that misleading information renders the original information inaccessible, as it becomes difficult or impossible to retrieve. Bekerian and Bowers (1983) explain that the original information may still reside in memory but simply can no longer be retrieved.

Lindsay and Johnson (1989), unsatisfied with the existing theories, proposed a competing explanation of the misinformation effect that rivals Loftus' memory impairment hypothesis. Source misattribution theory states that some inaccurate memories are the result of confusion between the sources of events. The authors explain that the misinformation effect comes from a confusion of the origin of the original event information and that of the misleading post-event information. Therefore, traces of the original and misleading information might both be represented in memory, but the source of the misleading information is mistakenly attributed to that of the originally witnessed event. Lindsay and Johnson contend that source misattribution leads to inaccuracy because the post-event information is more recent and therefore more salient in memory, thus it is incorrectly assumed to be a memory of what was originally seen.

The authors identified several ways in which source misattributions can occur. Lindsay and Johnson (1989) contend that misattributions can result when the source of the original information does not exist in memory, either because it has decayed away or because it was never encoded in the first place. In these cases, people try to infer the source of their memory and they generate a plausible but incorrect source. Source misattribution errors can also arise due to the tendency of participants to respond on the basis of familiarity with the cue rather than source information. In the vast majority of studies that investigate the misinformation effect, the misinformation is often more familiar than is the original information, and thus Lindsay and Johnson argue is accepted because of its familiarity at test. Finally, Johnson and colleagues (1993) outlined several variables that influence the likelihood that people will make source-monitoring errors. Included amongst these is the extent to which the misleading information is central rather than tangential to the series of events.

Recently, Ayers and Reder (1998) attempted to synthesize over 20 years of research on the misinformation effect using an activation-based framework. The authors

assert that the various explanations of misinformation data that exist in the literature (memory impairment and vulnerability of source information) can be integrated and understood through the application of the source of activation confusion model of memory. The model assumes that memory errors arise from the misinterpretation of activation. Ayers and Reder therefore maintain that memory errors discussed in the literature can be accounted for by people's failure to identify the source of activation or by their failure to achieve an exact match between an environmental source of activation and the correct memory representation.

A misinformation effect can be generated not only through external cues but can also result from internal processes that act to mislead people in their judgments. The way people perceive and subsequently recall events can be influenced by stereotypes related to an individual's background or race. Stereotypes are defined as a structured set of beliefs about the characteristics of members of social categories (Stangor & Schaller, 1996). Over time, people develop beliefs about characteristics of the important social groups in their environment. These beliefs influence how people encode, store, and retrieve information about members of these groups and also how they judge and respond to them (Sampson, 1999). It is argued that stereotypes arise out of normal processes of cognition. Macrae, Milne, and Bodenhausen (1994) explain that people need to categorize the social world in order to understand and interact with it. This process of categorization protects people from cognitive overload as it allows individuals to simplify enormous amounts of information and provides a framework within which this information can be organized. Aside from their cognitive function, stereotypes also serve the social function of helping people fit in and identify with their own social and cultural groups. Once these groups, which are often based on observable similarities such as race, have been identified members of the group tend to be viewed as more similar to one another and as possessing shared characteristics (Snyder & Meine, 1994).

A myriad of research suggests that racial stereotypes can influence people's perceptions of an event. In a classic experiment, Duncan (1976) demonstrated that racial stereotypes lead individuals to interpret ambiguous events in a manner consistent with the stereotype. The author presented a group of white students with a videotape showing either a black student shoving a white student or another white student engaging in the shoving. Commonly shared stereotypes that blacks are violent presumably influenced how the white students interpreted the event. They judged the same shove as more violent when done by a black student in comparison to a white student. This study provides evidence of a group-based racial bias whereby Whites tend to be more discriminatory toward Blacks. In subsequent work by Bodenhausen (1988), Gordon (1990), and Sommers and Ellsworth (2000) similar biases were observed, whereby Blacks were judged more harshly than Whites, in the context of mock juror decisions. Racial stereotypes can therefore function as a type of misinformation that can affect memory by altering people's perceptions of an event.

Individual-based biases, such as those related to an individual's background, can affect the way people perceive events in misleading ways. In a study that explored confirmation biases, Peterson (1976) discovered that people's expectations often influence their opinions and reports. Participants were shown a 7 minute videotaped disturbance and fight. Witnesses were given one of two sets of information prior to viewing the tape. This pre-event information, which described the main characters as

either disruptive radicals or free-speech advocates, was designed to bias or predispose their interpretations. The author found that witnesses who expected to see angry radicals remembered more details consistent with this view and fewer details in opposition to it. Peterson, along with more recent work by Jonas, Schulz-Hardt, Frey, and Thelen (2001), prove that extraneous cues can contribute to the formation of biases that influence the way people perceive and recall specific events.

The current research consisted of two studies, the first of which was an attempt to replicate the misinformation effect through the use of leading questions. I was specifically interested in determining whether the results generated can be accounted for by an activation-based account of memory. In addition, I investigated whether the background or race of a perpetrator, two influential factors identified in the literature, can affect guilt assessments made by witnesses to a potential crime.

Study 1

In Study 1, participants were shown a video of an ambiguous, staged crime (wallet-snatching incident) in which the perpetrator was depicted as either a white or black male. Prior to watching the video, participants were provided with background information that characterized the male figure as either a former juvenile offender or a respectable law-abiding citizen. Immediately following the video, participants were asked either neutral questions (required self-generated answers), positive leading questions (leading in the direction of a correct response), or negative leading questions (leading in the direction of an incorrect response). The present research sought to determine the affect of varied question types on the accuracy of memory, as measured in the context of central and peripheral questions. In addition, I investigated the influence of background and race on attributions of guilt.

I hypothesized that the introduction of misinformation, in the form of negative leading questions, would serve as an additional source of information that would contradict the original stored memory. In this case, confusion would result regarding the appropriate source of memory for the given event, a state that I predicted would give rise to a greater number of memory errors (Lindsay & Johnson, 1989). The existence of source confusion would also allow biases to infiltrate participants' perceptions. These biases, or stereotypes, not only affect the way people interpret the behaviors of others but also influence the way information is subsequently recalled (Dovidio, 1999). Dovidio argues that people tend to recall information in stereotype-consistent ways when they lack strong memories for specific details or events. Misleading suggestions, therefore, may leave memory vulnerable to biases, which can in turn influence guilt judgments. Because Blacks are more often associated with crime and violence (Devine, 1989), I predicted that the black perpetrator would be viewed as more guilty than his white counterpart and also perpetrators identified as juvenile offenders would be judged more harshly than those reported to have no criminal history.

In contrast, because the presence of accurate information contained within positive leading questions would facilitate more accurate perceptions of the events portrayed through the activation and subsequent retrieval of the original stored memory (Ayers & Reder, 1998; Lindsay and Johnson, 1989), I predicted that these suggestions would result in an increase in accurate memories and consequently would lead to a corresponding reduction in bias. Therefore, I predicted that any differences in the guilt

assessments of Blacks versus Whites and also criminals versus non-criminals found in the neutral condition would be greatly reduced.

Method

Participants. The participants were sixty-nine undergraduate students (20 males and 49 females) from a small liberal arts college in the northeast. All participants were enrolled in an introductory psychology class and received credit in exchange for their participation. Participants were randomly assigned to one of twelve experimental conditions in a 2 (background: criminal or non-criminal) x 2 (race: black or white) x 3 (question type: neutral, positive, or negative) design.

Procedure. Participants were escorted in groups, ranging in size from 2 to 7, into a classroom that contained a 19-inch color television (TV) and videocassette recorder. They were collectively instructed to select a chair that would allow them an unobstructed view of the TV monitor, which was positioned in the center of the room. The participants were asked to read and sign a certificate of informed consent, which abstractly described the purpose of the study and informed participants of their right to withdraw at any time.

Because the actors in the video were selected from the student population, participants received a written statement that described the content of the video as a recreation of a typical scene. This approach was chosen in recognition of the fact that individuals or places in the scene may be familiar to many students. Participants were further instructed to pay careful attention to detail and were made aware that they would be asked specific questions about what they were about to see. In light of the brevity of the video and the detailed nature of the questions, the instructions were accompanied by a written description of the movement of characters in the scene (see Appendices A & B). A series of three diagrams were also provided that outlined the characters' names and their position in the scene at three different times (beginning, middle, and end).

To manipulate the knowledge acquired by participants in relation to the male perpetrator's criminal history (the background independent variable), participants were provided with a page of background information. This information included the individual's name, age, height, weight, eye color, and a brief personal history (see Appendices C through F). Half of the participants were given information that characterized the male as a former juvenile offender while the other half were informed he was a law-abiding respectable citizen. A second page of background information was also provided that pertained to the central female figure in the video. This information, which remained constant across all conditions, addressed the same points listed above but did not mention criminal history (see Appendix G).

After all participants had indicated to the experimenter that they had read both the description of the scene and the background information, a video of an ambiguous staged crime was shown. The race of the perpetrator was varied in order to explore the effect of race on culpability (the race independent variable). One video portrayed the perpetrator as a white male while the other depicted him as black. The duration of the videos was held relatively constant, as each was approximately 34 seconds in length.

In terms of the content of the video, the scene opens with a woman walking down a path. She continues on her course until she is approached by a man who bumps into

her. Her purse falls to the ground and its contents scatter across the ground. Both individuals kneel down to pick up articles that have fallen. At the same time a distraction is created in the background by two friends engaged in an animated discussion as well as by various people who pass by. The man has his back to the viewer when he picks up her wallet (the woman is seen in profile) and although his hand moves from the ground to the inside of his coat it is unclear whether he hands it back to her or actually places it in his pocket.

Immediately following the conclusion of the video, participants were asked to answer a series of questions that pertained to the scene that had played out. In order to explore the effect of leading questions and their potential influence on guilt assessment, three different question types were employed (the question type independent variable). Previous research conducted by Laumann and Elliott (1992) served as a model for these questions, which have been shown in the literature to affect eyewitness responses. One group of participants was asked neutral questions for which they were required to generate a response (e.g. What color was the bag Molly was carrying?). A second group was presented with positive leading questions, whereby a yes response would be consistent with the events in the video (e.g. Didn't you see Molly carrying a black bag?). The remaining group was asked negative leading questions, whereby a yes response would be inconsistent with the events in the video (e.g. Didn't you see Molly carrying a blue bag?). In the latter two conditions, five neutral questions were incorporated in the questionnaires to avoid encountering a demand characteristic effect. The content of the questions focused on both central aspects of the video, such as physical attributes of the characters, and also peripheral components, such as the actions of characters in the background (see Appendices H through M for all questionnaires). For subsequent analyses, the questions were divided into these two categories, with both the central and peripheral conditions consisting of four questions each. In terms of participant responses, they were given the option of stating "uncertain" if they were unable to respond to a particular question.

Participants in all groups were asked to comment on the presumed guilt or innocence of the male figure in the video. These questions were presented both in the form of conditional questions (questions asked in accordance with the categories outlined above) and also a more neutral scale (e.g. On a scale of 1 to 10, 1 being most likely and 10 being most unlikely, indicate the likelihood that the male figure took an item from the female's bag). After completing the questions, which totaled seventeen in all, participants were given a debriefing statement and thanked for their participation.

Results

The purpose of the following analysis was twofold. First, I was interested in examining question type and its affect on accuracy, as measured by number of correct responses. The second focus of the analysis involved determining the independent and combined effects of all manipulated variables, namely background, race, and question type, on perceived guilt.

Effect of Question Type on Accuracy. In this phase of the analysis the proportion of correct responses was considered in order to determine how different question types influenced accuracy. A 3 (question type: neutral, positive, or negative) x 2 (race: black or

white) x 2 (background: criminal or non-criminal) x 2 (question focus: central and peripheral) analysis of variance (ANOVA) with repeated measures on the final factor revealed a significant main effect of question focus, $F(1, 56) = 21.14, p < .001$. Overall, 41.1% of all questions related to central aspects of the observed event were answered correctly, whereas only 23.3% of the peripheral questions were answered correctly. This main effect, however, was moderated by question type, as was indicated by a significant question focus x question type interaction, $F(2, 56) = 9.41, p < .001$.

To examine this interaction further, additional analyses were conducted comparing the effects of positive and neutral questions and negative and neutral questions, independently. To further analyze the differences between neutral and positive leading questions, a 2 (question type) x 2 (question focus) ANOVA, incorporating only neutral and positive leading questions, with repeated measures on the second factor was performed. The interaction proved to be marginally significant, $F(1, 44) = 2.91, p = .095$. To evaluate the interaction, two separate ANOVAs that independently examined differences between neutral and positive leading questions in terms of central questions correct and peripheral questions correct, respectively, were also conducted. The analysis that examined accuracy on central questions yielded significant results. Participants presented with positive leading questions answered more central questions correct ($M = 51.1%$) than those who received neutral questions ($M = 30.7%$), $F(1, 44) = 9.10, p = .004$. The analysis that examined peripheral questions was not found to be significant. Neutral and positive leading questions did not significantly differ in terms of their effect on the number of peripheral questions answered correctly ($M = 10.2%$ vs. $M = 14.6%$), $F(1, 44) = .526, p = .472$. Thus, I concluded that positive leading questions seem to enhance accuracy on questions that address central but not peripheral points. When parallel analyses were performed, there were no systematic differences revealed between neutral and negative leading questions, a finding that was inconsistent with the expected misinformation effect.

Effects of Background, Race, and Question Type on Perceived Guilt. In order to determine the effects of background, race, and question type on perceived guilt of the perpetrator, a 2 (background) x 2 (race) x 3 (question type) ANOVA was performed where the dependent variable considered was perceived guilt, as reported by a score on a given scale ranging from 1 (most guilty) to 10 (least guilty). The analysis revealed a marginally significant main effect of background, $F(1, 55) = 3.88, p = .054$, whereby perpetrators previously identified as criminals were viewed as less guilty ($M = 5.85$) than perpetrators who were presented with no criminal past ($M = 4.85$). No significant effects of race or question type were obtained.

Because the present research focused primarily on the effects of different types of leading questions on participant responses, separate analyses were conducted, first comparing neutral and positive leading questions, and second looking at neutral and negative leading questions. Therefore, two separate 2 (background) x 2 (race) x 2 (question type) ANOVAs were conducted that examined the effect of background and race in the context of neutral and positive questions, and neutral and negative questions, respectively. The analysis that incorporated neutral and positive questions revealed a significant main effect of background, $F(1, 37) = 4.38, p = .043$, consistent with the effect previously reported, whereby criminals were viewed as less guilty ($M = 5.85$) than

non-criminals ($M = 4.60$). A marginally significant interaction between background and question type was also found, $F(1, 37) = 3.81, p = .058$, suggesting participants who were asked neutral questions were more biased in their judgments of the perpetrator, as these individuals viewed criminals as less guilty ($M = 6.45$) than non-criminals ($M = 4.03$), $F(1, 20) = 6.71, p = .018$. Participants who responded to positive leading questions, however, showed no significant difference in their guilt assessment of criminals ($M = 5.25$) in comparison to non-criminals ($M = 5.17$).

The analysis that incorporated neutral and negative leading questions again yielded a significant main effect of background, $F(1, 35) = 4.75, p = .036$, whereby criminals were viewed as less guilty ($M = 6.15$) than non-criminals ($M = 4.69$). However, no interaction between background and question type was found. Thus, I concluded positive leading questions acted to reduce biases in guilt assessment that operated as a function of background information related to the perpetrator.

Discussion

The primary goals of Study 1 were to determine the influence of leading questions, both positive and negative, on the accuracy of memory, and also to investigate the combined affects of question type, background and race on attributions of guilt. The data revealed that participants, across all conditions, answered more central questions correct than peripheral questions. Upon further analysis, it was determined that positive leading questions yielded more correct responses on questions that addressed central but not peripheral aspects of the scene. Negative leading questions, in contrast, did not significantly affect the number of correct responses generated in the context of central or peripheral questions.

The analyses that involved factors that influence the assessment of guilt revealed that perpetrators identified as criminals were viewed as less guilty than perpetrators possessing no criminal past. This bias was only present, however, among participants who were asked neutral questions. Differences in guilt judgments of criminals and non-criminals did not exist among participants presented with positive leading questions. This finding is consistent with our prediction regarding the interaction of positive leading questions and background, and serves as evidence to support our theory that conditions that increase accuracy also tend to reduce bias. In contrast, negative leading questions did not lead to a significant increase in bias, relative to neutral questions, as was predicted.

Certain findings related to background, and more specifically the directionality of the bias observed, were somewhat unexpected and in fact contradict predictions presented earlier. Although judgments of the perpetrator did not appear to be influenced by conventional stereotypes, as outlined in work on stereotypes and expectations (Dovidio, 1999), biases did exist in participant responses. These biases are consistent with correction processes, whereby people attempt to remove influences that are perceived as illegitimate or unwanted (Wegener & Petty, 1995). Wegener and Petty explain that in certain contexts, social perceivers are able to identify potential sources of bias. The authors argue that when motivated and able to correct their assessment of a given target, people adjust their judgments of the target in a direction opposite to that of the perceived bias. In the context of our results, correction processes would explain the observed trend in guilt assessment. If participants were aware of the background manipulation, and in

particular the description of the perpetrator as a criminal, then according to this theory they would correct their judgments to compensate for a perceived bias related to criminality. This would therefore account for the fact that criminals were viewed as less guilty than non-criminals. Although the nature of this bias, which is consistent with correction processes, contradicts expectations it can be considered a bias nonetheless.

In terms of our original hypothesis, the introduction of misinformation (negative leading questions) did not lead to an observable decrease in accuracy. However, accuracy was significantly enhanced through the reinforcement of accurate memories (positive leading questions). Furthermore, conditions that increased accuracy also brought about a corresponding reduction in stereotypic biases.

To determine whether these findings could be attributed to an activation-based account of memory (Ayers & Reder, 1998), rather than explained by competing theories such as motivational influences, a second study was conducted specifically examining the role of activation in the accuracy of memory.

Study 2

In order to determine whether the reduction in bias, in terms of guilt assessment, observed among participants who were asked positive leading questions could be attributed to a spreading activation account of memory retrieval, a second study was conducted. In Study 2, participants viewed a video of an ambiguous staged crime, the content of which was identical to that in Study 1; however, the perpetrator was consistently depicted as White. Background information was manipulated in the same manner as has been previously described. Upon conclusion of the video, participants received either no post-event information, accurate information related to central aspects of the scene, or accurate information that pertained to peripheral details. Participants then responded to a series of neutral questions identical to those employed in Study 1.

Based on the activation-based memory model outlined by Ayers and Reder (1998), I hypothesized that the presence of accurate central information contained within positive leading questions in Study 1 may have served to activate the appropriate source memories for the events portrayed and thus reduced biases in perceptions specifically related to guilt. This study, which was designed to explore this potential explanation, was an attempt to determine how accurate post-event information influences memory retrieval.

Method

Participants. The participants were thirty-three undergraduate students (14 males and 19 females) from a small liberal arts college in the northeast. All participants were enrolled in an introductory psychology class and received credit in exchange for their participation. Participants were randomly assigned to one of six experimental conditions in a 2 (background: criminal or non-criminal) x 3 (post-event information: none, central, or peripheral) design.

Procedure. The methodology involved in this study was identical to that previously outlined for Study 1 with the following exceptions. In this second study, I utilized only one video, which depicted a white male perpetrator, as this scene generated the bias

observed in the first study. In addition, all participants were presented with neutral questions that pertained to the events in the video (see Study 1). To determine the role of different types of post-event information in memory activation, participants were provided with no post-event information, accurate post-event information related to central aspects of the scene, or accurate post-event information that pertained to peripheral aspects of the scene. This information consisted of three accurate statements, either central or peripheral, that were unrelated to subjects addressed in the questions. Central post-event information addressed more salient aspects of the scene, such as physical attributes of the characters (e.g., The male figure [Jeremy] was white), while peripheral post-event information consisted of more obscure background details (e.g., The bicycle ridden by one of the actors was blue). I hypothesized that central information would reduce biases in guilt assessment through the spreading activation of events previously stored in memory (Ayers & Reder, 1998; Lindsay & Johnson, 1989). The peripheral information should have no effect on guilt judgments, similar to the no information condition, because peripheral aspects of the scene were presumably never stored in memory and therefore cannot be retrieved even in the presence of accurate information.

Results

Effect of Question Focus and Post-Event Information on Accuracy. To determine the effect of question focus and post-event information on accuracy, a 2 (question focus: central or peripheral) x 3 (post-event information: none, central, or peripheral) ANOVA with repeated measures on the first factor was performed. The analysis revealed a significant main effect of question focus, $F(1, 30) = 94.86, p < .001$. Overall, 47.5% of all questions related to central aspects of the video were answered correctly, whereas only 8.1% of peripheral questions were answered correctly.

Although the interaction of question focus and post-event information was not found to be significant, $F(2, 30) = .397, p = .676$, participants who received central post-event information answered more central questions correct ($M = 47.9%$) than participants who received peripheral information ($M = 41.7%$). In addition, participants presented with peripheral post-event information answered more peripheral questions correct ($M = 6.3%$) than participants presented with central information ($M = 4.2%$). Unexpectedly, however, participants in the no information condition responded with the highest percent of correct responses for both central ($M = 52.8%$) and peripheral ($M = 13.9%$) questions.

Effect of Background and Post-Event Information on Perceived Guilt. To examine the independent and combined effects of background and post-event information on perceived guilt, a 2 (background: criminal or non-criminal) x 3 (post-event information) ANOVA was performed. The analysis revealed a significant main effect of background, $F(1, 27) = 4.69, p = .039$. Consistent with the effect obtained in study 1, yet contrary to our original predictions, perpetrators previously identified as criminals were viewed as less guilty ($M = 6.22$) than perpetrators who were presented with no criminal past ($M = 4.61$).

Although the interaction did not prove to be significant, $F(2, 27) = 1.02, p = .375$, the pattern of means was consistent with expectations. Participants who received no

post-event information were more biased in their guilt assessments, as criminals were judged as less guilty ($M = 7.00$) than non-criminals ($M = 4.00$), $t(7) = 2.65$, $p = .033$. The observed bias, however, was greatly reduced among participants who were presented with accurate central post-event information. There were thus no significant differences in their judgments of criminals ($M = 4.83$) in comparison to non-criminals ($M = 4.50$), $t(10) = .239$, $p = .816$. Participants who were given accurate peripheral post-event information showed evidence of bias, similar to those who received no information but less pronounced, whereby they judged criminals as less guilty ($M = 6.83$) than non-criminals ($M = 5.33$), $t(10) = 1.27$, $p = .234$.

Discussion

Study 2 was designed to determine whether an activation-based account of memory could sufficiently explain the results obtained in Study 1. The results of the current study indicated that participants again answered more questions related to central aspects of the scene correct than peripheral aspects. The effect of background obtained in study 1, as measured in terms of bias, was also replicated. Specifically, participants again viewed criminals as less guilty than non-criminals. In terms of our main manipulation of post-event information, the data revealed that participants who received no information were more biased in their guilt assessments in comparison to those given accurate central information, who showed no evidence of bias in their responses. Guilt judgments generated by participants presented with accurate peripheral information were characterized by biases similar to those given no information but somewhat less pronounced.

These findings are consistent with an activation-based account of memory (Ayers & Reder, 1998; Lindsay & Johnson, 1989), which when applied to this paradigm would predict that the greater activation of original stored memories, through the presentation of accurate central post-event information, would lead to more accurate unbiased reports. The model also explains the bias observed among participants presented with peripheral post-event information, which would fail to enhance accuracy because these memories were never encoded or stored and therefore can not be activated regardless of repeated stimulation. This lack of a source of memory is a state that would therefore leave memory vulnerable to biases.

The results presented should be interpreted with caution, however, due to the relatively small size of the sample population. Furthermore, while these findings support an activation-based account of memory, they do not rule out motivational influences as an explanation of the effects obtained in Study 1. It is therefore possible that the presence of accurate information contained within positive leading questions in Study 1 served to increase participant motivation to respond accurately to the questions posed, thus resulting in a corresponding increase in accuracy and decrease in bias. Finally, it is important to note that these results shed no additional light on the validity of the memory impairment hypothesis due to the fact that no form of misinformation was incorporated in the design.

General Discussion

The findings of these studies suggest that in the context of eyewitness reports the form in which a question is posed may affect the quantity and content of the information

remembered. In particular, the results indicate that the reinforcement of accurate information, either in the form of leading questions or post-event information, tends to increase accurate perceptions of an event and correspondingly decrease biases. Exposure to true statements embedded in questions or presented as facts influenced the information reported and specifically resulted in the recollection of more event details and unbiased judgments of a perpetrator regardless of criminal history.

In contrast, misinformation, which existed in the form of negative leading questions in Study 1, did not impair memory, a finding that is inconsistent with the general findings in the literature. The absence of a misinformation effect can perhaps be attributed to the nature of the design employed. Lindsay (1990) and others (e.g., Wright, Loftus, & Hall, 2001) have demonstrated that the success with which a misinformation effect can be generated depends on the duration of time that exists between the presentation of the misinformation itself and subsequent attempts to test memory. In the current research, the reliability of memory was tested immediately following the introduction of misinformation, a design in which it is more difficult to generate the intended effect. Regardless, the results obtained provide a new direction for future research, one in which the facilitation of accurate memory, as opposed to the creation of false memories, can be explored.

The theoretical implications of this work address the mechanisms involved in memory and specifically the manner in which accurate memories are stored and recovered. The findings outlined in this paper provide evidence for an activation-based account of memory. Consistent with the theories put forth by Lindsay and Johnson (1989) and Ayers and Reder (1998), I would argue that the reinforcement of accurate information contributes to greater activation of the appropriate source of memory. Consequently, this process leads to an increase in accurate perceptions, a state that limits the opportunity for biases to enter decision-making processes. I must acknowledge, however, that although this explanation is consistent with our findings, it does not represent the only explanation for the obtained effects. As previously discussed, increases in accuracy can be a function of motivational influences which could act to enhance an individual's sense of obligation to respond accurately to the questions posed.

Any interpretation of these findings should also consider the fact that participant responses were based on a video of an ambiguous staged crime, one which participants were informed did not actually occur. Therefore, it is possible that certain effects obtained, and in particular those related to correction processes, were a product of this knowledge and would not be found if the events portrayed were real. It can be argued that participants are more apt to adjust their views and judgments in a direction consistent with social acceptability if they know there will be no real consequences resulting from these actions (Nickerson, Mayo, & Smith, 1986). In these studies, participants may have been motivated to overcorrect for biases in order to be viewed favorably by the experimenter and thus adjusted their responses, which they believed had no implications for real matters of justice.

The findings presented have practical implications for not only interrogation processes but also legal strategies adopted by attorneys. These findings are particularly relevant to law enforcement officials who are responsible for interrogating witnesses in the search for information. In this context, the reinforcement of verified facts related to a case would serve to enhance accurate memories and thus reduce the possibility that

individual biases would infiltrate perceptions of an event. In contrast, the existence of inconsistent facts in interrogation processes or in the courtroom could potentially act as misinformation, which may result in source confusion and thus leave memory vulnerable to the biases. Stereotypes, for instance, have been found to exert a stronger effect in more ambiguous situations when facts surrounding an event are relatively unclear (Duncan, 1976). When presenting a case or closing argument it may therefore be beneficial to reinforce the facts of the case in order to facilitate the retrieval of accurate memories and consequently avoid individual biases from entering into guilt judgments. Costanzo and Peterson (1994) similarly emphasize the importance of the structure and content of closing arguments in guiding juror discretion in the courtroom.

Future research on this topic might potentially explore the mechanisms that underlie the positive effects, in terms of accuracy and reduction of bias, generated by the reinforcement of accurate memory. The design of future studies should not only address activation-based accounts of memory but also should incorporate measures to investigate the role of motivation in facilitating accurate reports. This may be accomplished by employing a design that varies the race and background of a perpetrator and informs certain participants prior to answering cued-recall questions that a reward will be provided for the greatest number of correct responses. This design would allow future researchers to determine whether motivational factors can operate to produce similar effects to those obtained. Also, it is necessary to explore the issues of accuracy and bias in guilt assessment in the context of real crime. Participant responses may be more truthful and therefore more generalizable to real-world situations if they were to witness a real crime and were led to believe that their responses would have real-world implications. Thus, the present research suggests that potentially new insights into memory and bias may play an integral role in understanding the nature of legal decisions.

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Appendix A

General Instructions and Description of the Scene (Black perpetrator)

The short video you are about to watch is a recreation of a typical scene that could potentially play out anywhere on any given day. Pay **CAREFUL** attention to detail, as you will be asked specific questions about what you have seen.

The following is a written description accompanied by a series of diagrams that outlines the movement of characters in the scene over time. You will be given a few minutes to commit this information to memory.

As the scene opens Molly is standing alone on the path. Amanda enters from the left followed by Stephanie and Laura who are walking together. Christine appears from the right and stops to talk with a friend. Jamal is next to enter the scene (from the right) and shortly thereafter Abby enters in the background from the right followed by Sara. Rebecca is last to appear as she enters into the background from the left.

- It is important to note that Molly, the primary female figure in the video, realized that she no longer had her wallet in her possession at the end of the day.

Appendix B

General Instructions and Description of the Scene (White perpetrator)

The short video you are about to watch is a recreation of a typical scene that could potentially play out anywhere on any given day. Pay **CAREFUL** attention to detail, as you will be asked specific questions about what you have seen.

The following is a written description accompanied by a series of diagrams that outlines the movement of characters in the scene over time. You will be given a few minutes to commit this information to memory.

As the scene opens Molly is standing alone on the path. Amanda enters from the left followed by Stephanie and Laura who are walking together. Sara then enters into the background from the right while Christine, who also appears from the right, has stopped to talk with a friend. Jeremy is next to appear (from the right) and shortly thereafter Abby enters in the background also from the right. Rebecca is last to appear as she enters into the background from the left.

- It is important to note that Molly, the primary female figure in the video, realized that she no longer had her wallet in her possession at the end of the day.

Appendix C

Background Information (Black criminal)

This background information pertains to the male figure that will appear in the video you will subsequently view:

Name: Jamal Miller

Age: 20

Height: 5'8"

Weight: 185 lbs

Eyes: Brown

Personal History: Jamal was born in New York City where he was raised by his mother and father. His family, which also encompasses two older sisters and a younger brother, resides in a middle-class neighborhood. His father is a professor and his mother, formerly a nurse, left her job years ago in order to be home with her children. Jamal attended public schools throughout the duration of his youth where he was generally regarded as an average student who occasionally showed promise but was too often distracted by outside influences such as sports and other social endeavors. Jamal currently attends a state university, and although he is unsure of exactly what he wants to pursue in the future, he is enrolled in classes necessary to graduate with a degree in history. Jamal has in recent years become acquainted with the criminal justice system having been sentenced to probation and community service for a charge of drug possession that was brought against him as a minor.

Appendix D

Background Information (Black Non-Criminal)

This background information pertains to the male figure that will appear in the video you will subsequently view:

Name: Jamal Miller

Age: 20

Height: 5'8"

Weight: 185 lbs

Eyes: Brown

Personal History: Jamal was born in New York City where he was raised by his mother and father. His family, which also encompasses two older sisters and a younger brother, resides in a middle-class neighborhood. His father is a professor and his mother, formerly a nurse, left her job years ago in order to be home with her children. Jamal attended public schools throughout the duration of his youth where he was generally regarded as an average student who occasionally showed promise but was too often distracted by outside influences such as sports and other social endeavors. Jamal currently attends a state university, and although he is unsure of exactly what he wants to pursue in the future, he is enrolled in classes necessary to graduate with a degree in history. Jamal has in the past been a lawful citizen and has on no occasion been involved in any illegal activity.

Appendix E

Background Information (White Criminal)

This background information pertains to the male figure that will appear in the video you will subsequently view:

Name: Jeremy Miller

Age: 20

Height: 5'10"

Weight: 175 lbs

Eyes: Blue

Personal History: Jeremy was born in New York City where he was raised by his mother and father. His family, which also encompasses two older sisters and a younger brother, resides in a middle-class neighborhood. His father is a professor and his mother, formerly a nurse, left her job years ago in order to be home with her children. Jeremy attended public schools throughout the duration of his youth where he was generally regarded as an average student who occasionally showed promise but was too often distracted by outside influences such as sports and other social endeavors. Jeremy currently attends a state university, and although he is unsure of exactly what he wants to pursue in the future, he is enrolled in classes necessary to graduate with a degree in history. Jeremy has in recent years become acquainted with the criminal justice system having been sentenced to probation and community service for a charge of drug possession that was brought against him as a minor.

Appendix F

Background Information (White Non-Criminal)

This background information pertains to the male figure that will appear in the video you will subsequently view:

Name: Jeremy Miller

Age: 20

Height: 5'10"

Weight: 175 lbs

Eyes: Blue

Personal History: Jeremy was born in New York City where he was raised by his mother and father. His family, which also encompasses two older sisters and a younger brother, resides in a middle-class neighborhood. His father is a professor and his mother, formerly a nurse, left her job years ago in order to be home with her children. Jeremy attended public schools throughout the duration of his youth where he was generally regarded as an average student who occasionally showed promise but was too often distracted by outside influences such as sports and other social endeavors. Jeremy currently attends a state university, and although he is unsure of exactly what he wants to pursue in the future, he is enrolled in classes necessary to graduate with a degree in history. Jeremy has in the past been a lawful citizen and has on no occasion been involved in any illegal activity.

Appendix G

Background Information (Female)

This background information pertains to the central female figure that will appear in the video you will subsequently view:

Name: Molly Rhodes

Age: 19

Height: 5'4''

Weight: 125 lbs

Eyes: Green

Personal History: Molly was born in Seattle where she was raised predominantly by her mother after her parents divorced when she was young. Molly has no siblings but is extremely close to members of her extended family and a selective group of friends. Her mother, who works as a librarian, moved to Boston after Molly decided to enroll at a university on the east coast. Molly is majoring in journalism and aspires to be a writer for a mainstream newspaper. She has a deep passion for music and dedicates a substantial amount of her free time to the study of the piano. Molly is also a stellar athlete, excelling at both tennis and golf.

Appendix H
Neutral Questions (Black Perpetrator)

Sex M _____ F _____

Please respond to the following questions pertaining to the scene. If you are unsure of answer, write “uncertain”.

- 1) Was Jamal wearing glasses?

- 2) What was the composition of the building in the background?

- 3) What was Rebecca doing in the scene?

- 4) On a scale of 1 to 10, 1 being most improper and 10 not improper at all, rate the appropriateness of the male figure’s behavior
1 2 3 4 5 6 7 8 9 10

- 5) Was there a car parked directly behind the garbage bin?

- 6) What color was Molly’s bag?

- 7) Did either Laura or Stephanie place their hands in their coat pockets?

- 8) What was leaning against the building in the background?

- 9) On a scale of 1 to 10, 1 being most definitely guilty and 10 most definitely innocent, indicate your impression of the male in the video
1 2 3 4 5 6 7 8 9 10

- 10) Did Jamal take any item(s) that fell from Molly’s bag?

- 11) In what order did Molly, Amanda, and Christine exit the scene?

- 12) What color jacket was Sara wearing?

- 13) Was Jamal wearing gloves?
- 14) Which two individuals were engaged in an animated discussion?
- 15) On a scale of 1 to 10, 1 being most likely and 10 being most unlikely, indicate the likelihood that Jamal took an item from Molly's bag
- 1 2 3 4 5 6 7 8 9 10
- 16) What color was the hood laying on the exterior of Jamal's jacket?
- 17) What was Abby doing in the scene?
- 18) What color was the jacket hanging from the item that was leaning against the building?

Appendix I
Positive Leading Questions (Black Perpetrator)

Sex M _____ F _____

Please respond to the following questions pertaining to the scene. If you are unsure of answer, write "uncertain".

1) Didn't you see Jamal wearing glasses?

2) Didn't you see a stone building in the background?

3) What was Rebecca doing in the scene?

4) On a scale of 1 to 10, 1 being most improper and 10 not improper at all, rate the appropriateness of the male figure's behavior

1 2 3 4 5 6 7 8 9 10

5) Didn't you see a maroon car parked directly behind the garbage bin?

6) Didn't you see Molly carrying a black bag?

7) Did either Laura or Stephanie place their hands in their coat pockets?

8) Didn't you see a bike leaning against the building in the background?

9) Didn't you see Jamal take an item that had fallen from Molly's bag?

10) In what order did Molly, Amanda, and Christine exit the scene?

11) Didn't you see Sara wearing a red jacket?

12) On a scale of 1 to 10, 1 being most definitely guilty and 10 most definitely innocent, indicate your impression of the male in the video

1 2 3 4 5 6 7 8 9 10

13) Didn't you see Jamal wearing gloves?

14) Which two individuals were engaged in an animated discussion?

15) Didn't you see a blue hood lying on the exterior of Jamal's jacket?

16) What was Abby doing in the scene?

17) Didn't you see a red jacket hanging from the item that was leaning against the building?

Appendix J

Negative leading questions (Black Perpetrator)

Sex M _____ F _____

Please respond to the following questions pertaining to the scene. If you are unsure of answer, write “uncertain”.

- 1) Didn't you see a green car parked directly behind the garbage bin?
- 2) Didn't you see a brick building in the background?
- 3) What was Rebecca doing in the scene?
- 4) On a scale of 1 to 10, 1 being most improper and 10 not improper at all, rate the appropriateness of the male figure's behavior
1 2 3 4 5 6 7 8 9 10
- 5) Didn't you see Molly carrying a blue bag?
- 6) Didn't you see Jamal wearing a hat?
- 7) Did either Laura or Stephanie place their hands in their coat pockets?
- 8) Didn't you see a bag leaning against the building in the background?
- 9) On a scale of 1 to 10, 1 being most definitely guilty and 10 most definitely innocent, indicate your impression of the male in the video
1 2 3 4 5 6 7 8 9 10
- 10) Didn't you see Jamal take an item that had fallen from Molly's bag?
- 11) In what order did Molly, Amanda, and Christine exit the scene?

12) Didn't you see Sara wearing a yellow jacket?

13) Didn't you see Jamal carrying a backpack?

14) Which two individuals were engaged in an animated discussion?

15) On a scale of 1 to 10, 1 being most likely and 10 being most unlikely, indicate the likelihood that Jamal took an item from Molly's bag

1 2 3 4 5 6 7 8 9 10

16) Didn't you see a red hood lying on the exterior of Jamal's jacket?

17) What was Abby doing in the scene?

18) Didn't you see a blue jacket hanging from the item that was leaning against the building?

Appendix K
Neutral Questions (White Perpetrator)

Sex M _____ F _____

Please respond to the following questions pertaining to the scene. If you are unsure of an answer, write “uncertain”.

- 1) What color was Jeremy’s hair?

- 2) What was the composition of the building in the background?

- 3) What was Rebecca doing in the scene?

- 4) On a scale of 1 to 10, 1 being most improper and 10 not improper at all, rate the appropriateness of the male figure’s behavior

1 2 3 4 5 6 7 8 9 10

- 5) Was there a car parked directly behind the garbage bin?

- 6) What color was Molly’s bag?

- 7) Did either Laura or Stephanie place their hands in their coat pockets?

- 8) What was leaning against the building in the background?

- 9) On a scale of 1 to 10, 1 being most definitely guilty and 10 most definitely innocent, indicate your impression of the male in the video

1 2 3 4 5 6 7 8 9 10

- 10) Did Jeremy take any item(s) that fell from Molly’s bag?

- 11) In what order did Molly, Amanda, and Christine exit the scene?

12) What color jacket was Sara wearing?

13) What was Amanda carrying?

14) Which two individuals were engaged in an animated discussion?

15) On a scale of 1 to 10, 1 being most likely and 10 being most unlikely, indicate the likelihood that Jeremy took an item from Molly's bag

1 2 3 4 5 6 7 8 9 10

16) What item(s) fell out of Molly's bag?

17) What was Abby doing in the scene?

18) What color was the jacket hanging from the item that was leaning against the building?

Appendix L
Positive Leading Questions (White Perpetrator)

Sex M _____ F _____

Please respond to the following questions pertaining to the scene. If you are unsure of answer, write “uncertain”.

1) Didn't you see an empty parking space directly behind the garbage bin?

2) Didn't you see a stone building in the background?

3) What was Rebecca doing in the scene?

4) On a scale of 1 to 10, 1 being most improper and 10 not improper at all, rate the appropriateness of the male figure's behavior

1 2 3 4 5 6 7 8 9 10

5) Didn't you see Molly carrying a black bag?

6) Didn't Jeremy have blonde hair?

7) Did either Laura or Stephanie place their hands in their coat pockets?

8) Didn't you see a bike leaning against the building in the background?

9) Didn't you see Jeremy take an item that had fallen from Molly's bag?

10) In what order did Molly, Amanda, and Christine exit the scene?

11) Didn't you see Sara wearing a red jacket?

12) On a scale of 1 to 10, 1 being most definitely guilty and 10 most definitely innocent, indicate your impression of the male in the video

1 2 3 4 5 6 7 8 9 10

13) Didn't you see Amanda carrying a burgundy purse?

14) Which two individuals were engaged in an animated discussion?

15) Didn't you see a water bottle fall out of Molly's purse?

16) What was Abby doing in the scene?

17) Didn't you see a red jacket hanging from the item that was leaning against the building?

Appendix M
Negative Leading Questions (White Perpetrator)

Sex M _____ F _____

Please respond to the following questions pertaining to the scene. If you are unsure of answer, write “uncertain”.

- 1) Didn't you see a green car parked directly behind the garbage bin?

- 2) Didn't you see a brick building in the background?

- 3) What is Rebecca doing in the scene?

- 4) On a scale of 1 to 10, 1 being most improper and 10 not improper at all, rate the appropriateness of the male figure's behavior
1 2 3 4 5 6 7 8 9 10

- 5) Didn't you see Molly carrying a blue bag?

- 6) Didn't Jeremy have brown hair?

- 7) Did you see Laura or Stephanie place their hands in their coat pockets?

- 8) Didn't you see a bag leaning against the building in the background?

- 9) On a scale of 1 to 10, 1 being most definitely guilty and 10 most definitely innocent, indicate your impression of the male in the video
1 2 3 4 5 6 7 8 9 10

- 10) Didn't you see Jeremy take an item that had fallen from Molly's bag?

- 11) In what order did Molly, Amanda, and Christine exit the scene?

- 12) Didn't you see Sara wearing a yellow jacket?

13) Didn't you see Amanda carrying a backpack?

14) Which two individuals were engaged in an animated discussion?

15) On a scale of 1 to 10, 1 being most likely and 10 being most unlikely, indicate the likelihood that Jeremy took an item from Molly's bag

1 2 3 4 5 6 7 8 9 10

16) Didn't you see a calculator fall out of Molly's purse?

17) What is Abby doing in the scene?

18) Didn't you see a blue jacket hanging from the item that is leaning against the building?

