The Effect of Timing of the Cognitive and Standard Interviews on Memory Retrieval of a Previously Witnessed Event

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INTRODUCTION

Twenty-five people were killed when a commuter train collided with a Union Pacific freight train near Los Angeles in September of 2008. Because of the pending millions of dollars in lawsuits, investigators had to determine whether the conductor of the commuter train passed legally through a green light as four eyewitnesses maintained, or if he drove through a red light distracted by sending and receiving text messages. The conductor had been killed and there were no cameras in the vicinity of the conductor, so eyewitnesses had to be relied upon to provide an accurate account of what occurred. After an extensive investigation, authorities decided that the light was red and the conductor was sending and receiving text messages, thus claiming that the eyewitnesses were wrong. How could it be possible that all four eyewitnesses-another conductor, a security guard, and two passengers-were incorrect in providing one crucial detail? The answer is that eyewitnesses can make mistakes, all of them can be wrong, and their erroneous testimony can have serious consequences on a criminal investigation (Frenda, Nichols, & Loftus, 2011).

Experimental psychologists have been extremely interested over the last several years as to how and why memory fails (Loftus & Pickrell, 1995). Numerous studies have been performed and have documented "how our memories can be disrupted by things we experienced earlier (proactive interference) or things that we experienced later (retroactive interference)" (Loftus & Pickrell, 1995, p. 720). Since there is evidence that memories in fact can be disrupted, the question that remains is exactly what factors or circumstances lead to distortion of memory? First, a witness's report may be altered due to normative social influence in which "a witness may decide that the cost of disagreeing with law enforcement-or with other witnesses-is too high, and so he adjusts his report accordingly" (Frenda, Nichols, & Loftus, 2011, p. 20). This phenomenon is also known as memory conformity or social contagion of memory, and is an important factor to consider when there are multiple witnesses to an event, as seen with the train collision in Los Angeles (Wright, Memon, Skagerberg, & Gabbert, 2009). Second, informational influence can lead to memory distortion in that an eyewitness weighs the relative likelihood of another eyewitness being correct versus oneself being correct (Wright, Memon, Skagerberg, & Gabbert, 2009). In other words, "if the one person had a better view, has better memory in general, or is more confident, one is likely to believe that the other person's memory is correct" (Wright, Memon, Skagerberg, & Gabbert, 2009, p. 175). Lastly, memory can be distorted by direct input from another eyewitness in which "people can remember seeing information which they only heard from another eyewitness" (Wright, Memon, Skagerberg, & Gabbert, 2009, p. 175).

The previous examples show how multiple eyewitnesses can have an impact on one's memory and ultimately distort it; however, there are several factors other than multiple eyewitnesses that can lead to the formation of distorted or false memory as well. If a witness is exposed to misleading or incorrect information about an event then the misinformation may become a part of the actual memory, known as the misinformation effect. The formation of distorted memories due to the misinformation effect has interested memory researchers for over a quarter century. In a typical three-stage misinformation effect study done by Okado and Stark (2005), the subjects witnessed an event of a man stealing a girl's wallet. Next, some of the subjects got misinformation about the event, such as the girl's arm getting hurt in the process (when in reality, it was her neck that was injured). Finally, subjects were asked to recall the original event in as much detail as possible. Many of the subjects claimed that they saw the misinformation details in the actual event in which they remembered seeing the girl's arm being hurt and not her neck. Overall, the study showed that misinformation was remembered as being part of the subjects' original memory 47% of the time, thus suggesting that distorted memories can be formed when witnesses are exposed to misinformation after the actual event has occurred (Loftus, 2005).

Since misinformation effects have been shown to have a considerable impact on memory, does the misinformation impair or completely alter the original memory? Or does the misinformation cause retrieval impairment, thus making it difficult for the original memory to be accessible? McCloskey and Zaragoza (1985) argued that "misinformation has no effect on the original event memory," but rather it "merely influences the reports of subjects who never encoded (or for other reasons can't recall) the original event" (p. 2). To support their position, subjects

witnessed an event in which a burglar used a hammer to break into a house. Subjects were then exposed to misinformation (burglar used screwdriver instead of hammer) and were asked whether the burglar used a hammer or screwdriver. Many of the subjects selected screwdriver, thus producing the usual misinformation effect. In McCloskey and Zaragoza's "modified test," the subjects had to choose between a hammer (true item) and a wrench (novel item). With the modified test, subjects were very good at choosing the true item (hammer) over the novel item (wrench) even after being exposed to misinformation, thus suggesting that the misinformation effect does not directly impair memory at all. In contrast to this view, other studies have suggested that small misinformation effects have been obtained when a "modified test" is used, therefore indicating that there may be alteration to the original memory as well. Either way, the misinformation effect can distort an eyewitness's statement about an event that had previously occurred (Loftus, 2005).

Based on the research that shows false memories can form through misinformation effects and how false memories can have serious consequences in a criminal investigation there has been a demand for researchers to find a way to diminish or deter misinformation effects. Geiselman, Fisher, Cohen, Holland, and Surtes (1984) developed a memory retrieval procedure known as the cognitive interview, which is supposed to help witnesses report a more accurate account of what they had witnessed by reducing the misinformation effect. The cognitive interview includes four general retrieval techniques: (a) mentally reconstructing the environment and the personal/emotional state that existed at the time of the crime; (b) reporting everything, even partial information, regardless of the perceived importance of the information; (c) recounting the events in a variety of temporal orders; and (d) reporting the events from a variety of perspectives. The first two components of the cognitive interview (mental reconstruction, report everything) are used to increase the overlap between the event and memory retrieval techniques. In other words, mental reconstruction and report everything are meant to make it easier for the witness to recall the actual event and provide more correct information. The next two components (changing order of events, report from a variety of perspectives) are methods that encourage using many memory access routes, thus helping the witness report a much more accurate account of the event. All of these components put together to form the cognitive interview are believed to help deter misinformation effects and provide more accurate information of an event than a standard police interview (Geiselman et al., 1986).

In several studies conducted using the cognitive interview, the results have suggested that the cognitive interview yields more correct reporting of information than a standard police interview. For example, Geiselman, Fisher, MacKinnon, and Holland (1985) had students watch a short film, and then the students were separated into two groups with one group receiving the cognitive interview and the second group receiving a standard interview. The results showed that the cognitive interview elicited 35% more correct information from participants without an increase in errors, compared to the standard interview. Centofanti and Reece (2006) further tested the effectiveness of the cognitive interview after participants had been exposed to misinformation about an event. In this study, 40 participants watched a short film depicting a bank robbery, were given a passage to read that included misinformation or neutral information, and then were given either a cognitive interview or a standard interview. The information participants provided in the interview was scored as either correct (statement is consistent with the film), incorrect (statement contains misinformation from passage), or confabulation (statement was neither present in film nor passage). The results of the experiment showed that participants who received the cognitive interview reported more correct information after receiving misinformation than participants who received the standard interview. Interestingly, the cognitive interview yielded more incorrect responses after participants had received misinformation than the standard interview. Even so, the cognitive interview has been shown to provide significantly more correct information than the standard interview after witnesses had been exposed to misinformation.

In further research involving the cognitive interview, Holliday et al. (2012), conducted a study to determine whether the cognitive interview deterred misinformation that had been presented immediately following an event. In this study, participants watched a short film of a staged crime and subsequently were given a post event narrative that provided correct and incorrect information. Participants then received the cognitive interview or a standard interview followed by a recognition memory test. The results showed that the cognitive interview yielded more correct responses and improved overall accuracy of the event than the standard interview, thus suggesting that the cognitive interview was a better deterrent to misinformation effects than the standard interview. Prescott, Milne, and Clarke (2011) also studied the effectiveness of the cognitive interview after a

significant delay between witnessing the event, and receiving the interview. This study differs from previous studies in that it does not focus on how well the cognitive interview deters misinformation effects, but rather on the impact of the timing of the cognitive interview on its overall effectiveness compared to a structured or standard interview. In this study, participants watched a short film of a crime and participants experienced a 1.5 hour delay between witnessing the event and receiving the interview. Participants received either the cognitive interview or the standard interview after the 1.5 hour delay had elapsed. The results showed that the cognitive interview significantly increased correct recall without increasing the amount of incorrect or confabulated information compared to the standard interview. Furthermore, the cognitive interview enhanced memory for conversation gist, and action detail meaning that participants were more descriptive in their responses during the cognitive interview than during the standard interview. The results of this study suggest that given the 1.5 hour delay, the cognitive interview still can be more effective than a standard interview.

The focus of the current study was the timing of the cognitive interview and the impact on its overall effectiveness. Specifically, is the cognitive interview more effective in deterring misinformation effects the sooner it is performed? Or does it lose its effectiveness after considerable time has passed from witnessing the event and receiving misinformation, to the interview? Memon, Zaragoza, Clifford, and Kidd (2010) conducted a study specifically looking at the timing of the cognitive interview and how effective it was in deterring misinformation effects. Participants watched a short film and were either given the cognitive interview prior to receiving misinformation, or after receiving misinformation. By doing this, Memon et al. (2010) were attempting to see if the cognitive interview was more effective in deterring misinformation in the future (if the cognitive interview was given before the misinformation), or if it was more effective in deterring misinformation that had already been presented. The results showed that the cognitive interview given after the presentation of misinformation yielded more correct responses than the cognitive interview given before the presentation of misinformation, thus suggesting that the cognitive interview is more effective after the presentation of misinformation. In the present study, timing served as the independent variable just as it was by Memon et al. (2010); however, the present study looked at the timing of the cognitive interview only after the presentation of misinformation. All of the previously mentioned studies looked at the effectiveness of the cognitive interview after the presentation of misinformation, but none of the studies used timing of the cognitive interview as a manipulation. Misinformation was presented in the form of a narrative, in which participants read a paragraph describing the events in the video. The narrative contained both misinformation (facts that did not occur) and correct information. Participants were then given either the cognitive interview or the standard interview at different time periods after reading the narrative. Thus, the type of interview (cognitive or standard) was the second independent variable and the results of the two interviews were compared. Therefore, the present study aimed to get a better understanding of the cognitive interview and how effective it was in deterring misinformation across different lengths of time, while also seeing if it facilitated better recall of correct information compared to the standard interview.

Several studies have been conducted in which timing or delay has been used as the independent variable to see the different impacts the delay interval has on memory recall. Egan, Pittner, and Goldstein (1977) conducted a study in which participants witnessed an event and were asked to identify the suspect in the event two days, 21 days, or 56 days after witnessing the event. The results of the study found that there were no significant decreases in providing correct identifications over the delay; however, the rate of providing a misidentification increased from 2 days (48%) to 21 days (62%) to 56 days (93%). Cutler, Penrod, O'Rourke, and Martens (1986) conducted a similar study in which timing or delay served as the independent variable (7-28 days) in which participants were asked to identify the suspect of a crime they had previously witnessed. The results found a significant main effect of delay on identification accuracy, in which participants were more likely to make a correct decision after seven days than after 28 days. Therefore, Egan et al. (1977) showed that participants are more likely to provide more misinformation as the delay increases, whereas Cutler et al. (1986) showed that participants are more likely to provide more correct information the sooner they are asked to recall (Dysart & Lindsay, 2007).

Given evidence that the cognitive interview is a better deterrent of misinformation over the standard interview in general, it was hypothesized that there would be a main effect for interview type such that the cognitive interview would yield more correct statements and less incorrect, confabulated, and misinformation statements than the standard interview. Furthermore, based on evidence on delay on memory, it was hypothesized that there would be a main effect for timing such that receiving the interview sooner after the presentation of misinformation rather than later would yield more correct details and a decrease in the number of incorrect, confabulated, and misinformation

statements. Lastly, it was hypothesized that there would be an interaction between type of interview and timing of the interview such that the cognitive interview given immediately after the presentation of misinformation would yield more correct statements and a decrease in incorrect, confabulated, and misinformation statements than the cognitive interview given later after the presentation of misinformation. The cognitive interview given sooner would also yield more correct statements and less incorrect, confabulated, and misinformation statements than the standard interview regardless of the timing. Therefore, it is hypothesized that there would be a significant interaction between the two independent variables.

Methods

Participants A total of 20 (N=20) male students were recruited from psychology classes and fraternities at Hampden-Sydney College. Participants who were in the psychology courses received extra credit for their participation while the participants in the fraternities did not receive extra credit.

Materials and Procedure A 2 x 2 between subjects factorial design was used where timing of interview (immediately after presentation of misinformation or 1 week later) and type of interview (standard or cognitive) served as the independent variables. All participants were assigned to one of the four different groups and informed that the purpose of the present study was to analyze the formation of memory of a previously witnessed event through two different modalities (visually, in writing). Participants were first read an introductory narrative (see Appendix A) that set the stage for the video they were about to view. A two minute and thirteen second video was shown to the participants to serve as the witnessed event in which a group of four teenagers shot a man in a parking lot with a rifle, and threw the man's body and murder weapon into a nearby lake. Also, the teenagers pushed the victim's white van into the lake before departing as well. After the film was shown, participants were asked to read a narrative written by the cameraman of the video (the eyewitness) describing the events from the video. Unbeknownst to the participants, the narrative (see Appendix B) contained three pieces of misinformation in which the number of teenagers or suspects (five instead of four), the actions of the victim when the suspects arrived (got out of his car but he was already out of his car when the teenagers arrived), and the murder weapon used (pistol instead of rifle) were manipulated.

After reading the misinformation narrative, participants either received a redacted cognitive interview (report everything, place events in reverse order) or the standard interview (see Appendix C and D) immediately after reading the narrative or one week after reading it. All of the participants were asked to answer the questions as accurately and descriptively as they could based on what they could remember from the video. The participants who were asked to come back one week later were told that it was necessary for them to return to answer some questions relating to the events they had witnessed. The statements given by the participants during the interview process were recorded and scored as correct, incorrect, confabulation, or misinformation (related directly to the misinformation in the passage). For example, the statement "The suspects' vehicle was blue and four people got out of the car" received one correct point for identifying the color of the vehicle (blue) and one correct point identifying the number of suspects (four). If the participant stated "The color of the suspects' vehicle was green..." they were assessed one incorrect point. A confabulation point was scored if an entire statement was neither present in the video nor in the misinformation narrative. For example, the statement "After killing the victim, all of the suspects jumped up and down" was assessed one confabulation point since it didn't appear in the video or the narrative. If the participant stated that there were five teenagers or suspects for example, this was scored as a misinformation statement because it directly related to the misinformation presented in the passage. Lastly, if the participant responded with "I don't know" to any of the questions, that response was assessed as one incorrect point. To specifically investigate whether the cognitive interview helped deter the misinformation effect better than the standard interview, the target items (number of suspects, actions of the victim when the teenagers arrived, and the murder weapon) were scored separately as correct or incorrect.

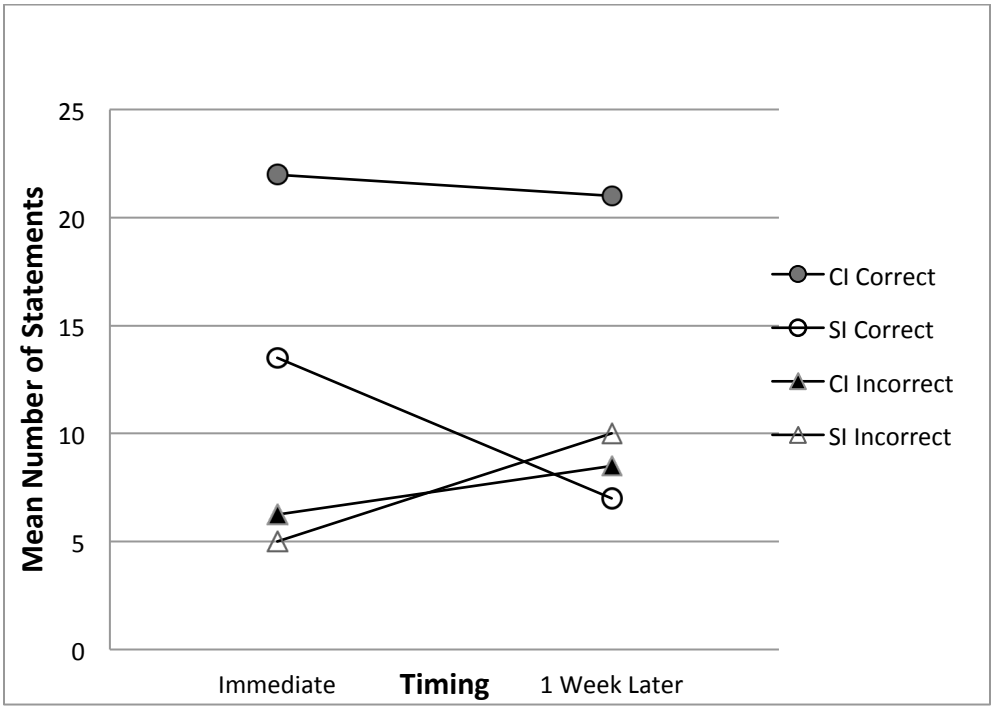

Figure 1: Mean Number of Correct and Incorrect Statements for the Cognitive and Standard Interviews as a Function of Time

Results

Separate 2 x 2 factorial ANOVAS (analyses of variance) were performed on data for correct and incorrect statements with both type of interview (cognitive and standard) and timing of interview (immediate and one week later) treated as between groups variables. As shown in Figure 1, the cognitive interview resulted in a significantly higher number of correct statements over the standard interview in both the immediate and one week later conditions. The number of correct statements for both interviews did decrease over time however, the standard interview showed a larger decrease in correct statements over time than the cognitive interview. First, the data for the number of correct statements were analyzed in which a significant main effect was found for the type of interview, $F(1, 16)=19.757$, $p<.05$, such that the cognitive interview resulted in significantly more correct statements than the standard interview. There was no significant main effect or interaction for the timing of the interview in regard to the number of correct statements. Interestingly, the number of incorrect statements was slightly higher for the cognitive interview in the immediate condition; however, the standard interview resulted in a higher number of incorrect statements in the one week later condition over the cognitive interview. Second, the data for the number of incorrect statements were analyzed and found a significant main effect for timing of interview, $F(1 ,16)= 48.05$, $p<.05$, such that the immediate interview resulted in significantly less incorrect statements than the interview given one week later. No analysis was conducted on the data for misinformation and confabulation statements due to the low number of statements given for each of these variables. Out of the 20 participants, only a total of four confabulation statements were made while only 25 misinformation statements were made. Due to the low number of statements, it was not necessary to conduct analysis on the data for confabulation and misinformation statements.

When looking at the data in Figure 1, it is clear that there were many more correct statements provided for the cognitive interview than for the standard interview; however, this result may have been due to the fact that participants in the cognitive interview had more opportunity to provide correct statements than participants in the standard interview due to the unstructured nature of the cognitive interview, perhaps skewing the results. As a way of adjusting for this confound, the proportion of correct statements was calculated for both the cognitive and standard interviews in the immediate and one week later conditions. The proportion of correct statements was determined by dividing the number of correct statements by the total number statements (correct plus incorrect) for each participant. It was believed

that this would be a more comparable measure of memory performance for the two interview types. The cognitive interview slightly has a higher proportion of correct statements than the standard interview in the immediate condition, but in the one week later condition, it is clear the cognitive interview results in a significantly higher proportion of correct statements over the standard interview. Analysis on the proportion of correct statements found a significant main effect for the type of interview, $F(1,16)= 14.86$, $p< .05$, and for the timing of interview, $F(1,16)= 16.06$, $p< .05$, such that the cognitive interview had a significantly higher proportion of correct responses than the standard interview whereas the immediate interview resulted in a higher proportion of correct responses than the interview given one week later. Furthermore, analysis also found a significant interaction, $F(I,16)= 4.67$, $p<.05$, for the type of interview and timing of interview. To further understand the interaction, pairwise comparisons were made between the means for the cognitive and standard interviews in the immediate and one week later conditions, using a Newman-Keuls' test. There was no difference in the means of the cognitive interview in the immediate and one week later conditions, thus suggesting that the proportion of correct statements doesn't change over time for participants who received the cognitive interview. There was, however, a significant difference ($p<.05$) between the means of the standard interview in the immediate and one week later conditions in which the proportion of correct statements was significantly lower in the one week later condition compared to the immediate condition. Interestingly, there was no significant difference found between the means of the cognitive and standard interviews for the proportion of correct statements in the immediate condition; however, a significant difference ($p<.05$) was found between the means in the one week later condition. This finding suggests that when given immediately, the cognitive and standard interviews will result in a similar proportion of correct statements; however as time progresses, the standard interview results in a significantly lower proportion of correct statements compared to the cognitive interview. Therefore, the interaction is driven by the difference of means for the cognitive and standard interviews in the one week later condition.

Discussion

The first aim of the present study was to determine if the cognitive interview would be able to overcome the misinformation effect and produce more accurate recall compared to the standard interview. The second aim of the study was to determine if an immediate interview would lead to more accurate recall compared to a delayed interview. The hypothesis that participants who received the cognitive interview would produce a higher proportion of correct statements than the standard interview was supported. Participants in the cognitive interview condition produced significantly more correct statements over participants in the standard interview condition regardless of time, thus suggesting that the cognitive interview serves as a better deterrent to the formation of false memories. The hypothesis that participants who received the immediate interview would produce a higher proportion of correct statements than participants who received the interview one week later after the presentation of misinformation also was supported. A significantly higher number of correct statements were provided by participants in the immediate interview condition than participants in the one week later condition regardless of interview type, thus suggesting that an immediate interview will be more likely to prevent misinformation from consolidating into a witnesses' memory than a later interview. Furthermore, the hypothesis that an interaction between type of interview and timing of interview was supported in that the immediate cognitive interview yielded the highest proportion of correct responses and the standard interview given one week later yielded the lowest proportion of correct responses out of the remaining two conditions (cognitive interview one week later, standard interview immediate). Finally, the hypotheses that there would be a significant main effect for type of interview and timing of interview on the number of confabulation and misinformation statements were not supported. As stated earlier, due to the low number of confabulation and misinformation statements provided, it is not clear whether or not the cognitive interview serves as a better deterrent of providing confabulation and misinformation statements over the standard interview; however, it is clear that the misinformation passage was not as effective as predicted in causing participants to produce misinformation and confabulation statements.

The findings of the present study support the findings of previous research, such as a study conducted by Kohnken, Schimossek, Aschermann, and Hofer (1995) in which the cognitive interview yielded a higher number of correct details as compared to a structured or standard interview even after the presentation of misinformation; however, Kohnken et. al. (1995) did find that the cognitive interview resulted in a significantly higher number of confabulation statements than the standard interview. This finding is not consistent with the present study in

that there were no differences in the number of confabulations as a function of treatment conditions. Dornburg and McDaniel (2006) also found findings consistent with the present study in that the cognitive interview effectively increased older adults' recall of specific events as compared to the standard interview. Interestingly, Dornburg and McDaniel (2006) also found the cognitive interview provided more accurate recall over the standard interview even after a three week delay. While the delay in the present study is much shorter than the delay seen by Dornburg and McDaniel (2006), the premise that the cognitive interview results in more accurate recall after a delay compared to the standard interview is still supported.

Based on prior research and the present study, it is clear that the cognitive interview is able to overcome or deter misinformation and lead to more accurate recall compared to the standard interview in both the immediate condition and the delayed condition. As demonstrated in the present study and previous studies looking at the misinformation effect and cognitive interview, there are several reasons as to why the cognitive interview may be a better deterrent of misinformation. One explanation as to why the cognitive interview facilitates more accurate recall than the standard interview is that the cognitive interview requires the witness to think more in depth about the event they had witnessed than the standard interview. For example, when a witness is asked to report freely everything he or she can possibly remember about the event, the witness is required to think in depth and systematically walk through each part of the memory of the event from beginning to end. In doing so, the witness is more likely to accurately remember the event because it would "encourage the activation of cues relevant to the original source of the correct memory from the video footage" (Centofanti & Reece, 2006, p. 679). In the standard interview, however, the witness is just asked to remember one specific part of the memory for the event at a time. Since the standard interview does not require as much in depth thought at the cognitive interview, activation of relevant cues to the original source (video) of the correct memory is less likely. Therefore, witnesses who receive the cognitive interview are more likely to produce accurate statements than witnesses who receive a standard interview.

Trace competition may be another explanation of the results which is when two memory traces of the event exist (the original information and post-event information) and the misleading post-event information is retrieved because it is the most recent (Centofanti & Reece, 2006). The cognitive interview, however, appears to eliminate the trace competition because it specifically asks participants to report everything only based on what they remember from the video (original correct source) and not recall from the misinformation narrative (most recent incorrect information). In other words, the cognitive interview increases the strength of the original memory trace associated with the video footage whereas the standard interview does not. In essence, the cognitive interview is protecting the witnesses from this trace competition between the correct information and the misleading information which results in a higher number of correct statements compared to the standard interview. In regard to the timing of the interviews, the delayed interview may have resulted in fewer correct statements than the immediate interview due to general memory decay. Participants who received the interview one week later may have simply forgotten some of the smaller details of the video over the course of a week which ultimately led them to make fewer correct statements. In contrast, participants who received the immediate interviews made more correct statements because the details of the video were "fresh" in their mind and general memory decay was not an issue (Centofanti & Reece, 2006).

While the study does show the cognitive interview to be superior to the standard interview, and immediate interviews to be superior to those done one week later, there are some limitations to the study. As stated earlier, one limitation is that the participants in the cognitive interview have more opportunity to give correct statements than participants in the standard interview due to the open ended questions in the cognitive interview. For example, a participant in the cognitive interview can talk about the plants, the lake, the parking lot, etc. in the video and get correct points based on their statements whereas participants in the standard interview are not asked questions related to the plants, parking lot, or lake. Therefore, the cognitive interview creates more opportunity to make correct statements while the standard interview has a ceiling effect to the number of correct statements. This limitation, however, is controlled by analyzing the proportion of correct statements for both interviews because it focuses on the accuracy of each interview without consideration to the number of correct statements. Another limitation of the study is there is no delay between reading the misinformation passage and receiving the interview for participants in the immediate interview. The fact that there is essentially no delay for participants in the immediate interview condition may explain why there is a significant difference in the proportion of correct statements. The details of the video are so "fresh" in their minds that it is easy for them to make correct statements even after reading the misinformation passage. In contrast, for the participants receiving the interview one week later, the information is not "fresh" and they are less able to accurately remember details

from the video. Implementing a "filler task" such as a crossword puzzle between the misinformation passage and the interview could mitigate this procedural concern because it would create some delay and make the results between the immediate and delayed interview conditions much more comparable. Moreover, doing so increases the external validity of the study because in real criminal investigations there is always some sort of delay between witnessing the event and when police are able to interview witnesses. Lastly, the number of participants is a limitation of the study in that there is a total of only 20 participants, with only five in each of the four groups. Because the number of participants is low, outlier scores can skew the data and the effect size of the results is diminished. Given some of these concerns, future research on the effectiveness of the cognitive interview can focus on altering delay between the misinformation passage and the interview such as creating a group that receives the cognitive interview three days after misinformation to see how well the cognitive interview holds up. Future research could also alter the passage each participant reads with one group receiving a misinformation passage and another group receiving a neutral passage to see how well the cognitive interview deters misinformation compared to a cognitive interview without the presentation of misinformation.

These research findings clearly demonstrate that the cognitive interview is superior to the standard interview in that the cognitive interview yields more accurate statements. Similarly, an immediate interview is superior to a delayed interview in that more accurate statements are produced the sooner an eyewitness is interviewed. Given the findings of the effectiveness of the cognitive interview in facilitating more accurate recall, it is crucial that law enforcement put the cognitive interview into practice over the standard interview; however, a standard interview given immediately may suffice. Based on analysis of the data, there were no significant differences in the proportion of correct statements for the cognitive interview and standard interview given immediately thus suggesting a standard interview can produce as many correct statements as the cognitive interview. Considering this finding, standard interviews will more than likely continue to be used when interviewing witnesses immediately after a crime because it is far more time consuming to conduct a cognitive interview. When time is of the essence in certain criminal investigations, conducting a cognitive interview immediately after a crime occurred may do more harm than good. While there was no difference in the proportion of correct statements between the cognitive and standard interviews in the immediate condition, police should use a cognitive interview when there is considerable delay between the crime and the interview because it leads to significantly more correct statements over time compared to the standard interview. This may suggest that over time, the cognitive interview protects witnesses from making incorrect statements compared to the standard interview. The fact that the cognitive interview "protects" witnesses from making incorrect statements may be a reason why police should conduct cognitive interviews immediately after a crime has occurred. As stated previously, the cognitive interview takes a significant amount of time to conduct which may not make the cognitive interview a desirable choice early on in a criminal investigation; however, since it may protect witnesses from making incorrect statements in the future, it may be beneficial to conduct it early on if police have to interview the witness again at a later time. For example, if police arrive on a crime scene and immediately interview a witness with either the cognitive or standard interviews, it is likely that each will produce the same number of accurate statements. If police used a standard interview immediately, however, this may cause problems if police have to interview the witness at a later time because the witness may be more likely to give incorrect statements. If police used a cognitive interview instead, this will mitigate the problems of using a standard interview immediately and the witness will be "protected" from making incorrect statements over time. Therefore, while the cognitive interview may take longer to conduct than the standard interview, police may want to use a cognitive interview immediately after a crime has occurred just in case they have to come back and interview the witness at a later date.

Even though the cognitive interview can protect witnesses' memory over time to some extent, police should still attempt to track down and interview witnesses to crimes as soon as possible because general memory decay and misinformation effects can be more influential on memory over time. For example, if police are not able to track down witnesses for several weeks or months after a crime has occurred, the likelihood of misinformation altering a witness's memory or the witness just forgetting details is significantly higher. With considerable delays such as this, the cognitive interview could potentially be ineffective in facilitating more accurate recall. Overall, police should interview witnesses as soon as possible and consider using a cognitive interview to help prevent incorrect statements and facilitate more accurate recall in criminal investigations.

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APPENDIX

Appendix

A. Introductory Narrative

On July 21, 2009, in Sarasota, Florida, a group ofteens killed a man in a parking lot. A neighbor at a nearby apartment complex was testing his security system at his apartment which included a series of cameras. While the man was testing his security cameras, he witnessed and recorded the murder on camera. The recording was turned into police and the group of teenagers were all arrested and charged with first degree murder and obstruction ofjustice. Now, you are going to watch the actual video ofthe crime as closely as you can. The audio in the video has been edited to remove the emotional reaction of the cameraman.

B. Misleading Narrative

A group of white male teenagers arrived in a blue jeep in a parking lot. A man dressed in all green got out of his car and closed the car door as the teenagers arrived. Then the five teenagers got out of the vehicle, left the doors open, and approached the man dressed in green. The man in green waved his arms in the air as he appeared to be upset at the teenagers' presence. As the victim was facing the

teenagers, one of the teenagers pulled out a pistol and shot the man. Afterwards, some of the teenagers dragged the body towards the lake and threw the body, along with the pistol, in the lake. One of the teenagers then released the parking brake to the victim's white van, and then all of them pushed the van into the water. All of the teenagers then returned to their vehicle and drove away.

C. Cognitive Interview Questions
    a. Report Everything- I want you to reflect on the video and think about everything you can remember about the event. I want you to report everything you can remember about the video no matter how small the detail or how irrelevant you believe it to be. So for example, you could describe what the plants looked like in the video even though they have no direct relation to the crime at all. I will give you a moment to gather your thoughts and then describe everything you possibly can about the event when you are ready.
    b. Recall events in different order-Next I want you to recall the events in a different order starting from the end and working your way forward. Think about the details of the event you just described to me and place them in reverse order. I will give you a moment to gather your thoughts and you can begin to tell me what happened in reverse order when you are ready.
    c. After reporting everything and recalling the events in different order, participants will be asked specific questions relating to the events in the video (if participants had not provided these pieces of information already) and will be asked specific questions relating to the misleading statements (the number of suspects, actions of the victim when the teenagers arrived, murder weapon used). If the participant had already reported an answer to the misleading statements, the question (e.g. How many suspects were there?) was not asked.

D. Standard Interview Questions
    a. What was the color of the car the teenagers arrived in?
    b. What was the man in green doing when the teenagers arrived?
    c. How many teenagers were there?
    d. What was the race of all of the teenagers, including the victim?
    e. What color clothes was each of the teenagers wearing?
    f. How was the victim killed?
    g. What happened to his body after he was killed?
    h. How many of the teenagers disposed of the body?
    i. What happened to the murder weapon?
    j. What was the victim's van sitting next to in the parking lot?
    k. What happened to the victim's white van?
    l. Was there anything else sitting in the water? If so, what was it?
    m. Did you see any cars entering the parking lot as the suspects' vehicle was leaving? If so, can you describe the car?