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THE IMPACT OF TRAINING ON EYEWITNESS MEMORY

by

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A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Psychology
in the College of Sciences
and in The Burnett Honors College
at the University of Central Florida
Orlando, Florida

Spring Term 2013

Thesis Chair: Dr. Shannon Whitten

ABSTRACT

In a large body of research, Elizabeth Loftus (1975) first illuminated major concerns about the inaccuracy of eyewitness accounts. The primary goal of the present research was to test whether training regarding common eyewitness mistakes and witness suggestibility could improve eyewitness accuracy. The experimental group watched a presentation on research conducted by Elizabeth Loftus (1975) on eyewitness testimony and suggestibility during a Psychology course. Afterwards, an actor interrupted the classroom and had a discussion with the teacher. Students were asked a series of questions about the disruption. Some of the questions were leading and suggested certain things about the disruption that were inaccurate. After the misleading questions were asked, students were instructed to write a brief summary of what they saw. One week later, the students were asked direct questions about the disruption. A control group did not receive the presentation on eyewitness testimony, but witnessed the exact same event as the experimental group and followed the same procedure. The results suggest that participants who were trained were not as influenced as participants in the control group. Additionally, students in the control group reported the actor's behavior as more threatening than did the experimental group. This research not only adds to the existing literature, but has the potential to improve current eyewitness identification procedures in order to strengthen our justice system.

ACKNOWLEDGMENTS

I would like to first and foremost thank my amazing mentor and Thesis Chair, Dr. Shannon Whitten. This thesis would be little more than a passing thought without all of your help and dedication to my success. I'd also like to thank my committee members, Dr. Karen Mottarella and Ms. Nancy Brasel, for offering me your resources, knowledge, and support throughout the entirety of this project.

Thank you to the members of my Research Team. You each have helped me in your own way, especially in conducting this experiment.

Melissa, Angela, Courtney, Sarah, RoseAnn, and Raina: If you all weren't doing this with me, there is no way I would have gotten this far. The support each of you has given me is truly appreciated.

Finally, thank you to all of my friends and family for your continuing belief in my aspirations.

-Breanna

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INTRODUCTION

It is impossible for most of us to imagine being convicted of a crime we did not commit. However, many criminal convictions depend on eyewitness testimony (Greene & Loftus, 1984; Nelson, Laney, Fowler, Knowles, Davis, & Loftus, 2011). Unfortunately, a large body of research demonstrates that eyewitness memory can be an unreliable source of information (Greene & Loftus, 1984; Loftus, 1975; Loftus & Palmer, 1974; Loftus & Zanni, 1975; Loftus, Miller, & Burns, 1978; Nelson et al., 2011; Powers, Andriks, & Loftus, 1979). Extensive research has been conducted in all areas of eyewitness memory in order to find out why this occurs, and how it can be improved. One of the primary researchers in this area is Elizabeth F. Loftus, Ph.D., who has conducted numerous experiments demonstrating the fallibility of eyewitness memory, the power of suggestibility, and the effects of leading questions on eyewitnesses (1975; 2005).

In general, an eyewitness will go through the experience of an accident or event, and be questioned as soon as possible by the police or investigators. Either before or after questioning, witnesses usually write a statement. Depending on the particular severity of the event, an eyewitness may be called upon to testify in court. As discussed by Powers et al. (1979), witnesses are usually asked to recall very precise details about events they have witnessed, such as whether the traffic signal was red or green, the build of the burglar, and other specific questions related to what the witness saw. Witnesses vary in their ability to accurately recall events and in their proneness to suggestibility, which involves incorporating postevent information as part of their memory for that event.

The accuracy of eyewitness testimony is a critical factor in the functioning of our judicial system, especially considering that legal proceedings often rely on eyewitness accounts in order to make sentencing determinations. As previously mentioned, research has shown eyewitness accounts to be unreliable (Greene & Loftus, 1984; Loftus, 1975; Loftus & Palmer, 1974; Loftus & Zanni, 1975; Loftus et al., 1978; Nelson et al., 2011; Powers et al., 1979). When recalling witnessed events, eyewitnesses can easily be swayed by the way questions are worded by investigators. Even subtle differences in wording can affect what witnesses recall (Harris, 1973; Loftus, 1975; Loftus, 2005; Loftus & Palmer, 1974; Loftus & Zanni, 1975; Loftus et al., 1978; Powers et al., 1979). An astonishing number of individuals are convicted of crimes that they did not commit due to inaccurate eyewitness memory. As cited by Greene and Loftus (1984):

Rattner (1983) estimates that there may be as many as 8,500 wrongful convictions in our country every year, based on publicized accounts of miscarriages of justice; that over half of these wrongful convictions involve eyewitness testimony and in more than 10% of cases, the innocent person is sentenced to death. (p. 395)

Another startling example, as cited by Greene and Loftus (1984) involves the discoveries of Borchard (1932). He analyzed the convictions of 65 innocent men and found that 29 of them had been found guilty primarily due to inaccurate eyewitness testimony. These 29 men had been inaccurately identified by a total of 140 witnesses at almost 5 witnesses per defendant wrongfully convicted (Greene & Loftus, 1984). According to Nelson et al. (2011), 246 wrongful convictions since 1992 have been overturned through the Innocence Project, an effort to use DNA to absolve wrongly convicted felons. Incorrect eyewitness identification played a role in the wrongful conviction of about 75% of these cases.

One of the reasons that eyewitness testimony is so prone to error is *unconscious transference*, i.e., an eyewitness may mistakenly identify a person as having committed a crime, when, in fact, the eyewitness saw that person in a different context. Nelson et al. (2011) presented participants with a video of money being stolen; however, the perpetrating actor in the video was swapped with another actor during the film. Although this seems like a change that would be obvious to viewers, only 4.5% of participants noticed the change in actors. This result supported Nelson et al.'s (2011) hypothesis that the majority of participants would not notice the change, and also supports the idea that eyewitnesses are unable to easily differentiate between bystanders, people seen in a different context, and perpetrators.

Greene and Loftus (1984) point out that the potential unreliability of an eyewitness report stems from three main factors. These include the “inherent unreliability that occasionally plagues human perception and memory,” “human susceptibility to suggestion,” and the idea that “laypeople and even some judges are often unaware of the potential unreliability of eyewitness accounts” (pg. 396). These factors, whether combined or even entirely exclusive of each other, have the ability to lead to wrongful accusations against an innocent person.

In addition to the natural limitations of perception and memory, the specific wording used to question witnesses may lead to inaccurate reports. Early research on question wording and its effect on responses was conducted by Harris (1973), who showed that when questions presuppose something about an object, participants will describe that object on the basis of what the presupposition implies. For example, a question given to half the participants in Harris's experiment was, “How deep was the canal?” This presupposes nothing about the depth of the canal, and an average response of 61.0 feet was given to this particular question. In contrast,

participants who received the question, “How shallow was the canal?” which did include a presupposition regarding depth of the canal, had an average response of 19.6 feet (Harris, 1973). This supported Harris’s (1973) hypothesis that adjectives with directional implication would result in a larger response variance compared with adjectives that carried a nominal implication.

Loftus and Palmer (1974) extended the research by Harris (1973), by defining and exploring the role of leading questions on memory. Leading questions are defined as “questions that either by its form or content, suggests to the witness what answer is desired or leads him to the desired answer” (p. 585). The researchers conducted an experiment in order to determine the effects of wording on reported car speed in an accident. Participants watched seven films depicting traffic accidents and had to write a brief statement describing what they saw, then respond to a questionnaire. The critical question in this instance was, “About how fast were the cars going when they hit each other?” The verb “hit” in this question was replaced with either “smashed,” “collided,” “bumped,” or “contacted” for equal numbers of participants. It was found that participants who had the verb “smashed” reported a mean speed of 40.8 miles per hour, whereas “contacted” received a mean speed of 31.8 miles per hour, representing a statistically significant difference (Loftus & Palmer, 1974). In summary, the differences in question wording led to differences in speed estimations by participants.

In a second experiment conducted by Loftus and Palmer (1974), participants watched an accident involving multiple cars followed by 1/3 of the participants receiving the question, “About how fast were the cars going when they smashed into each other?” and another 1/3 of participants receiving the question, “About how fast were the cars going when they hit each other?” and the final 1/3 not receiving any question regarding speed. One week later, all

participants were asked, “Did you see any broken glass?” Participants who received the “smashed” question reported seeing broken glass significantly more often than the participants who received either “hit,” or who were not interrogated about vehicular speed at all. Furthermore, participants who received the “smashed” question reported a vehicular speed of about 10.46 miles per hour whereas those who received “hit” estimated the speed at about 8.00 miles per hour. These results inspire some disconcerting revelations about leading questions and long-term memory. Loftus and Palmer (1974) propose a possible reason for this interesting process in memory:

The first [idea] is information gleaned during the perception of the original event; the second [idea] is external information supplied after the fact. Over time, information from these two sources may be integrated in such a way that we are unable to tell from which source some specific detail is recalled. All we have is one “memory.” (p. 588)

This idea was consistently explored in subsequent research and is the basis for the theory of *reconstructive memory* (Loftus, 1975).

Loftus (1975) continued to find support for the effect of leading questions on memory by looking at their impact on past personal experiences. In one study, 40 people were asked about their headaches and related headache products other than the product they were currently taking (Loftus, 1975). One of the critical questions asked to half of the participants was, “In terms of [headache medication] products, how many other products have you tried? 1? 2? 3?” The other half of participants were asked the exact same question except “1? 2? 3?” was replaced with “1? 5? 10?” The 1/2/3 participants answered, on average, 3.3 other products. The 1/5/10 participants responded with an average of 5.2 (Loftus, 1975). This once again demonstrates that differences

in responses may be a result of how the question was framed and not an accurate representation of the respondent's experience.

In another experiment conducted by Loftus (1975), student participants were asked to watch a videotape in which eight demonstrators disrupt a classroom. Along with nineteen filler questions, half of the participants were asked one critical question, "Was the leader of the four demonstrators who entered the classroom a male?" The other half were asked, along with nineteen filler questions, "Was the leader of the twelve demonstrators who entered the classroom a male?" These were both either "yes" or "no" questions. One week later, the same participants were asked "How many demonstrators did you see entering the classroom?" It was found that the participants who had the "4" demonstrators question previously, recalled seeing an average of 6.40 people. The "12" group recalled seeing an average of 8.85 people (Loftus, 1975). This difference supports previous findings in that leading questions have a direct, significant effect on response.

Rumelhart and Norman (1973) explain that, "retrieval of an experience from memory is usually a reconstruction which is heavily biased by the person's general knowledge of the world" (p. 450). Loftus (1975) includes the idea that subsequent information offered about an event, such as the introduction of questions containing true or false presuppositions, is also integrated into memory and can alter the original representation of an event. In response, a witness will recall that memorial representation when asked about what they remember (Loftus, 1975).

Reconstructive memory is a concept with interesting applications, especially for the justice system (Greene & Loftus, 1984; Loftus, 2005; Loftus & Palmer, 1974; Loftus & Zanni, 1975). In discussing memory retrieval processes, Loftus (1975) explains that after being

questioned by police, witnesses may have to testify in court, and when that happens, they must re-create parts of the witnessed event from long-term memory. A regenerated image is envisioned, and any response a witness makes is based on this regeneration (Loftus, 1975). This is a problem due to the fact that eyewitnesses may easily have their memories construct new images based on presuppositions and leading questions. In turn, they rely on these regenerated images in order to answer questions in which legal determinations are reliant.

Moreover, even a seemingly trivial detail such as article choice “a” or “the” in questions has been shown to have a leading effect on memory (Greene & Loftus, 1984; Loftus & Zanni, 1975; Loftus, 1975). Loftus and Zanni (1975) conducted two experiments to test the effect of articles in question wording on subsequent memorial representation. The first experiment involved participants watching a multiple car accident and then being asked one of two critical questions: “Did you see *a*...?” or “Did you see *the*...?” Participants could either respond with “yes,” “no,” or “I don’t know.” It was found that participants who received the question with the article “a” were more than twice as likely to respond with “I don’t know.” On the other hand, participants who received the article “the” were more likely to respond with either a definitive “yes” or “no” (Loftus & Zanni, 1975).

In order to further explore this idea, a second experiment was conducted by Loftus and Zanni (1975) replicating the first, except with new participants and a different video. This time, a film showing a man backing out of a parking lot into a woman carrying groceries was shown. Results from Experiment 1 were replicated. When an indefinite article such as “a” was used in a question asking about an item not actually present in the film, “yes” responses occurred 6% of the time. In contrast, when the definite article “the” was used, “yes” responses occurred 20% of

the time. These results suggest two possibilities. The definite article may produce a bias favoring a “yes” or “no” answer. Also, use of the definite article “the” may more strongly imply that an item was present when it actually may not have been, causing a reconstruction in memory (Loftus & Zanni, 1975).

Loftus (1975) further researched the use of articles in leading questions. She conducted an experiment in which participants watched a film clip of a car that fails to stop at a stop sign. As a result, a five-car, bumper-to-bumper collision occurs. Participants were asked either, “How fast was Car A going when it ran the stop sign?” or “How fast was Car A going when it turned right?” Then, all participants received the question, “Did you see a stop sign for Car A?” Fifty-three percent of participants who received the “stop sign” question answered “yes.” Only 35% of participants who received the “turn right” question answered “yes” (Loftus, 1975). Loftus (1975) concluded that the participant may “see” the stop sign that he, himself, has constructed.

In one of the most well-known of experiments conducted by Loftus (1975) and use of articles in leading questions, participants watched a brief videotape of a car accident and then answered some questions. The critical question in this instance was, for half of the participants, “How fast was the white sports car going when it passed the barn while traveling along the country road?” The other half were asked, “How fast was the white sports car going while traveling along the country road?” There was no barn in the videotape. One week later, all participants were asked, “Did you see a barn?” Of the participants who received the question assuming a barn was shown, 17.3% replied “yes.” Of the participants who did not receive the question assuming a barn was present, only 2.7% replied “yes.” As shown from the results of this

experiment, an initial question in which a false presupposition is included can influence a witness's tendency to later report seeing the nonexistent object presupposed (Loftus, 1975).

The impact that leading questions can have over memory has come to be known as the *misinformation effect*, which refers to “the impairment in memory for the past that arises after exposure to misleading information” (p. 361). It is the name given to the change in reporting that occurs after misleading information is presented (Loftus, 2005). Zaragoza and Lane (1994) asked the question, do people confuse the misleading suggestions for their “real memories” of the witnessed event? After they conducted experiments in which participants were asked questions about their memory of suggested items, they concluded that participants definitely do sometimes come around to believing they have seen things that were only suggested. Loftus (2005) notes that, “Once embraced, people can express these false memories with confidence and detail” (p. 365).

People are particularly susceptible to a false memory when time has passed and the original memory of the event has faded. This is due to the fact that any type of discrepancy or contrast with what the person originally remembered is less noticeable after time has passed (Loftus, 2005). However, false memories can still occur even if the person notices a discrepancy. An example by Loftus and Hoffman (1989) is given in terms of eyewitness suggestibility, “the rememberer sometimes thinks ‘Gee, I thought I saw a stop sign, but the new information mentions a yield sign, I guess I must be wrong and it was a yield sign.’”

Furthermore, this influence appears to occur independently of cognitive ability. Research conducted by Powers et al. (1979) found evidence to support the idea that there is no relationship between measures of cognitive ability and accuracy or suggestibility. It was hypothesized that

there would be a significant relationship between the two. Participants first took the Washington Pre-College Test in order to measure mental ability. They then viewed a series of slides in which a man steals a woman's wallet. They were then asked to fill out an accuracy questionnaire, read a suggestibility paragraph, and take a final test. A significant correlation between eyewitness mental ability and accuracy or suggestibility was not found. Therefore, if cognitive ability does not influence ability to avoid suggestibility or improve accuracy in eyewitness memory, it is assumed that each individual is at about the same level of ability when it comes to identifying leading questions, and therefore responding to them in an unbiased way.

Previous research into leading questions, suggestibility, reconstruction of memory, and the misinformation effect in general, demonstrates that eyewitness testimony can be influenced easily. This is a major problem in society, and a way in which this influence can be reduced is necessary to explore scientifically. One way to possibly reduce suggestibility could be to provide training to witnesses.

Education and information are some of the most powerful tools that we have to bring about awareness. Bringing awareness of common mistakes made in eyewitness testimony including suggestibility and leading questions, by way of training, could greatly decrease eyewitness mistakes. If witnesses were aware of the possibility that interrogation wording following events could sway them in one direction, they may be less likely to report a definitive answer that, in turn, could cause somebody to be charged with a crime they did not commit.

Reardon and Fisher (2011) conducted an experiment to test whether showing jurors video clips of eyewitnesses making their choices in line-ups would help them to discriminate between confident and unconfident witnesses. When jurors saw a video clip of witness' description of the

perpetrator and the original line-up identification process, jurors rated accurate witnesses as more accurate than inaccurate witnesses (Reardon & Fisher, 2011). This particular finding supports the possibility that training with educational material could impact witnesses.

Similarly, Loftus (2005) summarizes previous research demonstrating that warning people that they may be exposed to misinformation sometimes helps them to resist it. Specifically, warnings are helpful when given before the misinformation has had its effects. Loftus (2005) concludes, “If people are warned prior to reading post-event information that the information might be misleading, they can better resist its influence, perhaps by increasing the likelihood that the person scrutinizes the post-event information for discrepancies” (p. 362).

Therefore, it would seem as though training people could serve as a way to reduce future eyewitness mistakes. Particularly, information centered on Loftus’s work in leading questions, suggestibility, and reconstruction of memory would serve as the best educational training background.

HYPOTHESIS

It was hypothesized that teaching participants about eyewitness mistakes by way of Loftus's research would result in increased accuracy in postevent question responses as opposed to responses given by participants who did not receive the information. Specifically, participants trained in eyewitness testimony errors would be more resistant to the effects of leading questions compared to participants who did not receive such training.

METHODS

Participants

Forty-one students at the University of Central Florida's Palm Bay Regional Campus participated in this research study. The experimental group consisted of twenty-five students who were enrolled in a Psychology class, while the control group consisted of sixteen students who were enrolled in an Early Childhood Education class. The experimental group was made up of mostly females (80%), as was the control group (93.8%). Also, in the experimental group, 72% of participants identified themselves as White, 20% as Hispanic, and 4% as African American. The average age for the experimental group was 28 ($SD = 12.34$). In the control group, 68.8% of participants identified themselves as White, 25% as Hispanic, and 6.3% as African American. The average age for the control group was 30 ($SD = 10.65$).

Materials

IRB Approval Letter. In order to conduct this research, approval from the Institutional Review Board was required. The approval letter can be found in Appendix A.

Elizabeth Loftus PowerPoint Lecture. A series of PowerPoint slides was presented during a Psychology class and integrated into a class lecture as a part of regular course material. These slides were about the work of Elizabeth Loftus, and focused on common mistakes made in eyewitness testimony including how leading questions and suggestibility can result in a faulty reconstruction of eyewitness memory. The control group did not receive this lecture. See Appendix B for an outline of the PowerPoint slides.

Witnessed Event Script. All participants witnessed a minor class disruption. At a pre-specified time during class, an actor interrupted the classroom and, along with the teacher, recited from a script. This script remained exactly the same for both the control and experimental groups. The script is provided in Appendix C.

Informed Consent. Each participant was asked to read a consent form to decide if they were willing to participate. This form can be found in Appendix D.

Leading Questions. The experimenter verbally presented a series of 14 questions to the participants after the actor left the room and informed consent was given. The questions included 9 filler questions. Participants wrote their answers down on a piece of blank lined paper. The leading questions remained exactly the same for both the control and experimental groups. An example of one of the leading questions was, “What color was the notebook he threw down?” (The actor did not throw down a notebook). The leading questions are provided in Appendix E.

Direct Questions. One week after the initial event and leading questions, a series of 9 direct questions were verbally asked by the experimenter. Participants were asked to write their answers down on a provided piece of blank lined paper. The purpose of the direct questions was to measure the impact of the previous week’s leading question responses. The direct questions were exactly the same for both the control and experimental groups. An example of one of the direct questions was, “Where did he say he was from?” The direct questions are provided in Appendix F.

Confidence Recording. In addition to answering questions on a piece of blank lined paper, participants were asked to record their confidence level next to each of their answers. After reciting the first question verbally for both the leading and direct questions, the

experimenter wrote the confidence levels on the white board in the classroom. Confidence levels ranged from 1-3. The scale can be found in Appendix G.

Experimental Group Participant Information Form. Demographic information including age, gender, ethnicity, college major, academic year, GPA, what types of television shows are of interest, and questions asking if participants were familiar with Elizabeth Loftus's work in eyewitness testimony prior to participating in this experiment were asked. Participants were also asked if they felt as though the lecture influenced their answers. The participant information form given to the experimental group is provided in Appendix H.

Control Group Participant Information Form. Demographic information including age, gender, ethnicity, college major, academic year, GPA, what types of television shows are of interest, and questions asking if participants were familiar with Elizabeth Loftus's work in eyewitness testimony prior to participating in this experiment were asked. This form can be found in Appendix I.

Research Information Form. All participants were provided with a research information form, which revealed the true nature of the experiment. This can be found in Appendix J.

Procedure

Participants from the University of Central Florida's Palm Bay Regional Campus were given the opportunity to participate in this research if they were enrolled in a particular Psychology class, which acted as the experimental group, or a particular Early Childhood Education class, which acted as the control group. Participants in the experimental group were taught during a normal class lecture about common mistakes made in eyewitness testimony including leading questions, suggestibility, and how both can affect memory. This information

summarizes Elizabeth Loftus's research findings. About one hour after this presentation, an actor interrupted the class and engaged in a scripted conversation with the teacher. The actor also interrupted the classroom containing the control group participants and read from the exact same script. The only difference between the experimental and control group was that the experimental group received the lecture before the actor's interruption. As soon as the actor left, participants were asked if they wanted to participate in research concerning eyewitness memory. Those who decided that they wanted to participate agreed on the informed consent.

Participants were told they were going to be verbally asked some questions about what they saw. They were then provided with a blank sheet of lined paper. Each piece of lined paper had a number assigned in the top right corner. Participants were asked to remember their particular number and were provided with a sticker that was paper clipped to their lined piece of paper in order to save it so it could be easily remembered the following week. The experimenter then asked the leading questions, giving the participants time to record their responses. After the first question was asked, the experimenter asked the participants to also record their confidence in each particular answer. A confidence scale was written on the white board. Confidence levels ranged from 1-3, with 3 being "confident," 2 being "somewhat confident," and 1 being "not confident." After the leading questions were answered, participants were asked to write a brief summary, on the same lined paper, describing what they saw occur. After this was completed, participants were thanked for their participation and told that there may be the potential for some follow-up questions later on.

One week later, during the same classes as the previous week, participants were asked to answer some follow-up questions regarding the event that took place exactly one week prior.

Participants were provided a blank piece of lined paper and asked to put their number from the week before in the top right corner. The experimenter then began asking the direct questions. After the first question was read, participants were asked to record their confidence in each of their answers, as done the week prior. The experimenter then wrote the confidence scale on the white board with the same intervals as before. After the participants were finished recording their responses, they were asked to fill out some demographic information, along with providing their individual number on the top right corner of the paper. Finally, they were given a research information form that served to educate them about the purpose of the experiment. The information research form included contact information in the event that a participant wanted more information regarding the study or had any questions or concerns.

RESULTS

Data Preparation

Before testing the hypothesis, the responses to each direct question were first coded according to whether or not the response was consistent with the misleading information. For example, one of the leading questions suggested that the actor was from Kansas rather than Kentucky. When participants indicated he was from Kansas, the response was scored 1. When they reported any other response, it was scored 0. Thus, higher scores indicated responses that were consistent with the misleading information. Each participant's error scores were averaged, creating a proportion of error score per participant. This score was used in the analysis. Additionally, direct question 2, "About what age bracket would you place the boy," was omitted due to responses that were not able to be numerically categorized. For example, "middle aged" was too broad a response to correspond with a specific age. Nine percent had to be omitted because they were not present for both sessions. This resulted in a total of forty-one participants, with twenty-five in the experimental group, and sixteen in the control group.

Analysis of Responses to Direct Questions

To address the hypothesis that students who received training would be more resistant to the effects of leading questions, a oneway ANOVA was performed on the proportion of error responses with experimental condition (training vs. no training) as the independent variable. An alpha level of .05 was applied to the analysis. The results were not statistically significant but were marginally significant in the hypothesized direction, $F(1, 39) = 3.345, p = .075$. The mean proportion of error responses was .25 ($SD = .28$) for the experimental group. For the control

group, the mean proportion of error responses was .41 ($SD = .27$). In other words, 25% of responses in the experimental group were influenced by the misleading questions, evident by the corresponding responses to the direct questions, whereas 41% of responses in the control group were influenced. Refer to Appendices E and F for a complete list of the misleading and direct questions. The leading questions that were included in this analysis were numbers 4, 6, 8, 10, and 12, and their influence on direct question responses to numbers 3, 5, 6, and 9. These results are illustrated in Figure 1.

Because many of the leading questions indicated that the actor was more threatening than he actually was, and because this is an important issue in our legal system, an analysis was conducted using only the direct question responses that indicated threatening behavior. The leading questions which suggested threatening behavior and were included in this analysis were numbers 6, 8, 10, and 12, with their influence being on direct questions 3, 6, and 9. Again, the results were not significant, but were marginally reliable in the hypothesized direction, $F(1,39) = 3.288, p = .078$.

Additionally, because the question for whether or not the actor was perceived as threatening is so theoretically important, a Chi Square analysis was used to determine whether there were differences on one question, "Did the person display threatening behavior?" The results of the Chi Square analysis were significant, $\chi^2(1) = 4.148, p < .05$. Approximately 44% of the experimental group and 81% of the control group explicitly stated that the actor was threatening. These results can be found in Figure 2.

Analysis of Confidence Responses

Moreover, in order to explore how confidence ratings for responses changed between the two sets of questions, a 2 X (Experimental vs. Control) 2 (Session one vs. Session two) mixed model, between-subjects ANOVA was conducted on the average confidence ratings. It was found that there was a main effect of session, $F(1, 39) = 8.084, p = .007$. People significantly increased in confidence from session one ($M = 1.842, SD = 0.51$) to session two ($M = 2.080, SD = .26$). However, there was no main effect for experimental condition, nor an interaction between session and condition.

DISCUSSION

This experiment examined whether students who received training in the errors associated with eyewitness testimony would be less affected by leading questions after witnessing an event. After analyzing the results, the hypothesis was only marginally supported. While the mean error rates were higher for the non-trained group, as predicted, the overall analyses failed to reach statistical significance at the .05 level. In the experimental group, 25% of participants responded consistently with the misleading information, whereas 41% of participants in the control group responded consistently. It is unclear whether this finding is truly an effect of the training that the experimental group was given, or if the fact that most (60%) of the experimental group reported familiarity with the training content, whereas no one in the control group reported familiarity with the training content. Having previous exposure to this popular topic could have possibly given the experimental group an advantage. Either way, this is an encouraging outcome to be explored more in depth.

Additionally, the control group reported the actor as threatening more often than the experimental group. When asked if the actor displayed any threatening behavior, only 44% of the experimental group explicitly stated that yes, the actor displayed threatening behavior. On the other hand, 81% of the control group stated that the actor displayed threatening behavior. It is worth emphasizing that although the actor seemed confused and was perhaps rude, he at no point made any threat or raised his voice. This finding is important because it directly relates to the current issues plaguing our legal system; someone seen as a threat is more likely to be perceived as guilty, creating a domino effect of misleading testimony and false assumptions that may lead to a false conviction. It is possible that the experimental group was much more cautious

to “convict” or distort someone’s behavior, as they may have believed that their own perceptions of the situation were skewed as a result of the training they had just received.

It is also worth noting that while participants in the experimental condition indicated the actor was a threat at almost half the rate of the control group, they still perceived a threat when there was no evidence of threatening behavior 44% of the time. Even though the reduction is encouraging, this is still a large percentage considering it was formed solely on the basis of misleading information. Clearly, even though training may have an advantage, the power of leading questions is difficult to weaken.

Although the lack of statistical reliability is discouraging, it is important to note that the very small sample size may have dampened the effect, causing a potential Type 2 error. With more participants and statistical power, this difference may be more apparent. In order to build upon this research, certain measures must be taken into consideration, with sample size being one of the most important.

Limitations

One of the primary limitations of the present study is the small sample size. It is difficult to make generalizing conclusions from such a limited sample. Having an increased sample size would result in more accurate results, especially with a more even number in both the control and experimental groups. Demographically, it would also be beneficial to include more males in the study, and participants with a more diverse educational background.

In addition, introducing leading questions at different time points within the experiment may have an effect on participant suggestibility to them. Loftus et al. (1978) conducted five experiments in which participants watched a series of slides involving an auto-pedestrian accident and given consistent, misleading, or no information. It was found that when misleading information is given immediately after an event, it has a different effect than when it is delayed until just before a final memory test. More specifically, misleading information had a greater impact if presented just before a final test rather than directly after the initial event (Loftus et al., 1978).

Future Research

In replicating this experiment, results may be more reflective of eyewitness ability due to training if leading questions are introduced at various, specified amounts of time after the actor interrupts the classroom, rather than just directly after (Loftus et al., 1978). Testing different variations of the procedural method such as timing between training and the event, the event and leading questions, or leading questions and direct questions could truly show the impact that training may have.

Including more participants would be the necessary first step so that findings have more support. Within a larger sample size, having greater diversity in variables such as age, gender, and educational background may bring about more accurate results that can be applied to a more general population. It also may be beneficial to explore eyewitness awareness training in other environments, beyond the classroom, in order to compare results.

This research can certainly be expanded upon. Discovering ways to decrease faulty eyewitness recognition has important implications. Any research that can help progress this area is crucial to keeping our justice system just that, a system of justice.

Figure 1: Participants Influenced by Leading Questions

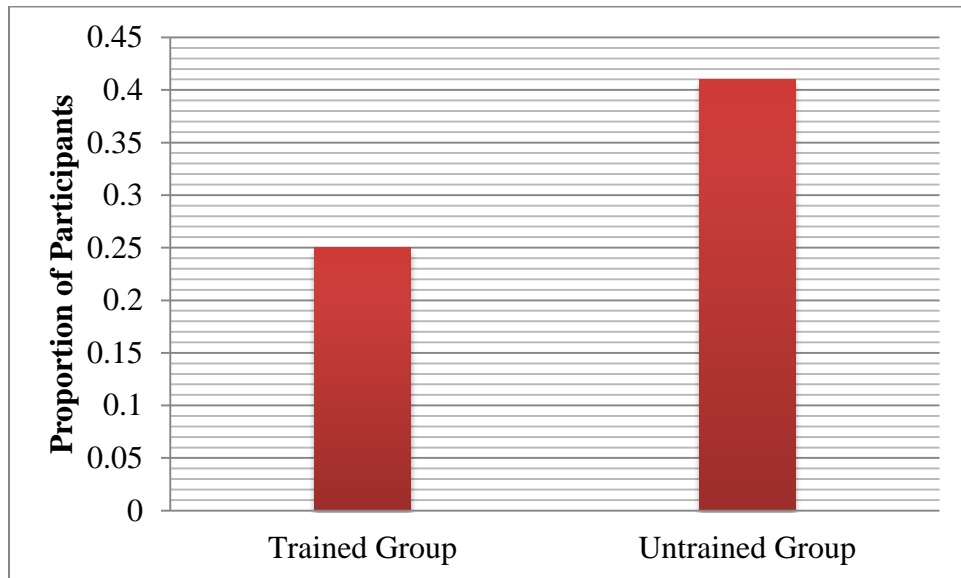
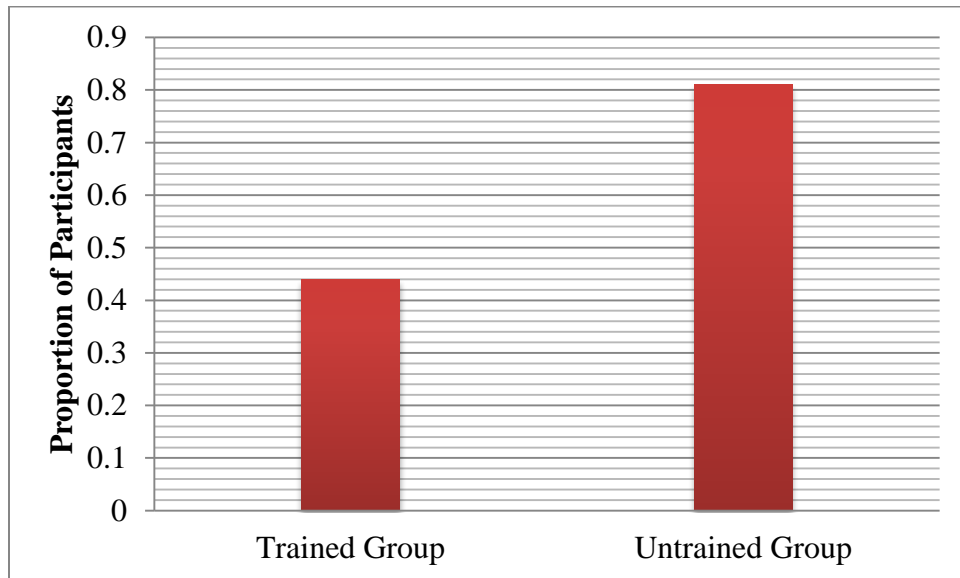


Figure 2: Participants Who Reported Threatening Behavior



APPENDIX A: IRB Approval Letter

IRB Approval Letter:



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1
FWA00000351, IRB00001138**

To: **Shannon N. Whitten and Co-PIs: Breanna Nelson, Karen E. Mottarella**

Date: **October 26, 2012**

Dear Researcher:

On 10/26/2012, the IRB approved the following human participant research until 10/25/2013 inclusive:

Type of Review: UCF Initial Review Submission Form
Project Title: Eyewitness Memory
Investigator: Shannon N. Whitten
IRB Number: SBE-12-08764
Funding Agency:
Grant Title:
Research ID: N/A

The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 10/25/2013, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewska, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 10/26/2012 11:55:39 AM EDT

A handwritten signature in black ink that reads 'Joanne Muratori'.

IRB Coordinator

APPENDIX B: Elizabeth Loftus PowerPoint Lecture

Elizabeth Loftus PowerPoint Lecture:

Thanks for the Memories!

Loftus, E. F. (1975). Leading questions and the eyewitness report. *Cognitive Psychology*, 7, 560 – 572.

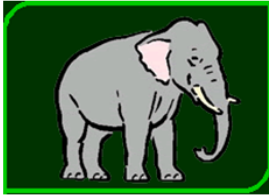


Can We Trust Eyewitness Testimony?

- http://www.youtube.com/watch?v=v_QbTX2qS10&feature=relmfu
- http://www.youtube.com/watch?v=NVHWn3m2PDE&feature=list_related&playnext=1&list=SP29474C97F87E656E
- <http://www.youtube.com/watch?v=VZhcp6dOKds&feature=endscreen&NR=1>

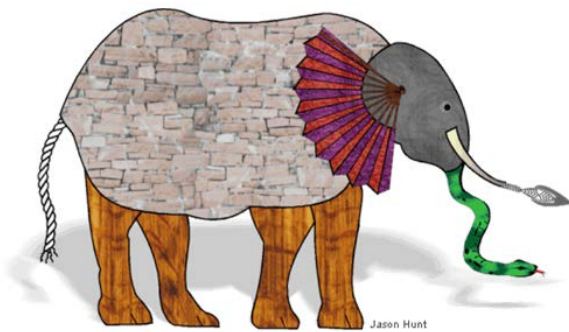
Nature of Memory

- We tend to think of memory as like a photograph or video; once accessed, perfectly preserving the information over time.



- Unlike the old saying about elephants, however, humans do tend to forget information in very specific ways

Elizabeth Loftus and Reconstructive Memory



Methodology & Results, Exp. 1

- **Methodology:** 150 students saw a video of a 5-car pile up.
 - ▣ **Group 1:** How fast was Car A going when it ran the stop sign?
 - ▣ **Group 2:** How fast was Car A going when it turned right?
 - ▣ All were asked, "Did you see a stop sign?"
- **Results:** 53% in Group 1 saw a stop sign, whereas 26% in Group 2 saw a stop sign

Methodology & Results, Exp. 2

- **Methodology:** 40 participants shown a film about a class being disrupted by 8 demonstrators
 - ▣ **Group 1:** Was the leader of the 4 demonstrators male or female?
 - ▣ **Group 2:** Was the leader of the 12 demonstrators male or female?
 - ▣ How many demonstrators did you see entering the classroom?
- **Results:** Average for Group 1 was 6.40 and the average for Group 2 was 8.85, a statistically significant difference.

Methodology & Results, Exp. 3

- **Methodology:** 150 participants shown a film about an accident
 - ▣ **Group 1:** How fast was the white sports car going when it passed the barn?
 - ▣ **Group 2:** How fast was the white sports car going while travelling along the country road?
 - ▣ Did you see a barn?
- **Results:** Group 1 said yes 17.3% of the time and Group 2 said yes 2.7% of the time, a statistically reliable difference.

Methodology & Results, Exp. 4

- **Methodology:** 150 participants shown a film about an accident where a car hits a baby carriage
 - ▣ **Group D:** Directly asked: did you see a barn in the film?
 - ▣ **Group F:** False proposition: Did you see a station wagon parked in front of the barn?
 - ▣ **Group C:** No barn mentioned
 - ▣ One week later: Did you see a barn?
- **Results:** Group D said yes 15.6% of the time and Group F said yes 29.2% of the time, whereas the control group said yes 8.4% of the time, a statistically significant difference.

Conclusions and Discussion

- Subtle differences in language can influence memory for events
- Memory is a reconstructive process
- Implications for court cases
 - ▣ Officers trained on interviewing witnesses
- Therapy and the Recovery of Repressed memories

Lost in the Shopping Mall? Loftus Herself

- http://www.youtube.com/watch?v=il0u2s_WGXA

APPENDIX C: Witnessed Event Script

Witnessed Event Script:

Actor walks in with pile of books, looking frazzled.

Actor: Is this the class for astrophysics?

Teacher: What?

Actor: I'm looking for the astrophysicist on this campus.

Teacher: I'm not her. I don't think we offer anything like that here.

Actor: I'm a transfer student from Kentucky, I need the astrophysicist!

(Actor starts to get frustrated)

Teacher: Well, I don't know what or who you are talking about.

Actor: I think you do, and I will get this straightened out.

(Drops notebook, picks it up, and hurries out the door).

Teacher: That was weird.

APPENDIX D: Informed Consent

Informed Consent:

Eyewitness Memory
Informed Consent

Principal Investigator(s): *Breanna Nelson*

Sub-Investigator(s): *Shannon Whitten, PhD*

Investigational Site(s): *University of Central Florida (Palm Bay Campus), Department of Psychology*

Introduction: Researchers at the University of Central Florida (UCF) study many topics. To do this, we need the help of people who agree to take part in research studies. You are being invited to take part in a research study which will include about 50 people at the UCF Palm Bay Campus. **You must be 18 years of age or older to be included in the research study.**

The person doing this research is Breanna Nelson at the University of Central Florida under the supervision of Dr. Shannon Whitten.

What you should know about a research study:

- Someone will explain this research study to you.
- A research study is something you volunteer for.
- Whether or not you take part is up to you.
- You should take part in this study only because you want to.
- You can choose not to take part in the research study.
- You can agree to take part now and later change your mind.
- Whatever you decide it will not be held against you.
- Feel free to ask all the questions you want before you decide.

Purpose of the research study: The purpose of this study is to understand and evaluate what students can remember after watching an event take place.

What you will be asked to do in the study: You will be asked to answer some questions regarding the event that you witnessed and record your confidence in the responses you provide. You will then be asked to freely write a brief summary of what you saw occur. This is not expected to take more than 10 minutes. A week later, there may be a few follow-up questions. This is not expected to take more than 10 minutes. Finally, you will be asked to answer some demographic questions. This should not take more than 10 minutes. It is important to note that there are no right or wrong answers to any part of this experiment. Although this experiment is not timed, it is not expected to take any more than 30 minutes altogether. Your only responsibility is to do the best that you can on each of the tasks. You do not have to answer every

question or complete every task. You will not lose any benefits if you skip questions or tasks.

Location: The experiment is conducted live at the UCF Palm Bay Regional Campus.

Time required: It is expected that it will take no more than 30 minutes for you to answer questions regarding the event you saw take place over the course of the entire experiment.

Risks: There is no foreseeable risk to participating in this experiment.

Benefits: We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include learning more about the research process from the perspective of a participant in that process.

Alternatives:

Instead of being in this research study, your choices may include: other experiments listed on SONA or extra credit opportunities offered through the Psychology Department.

Compensation or payment:

There is no direct compensation for taking part in this study. It is possible, however, that extra credit may be offered for your participation, but this benefit is at the discretion of your instructor. This study is worth .5 SONA credits. There is no penalty if you do not participate.

Anonymous research: This study is anonymous. All information is completely anonymous and will be stored in a locked filing cabinet. Your responses cannot be connected to you in any way.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints, or think the research has hurt you, contact Breanna Nelson at breannanelson@knights.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901. You may also talk to them for any of the following: Your questions, concerns, or complaints are not being answered by the research team. You cannot reach the research team. You want to talk to someone besides the research team. You want to get information or provide input about this research.

APPENDIX E: Leading Questions

Leading Questions:

(With Fillers)

- 1.) Was the person tall or short? (Filler)
- 2.) About what age bracket would you place the boy? (Leading)
- 3.) What was the man's hair color? (Filler)
- 4.) What class did the Kansas transfer student say he was looking for? (Leading)
- 5.) What kind of shirt was he wearing? (Filler)
- 6.) What color was the notebook he threw down? (Leading)
- 7.) Did he have any visible scars or tattoos? (Filler)
- 8.) After he threatened the teacher, how did she respond? (Leading)
- 9.) What was he carrying? (Filler)
- 10.) What did he yell at the teacher before he left? (Leading)
- 11.) Was he generally heavy/light in weight? (Filler)
- 12.) After he slammed the door, what did the teacher say? (Filler)
- 13.) What color eyes did he have? (Filler)
- 14.) Did he have a loud or soft type voice? (Filler)

APPENDIX F: Direct Questions

Direct Questions:

(Post Leading Questions)

- 1.) How old was the person?
- 2.) What would be your estimate on his weight?
- 3.) What was the person's overall demeanor towards the teacher?
- 4.) How did the teacher respond to the situation?
- 5.) Where did he say he was from?
- 6.) How did the person act right before they left?
- 7.) What did he say to the teacher before they left?
- 8.) What was he wearing?
- 9.) Did the person display any threatening behavior? If so, what?

APPENDIX G: Confidence Recording

Confidence Recording:

1 = Not confident

2 = Somewhat confident

3 = Confident

APPENDIX H: Experimental Group Participant Information Form

Experimental Group Participant Information Form:

Demographic Information

Please indicate your Gender:

- Male
- Female

What is your age?

What is your major?

What academic year are you?

- Freshman
- Sophomore
- Junior
- Senior

What is your GPA?

Please indicate your ethnicity:

- American Indian or Alaskan Native
- Asian
- Black or African American (Not of Hispanic origin)
- Hispanic or Latino
- Native Hawaiian or Other Pacific Islander
- White or Caucasian (Not of Hispanic origin)

Were you familiar with Elizabeth Loftus's work in eyewitness testimony before this study?

Were you familiar with Elizabeth Loftus's work in suggestibility (leading questions) before this study?

Were you familiar with any type of common eyewitness testimony mistakes before this study?

What kind of TV shows interest you?

Were you in class the week the presentation occurred in which the teacher taught the class about Elizabeth Loftus?

Do you personally feel as though the education provided in eyewitness testimony and suggestibility increased your accuracy in responding to questions?

Did you figure out at any point during the experiment that this study was about Elizabeth Loftus and her previous work done in eyewitness testimony and suggestibility? If yes, please describe.

APPENDIX I: Control Group Participant Information Form

Control Group Participant Information Form:

Demographic Information

Please indicate your Gender:

- Male
- Female

What is your age?

What is your major?

What academic year are you?

- Freshman
- Sophomore
- Junior
- Senior

What is your GPA?

Please indicate your ethnicity:

- American Indian or Alaskan Native
- Asian
- Black or African American (Not of Hispanic origin)
- Hispanic or Latino
- Native Hawaiian or Other Pacific Islander
- White or Caucasian (Not of Hispanic origin)

Were you familiar with Elizabeth Loftus's work in eyewitness testimony before this study?

Were you familiar with Elizabeth Loftus's work in suggestibility (leading questions) before this study?

Were you familiar with any type of common eyewitness testimony mistakes before this study?

What kind of TV shows interest you?

Were you here last class when an actor came in and you were asked to answer some questions regarding that?

Did you figure out at any point during the experiment that this study was about Elizabeth Loftus and her previous work done in eyewitness testimony and suggestibility? If yes, please describe.

APPENDIX J: Research Information Form

Research Information Form:

**Research Study:
Eyewitness Memory
Research Information Form**

The purpose of this study was to evaluate how education on eyewitness testimony may improve accuracy and reduce suggestibility in postevent student responses.

During this study, an actor was asked to come into the classroom and pretend they were looking for the astrophysics class and professor. This actor was part of the experiment and was reciting lines from a given script. The teacher was also a part of the experiment and was reciting from a given script. Before this actor came into the room, the experimental group was taught about Elizabeth Loftus (1975; 2005) and her work regarding eyewitness testimony. They were informed of common eyewitness mistakes and were shown how suggestibility in questions can affect responses in eyewitnesses. At the end of this experiment, each participant was asked a series of questions to test their recall of events. Some questions were purposely leading in order to test students' level of suggestibility. You were also asked to write a brief summary of what you saw. A week after your initial responses, you were asked to answer some follow-up questions about what you remember from the previous week. This was done in order to see how suggestive and leading questions would impact your memory long-term. This was also done in order to serve as a comparison to the leading questions. Finally, for each set of questions, you were asked to record your confidence in your answers in order to test confidence in memory. Lastly, you were asked to fill out some demographic information. We are evaluating the impact of educational material on eyewitness testimony and how it may improve postevent responses.

All data collected during the study is anonymous and will be used only for the purpose of the study. The responses in this study are de-identified and cannot be linked to you.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

If you have any further questions regarding this experiment or your participation in it, please contact Breanna Nelson at breannanelson@knights.ucf.edu or Dr. Shannon Whitten at Shannon.whitten@ucf.edu. If you would like a copy of the results for this study, please contact Breanna Nelson or Dr. Shannon Whitten.

Thank you for your cooperation!

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