Running Head: FALSE MEMORIES

# False Memories:

# The effect of confidence ratings on free recall tests

Katie Jensen

Gustavus Adolphus College

## Abstract

This study sought to extend research on false memories by examining the influence of confidence ratings immediately following forced confabulation and memory implantation on subsequent free recall. All participants were asked a series of false-event questions, for some of these questions an experimenter provided a response (memory implantation), for others participants were forced to generate a response (forced confabulation). Half of the participants rated their confidence in their implanted and confabulated answers, thereby reflecting upon the misinformation, the balance did not rate their confidence. The results demonstrated that participants were more likely to falsely recall an implanted or confabulated false-event item than to spontaneously falsely recall these items. Whereas, the confidence condition did not have any statistically significant results, it showed an interesting trend suggesting that reflection led to a higher rate of false recall only for implanted items.

# False Memories: The effect of confidence ratings on free recall tests

Eyewitness testimony is used frequently in cases of criminal justice within our court system, as well as in day to day life. Whereas we tend to trust people to accurately recall what they have witnessed and to tell, "the truth, the whole truth and nothing but the truth," psychological scientists have demonstrated that people are susceptible to falsely remembering past events (e.g. see Loftus, 1992, 1996, 2005 for reviews). In the typical eyewitness memory procedure, participants first witness an event. Immediately following the event, half receive new, misleading information regarding the witnessed event, and the other half does not receive this information. Participants are then asked to recall the original event. The participants who received the misleading information are more likely to report the misleading information as events they believed occurred in the witnessed event than those who were not exposed to the misinformation (Loftus, 1992).

Research has clearly established that witnesses can develop false memories for misinformation provided to them; more recent research has shown that participants can be led to develop false memories for misinformation they were forced to generate themselves. Zaragoza, Payment, Ackil, Drivdahl, & Beck (2001) had participants view a video clip and then answer false-event questions, where they were forced to confabulate (generate) their own answer. For example, participants were asked where the boy was bleeding (he was obviously never bleeding in the video) and they were required to provide an answer. This technique led the participants to be more likely to report these false-event items one week later than if they had not been forced to confabulate the misinformation.

Whether false memories are more or less likely following forced confabulation

relative to instances when misinformation is implanted by an interviewer has only received preliminary investigation (Thomas & Johnson, 2007). Whereas no published studies have addressed this issue explicitly, several studies provide information relevant to predicting possible outcomes. For example, Slamecka and Graf (1978) demonstrated that generating information enhances memory for the information relative to when the same information is simply provided by the experimenter. The Levels of Processing (LOP) Theory, proposed by Craik and Lockart (1972) also helps to explain why a generated item and therefore a confabulated item may be more likely to be remembered than an item that is read or implanted. This theory says that if something requires deeper mental processing, it will be more memorable (Craik & Tulving, 1975; Lockart & Craik, 1990). In regard to confabulated and implanted items, the prior requires more thought and mental activity than the latter, thus making it more memorable.

The generation effect and LOP theory suggest that misinformation participants are forced to confabulate themselves will be more memorable than misinformation implanted by an experimenter. If strong memories of confabulated items are <u>not</u> accompanied by memories of having fabricated the information simply to appease the experimenter, then they may be particularly likely to appear on tests of free recall. This possibility is supported by findings that suggest generating information interferes with one's ability to remember where the information originated.

For example, Jurica & Shimamura (1999) found that generating items can have a negative effect on source memory. In their study, when participants were required to generate answers they were less able to remember the source of the information than if they had not generated the information. Without remembering source, self-confabulated

misinformation may be particularly susceptible to false memory development. In contrast, Geghman & Multhaup (2004) found that participants were better at identifying the source if they generated the relevant information themselves. That is, not only did participants show enhanced memory for self-confabulated information relative to information provided by an experimenter, they also showed enhanced memory for source. These contradictory findings leave open the question of whether false memory development will be more likely for self-confabulated versus implanted misinformation.

Preliminary research (Thomas & Johnson, 2007) explored the effects of requiring participants to reflect upon the source of their memories when they had previously encountered false information. The participants served as eyewitnesses to an event, who then answered some false-event questions, some of which required them to confabulate misinformation and some that were paired with implanted items provided by an interviewer. One week later, participants were given either a free recall test, where they were instructed to recall everything they could remember happening in the video, or a source recognition test. The source recognition test asked for every false-event item (implanted and confabulated) whether the participant remembered the item being present in the video and whether the same item had been the subject of an interviewer's question. The purpose of asking the participants where they had encountered the item before was to get them to reflect upon the source of the information. The source recognition test revealed that participants were more likely to falsely recognize implanted items than confabulated items. However, on the free recall test with no prompt to think about source, participants were more likely to falsely recall confabulated items than implanted items. This suggests that when recalling information, participants were less likely to

remember the source of the misinformation and thus more likely to inaccurately report it as having been in the witnessed event.

Another interesting thing that happens when forcing participants to confabulate false information is that some resist doing so. Zaragoza et al. (2001) encountered resistance in their oral interviews when researching false memories with confabulation and confirmatory feedback. Participants were instructed beforehand that they must provide an answer for every question asked. Despite these instructions, participants verbally resisted answering the false-event questions 42% of the time, by saying for example, “I didn't see that,” “I don't know,” “That didn't happen,” or “I am just guessing.” These overt statements of resistance seemed to protect the participants against false memories on subsequent recognition tests. That is, when a participant resisted answering a question, they were less likely to later report that the resisted item occurred in the video. Further research (Thomas & Johnson, 2007) coded resistance similarly, but uncovered some intriguing results: whereas resistance was found to protect participants from false memories on a source recognition test one week after the initial interview it did not protect participants from falsely recalling items in a free recall test. In other words, participants who resisted confabulating a false-event item were more likely to later report that the resisted item occurred in the video in a free recall test.

These data are counterintuitive. We would like to think that if we resist answering a question that we know is misleading, then we will be able to remember later that we resisted answering the question, and therefore the answer we gave is false. However, this research (Thomas & Johnson, 2007) suggests that participants are more likely to recall false information that they resisted when prompted to recall information from the

witnessed event. If true, this is a dangerous phenomenon in forensic interviews, and may suggest that our judicial system needs to re-evaluate the way witnesses are questioned in order to make sure the information reported is true to the actual witnessed event.

Whether providing an opportunity to reflect upon all false-event questions would alter the likelihood of a confabulated item being falsely recalled was one of the questions addressed in an unpublished pilot study (Jensen & Engebretsen, 2007). Another unique aspect of this study was that it did not employ confabulated and implanted items, but rather used forced choice. Therefore, participants read a question and were presented with two answers which they were forced to choose between. Jensen and Engebretsen demonstrated that the forced choice method also led to false memories and proposed that this technique probably falls somewhere between implanted and confabulated items in regard to levels of processing. In order to look at the consequences of reflection with this method, participants rated their confidence in each answer they provided about a witnessed event. Therefore, when given the opportunity to reflect, would participants give a low confidence rating as an indication of resistance provided in previous research and would their ratings effect how likely they were to falsely recall the event one week later? Not surprisingly, it was found that participants were likely to give low confidence ratings to false information. However, their confidence ratings did not correlate with the likelihood that they would later falsely recall the event. In other words, this more internal, personal way of reflecting upon a false-event item by giving it a low confidence rating did not have the same kind of effect that overt statements of resistance had on false memories (Thomas & Johnson, 2007). Jensen and Engebretsen concluded that these findings may have resulted because the confidence scale did not measure the same kind

of resistance that spontaneous overt statements of resistance cause. However, because all participants reflected on and rated their confidence it was not clear what role the confidence intervals had on later false recall. With this in mind, the present study aimed to address this issue specifically by having half of the participants rate their confidence in each item (how confident they were that the item occurred in the witnessed event) and half not rate their confidence. Therefore, the current study sought to again look at confidence ratings as a form of self-reflection or internal resistance by the participants. In addition, this study was designed to run up to twenty participants at one time, which is new to experiments dealing with forced confabulation. Previously, studies that have examined this suggestive interview technique have forced participants to confabulate in a one-on-one interview (see Ackil & Zaragoza, 1998; Zaragoza, et al., 2001; Thomas & Johnson, 2007). An unpublished pilot study was able to demonstrate the false memory effect for forced choice false items in a large group setting (Jensen & Engebretsen, 2007). This study aims to extend this finding to confabulated items.

## Method

### *Participants*

The participants were 84 undergraduate students from a small private college in the Midwest who participated by signing up to complete a course requirement for General Psychology. Twenty-two participants' data were eliminated because they failed to follow the directions precisely, and four participants' data were eliminated due to failing to show up for the second part of the experiment. Therefore, 110 people participated in this experiment, but the analysis is restricted to the 84 who completed the

study without incident.

*Design*

This study used a 3x2 mixed design, with the false-event item type (implanted, confabulated, or control) as the within-subjects factor and confidence rating (confidence interval or no confidence interval) as the between-subjects variable. The dependent variable was the number of false-event items (implanted, confabulated, and control) reported in the free recall test.

*Materials*

An 8 minute video clip was viewed (see also Zaragoza, et al., 2001; Thomas & Johnson, 2007). The video clip was taken from the Walt Disney movie, "Looking for Miracles," which is about two brothers attending summer camp. The chosen clip included three scenes with different events that take place. The first scene takes place in the dining hall, where some proper ladies were visiting the camp, one of the campers' birthdays was celebrated, and the older brother tried to quiet the campers down, fell off a chair, and was chastised. The second scene began with the ladies walking down to the lake, they then sat in canoes and listened to folk tales, a snake appeared in the bottom of one canoe, the ladies jumped out and the counselor killed the snake. The third scene was of two boys picking on the younger brother, they pushed him into the lake, his brother (the counselor) told the boys to "Scram," he helped his brother out of the water, and the scene concluded with the younger brother running off crying.

A power point was used to simulate an interview where the false-event information was presented (see appendix A). The power point contained fifteen questions about the video, of which nine were true-event questions and six were false-event

questions. True-event questions were questions regarding things that actually appeared in the video clip, and false-event questions were misleading; they asked about things that never actually happened in the video. Each power point screen consisted of a question and a blank underneath. When a false-event question was used to elicit a confabulated response, the blank was not filled. When the same false-event question was used to provide an implanted response, the blank was filled with a response. Implanted items were those confabulated most frequently in previous research (Zaragoza et al., 2001).

Each power point consisted of five true-event questions where the answer was provided for the participants, four true-event questions where the participant had to generate their own answer, three false-event questions where participants encountered implanted items, and three false-event questions where the participants confabulated an answer. Three versions of the power point existed in order that each false-event question served equally often as an implanted, confabulated, and control item. After each question in the confidence condition, another slide appeared which had the confidence scale on it, which ranged from one being “not at all confident” to five being “extremely confident” that the item occurred in the video.

For the free recall test (see appendix B), participants sat at a computer and typed their memory reports in Microsoft Word. The instructions for the free recall test were presented on a power point on a large screen to the entire class, after which subsequent slides were used to prompt recall of the three scenes from the video. The first slide in each series was a one sentence description of the scene they viewed in the movie the previous week. The second slide asked the participants to write everything they could remember about this scene. Following this slide were supplemental questions that asked

participants to address certain parts of the scene (see Appendix B).

*Procedure*

*Phase 1: Movie viewing.* Participants entered the classroom, were instructed to fill out their consent forms and viewed the 8 minute video clip, serving as "eyewitnesses" to this event.

*Phase 2: Power Point.* Immediately following phase 1, the power point was presented on a large screen in the front of the classroom. Each participant had a blank answer sheet on which they recorded their answers, and confidence if in the relevant condition (see appendix C). The experimenter told the participants that the power point contained answers that a previous participant had recorded. Participants were informed that they were supposed to record these answers and write their own answers for the questions for which the previous participant did not record an answer. Therefore, if the answer was provided on the power point (implant condition) the participants were instructed to copy that answer onto their answer sheet. If the answer was not provided, they were instructed to write a tangible, plausible answer to the question (confabulate condition). The experimenter walked around the room as the questions were presented and monitored the answers the subjects wrote down; if a subject wrote "nothing" or an answer that was not tangible, they were instructed to provide a tangible answer. Participants then completed the Impression Questionnaire in which they filled out a five question survey asking them to evaluate the person who they were told provided the answers on the power point (see appendix D). This was used to distract the participant from the true intentions of the experiment, in order that they would not dwell on the false items they were presented with. The Impression Questionnaire took participants about

three minutes to complete.

*Phase 3: Testing.* One week later all participants returned to complete a free recall test. They were unaware of this test prior to their return. When they arrived, all the computers had a blank Microsoft Word document pulled up and the participants were instructed to write their participant number on the page and save the document as their number. The experimenter informed the participants that they had encountered some false information the previous week, and instructed them to complete this task with only the events they witnessed in the video. The experimenter read through the directions and then proceeded to go through each slide, one at a time, reading each question aloud to the participants. Participants were given as much time as they needed to answer the questions; the experimenter assessed this by moving on when all typing had ceased. When the power point came to an end, the participants saved their data and left. They were debriefed through email at the end of the experiment.

## Results

The data from eighty-four participants were analyzed using a 3x2 mixed Analysis of Variance. The within factor was the item type (implanted, confabulated, or control) and the between factor was the confidence condition (confidence interval or no confidence interval). The dependent variable was the proportion of times false-event items (confabulated, implanted, control) were reported, thereby showing how likely it was for an item to be falsely recalled on the free recall test. A main effect of item type was found between the implanted items (M=.17, SD=.24), confabulated items (M=.15, SD=.21), and control (M=.03, SD=.09), $F(2, 164)=13.7$, $p<.05$. A paired samples t-test

was used to examine this main effect. The mean number of false memories reported for implanted false-event items was significantly higher than the control, $t(83)=5.27$, $p<.05$. The mean number of false memories reported for confabulated false-event items was also significantly higher than the control, $t(83)=4.78$, $p<.05$. There was no statistically significant difference between the implanted and confabulated items. This reveals that participants were more likely to falsely recall implanted and confabulated items as compared to control items. However, participants were not more likely to falsely recall an implanted item as compared to a confabulated item and vise versa.

No main effect of confidence condition was found. Items falsely reported from the confidence condition (M=.36, SD=.55) did not differ statistically from the items falsely reported from the no confidence condition (M=.35, SD=.56), $F(1, 82)=.011$, $p>.05$, the observed power equals .051. This suggests that confidence judgments in and of themselves did not impact the likelihood of false-event memories. However, as is apparent in Figure 1, the implanted items have a trend towards more items being falsely recalled in the confidence condition, whereas, the confabulated items are very similar across the confidence versus no confidence conditions. Despite this apparent interaction between item type (implant and confabulate) and confidence interval condition, the results of the ANOVA did not reach statistical significance (the power was .337). Furthermore, Figure 2 shows an increase in implanted items being falsely recalled in the confidence condition as compared to the no confidence condition, although again, it was not statistically significant. Similarly, Figure 3 shows the comparison confabulated and control items, which reached statistical significance, but also demonstrates the similarity for the confabulated items between confidence conditions.

To further examine the role of confidence, the confidence interval ratings were examined and analyzed. The vast majority of false event items (implant and confabulate) were given low confidence ratings of either a "1" or a "2" (M=.84), whereas confabulated items had a mean of .98 and implanted items had a mean of .71. In other words, participants were demonstrating that they were relatively certain the events they recorded had not occurred in the video. To examine the extent to which these ratings may have impacted false memory development, I examined false memories for only those items rated a "1" or "2" during the interview. Figure 4 shows the mean number of times participants falsely recalled confabulated and implanted items they rated as not having appeared in the video. It is important to note the similarity between these data and the false-event items (implant and confabulate) in the confidence condition. This confirms that for the majority of the items that were falsely recalled, the participants had low confidence (at the time of the power point) that the item had occurred in the video. In other words, it does not appear as though providing a low confidence rating had any additional impact on false memory development.

## Discussion

This study demonstrated that both implanted and confabulated items were more likely to be falsely recalled than control items. This means that when participants copied an answer to a false-event question (as they do in the implant condition) and completed a free recall test one week later, they were more likely to say that this item occurred in the video than if they had never encountered the false-event question before. For example, one question participants may have received during the power point phase was: *What*

*type of hat was the boy wearing?* In the implant condition, the participants were provided with the answer: *baseball hat,* and they copied it onto their answer sheet. They were then more likely to report that the boy was wearing a baseball hat in the free recall test one week later than if they had not answered this question previously. A similar false memory effect occurred for confabulated items. That is, participants were more likely to report that the boy was wearing a baseball hat if they had been forced to confabulate this misinformation than if they had not been asked this question before. These findings demonstrate that both implanted and confabulated items are dangerous as they lead to false memories.

One might suspect that participants were simply reporting the false memories because they felt pressured to "help" the experimenter. In order to control for this, participants were informed at the time of the free recall test that they received some false information about the eyewitnessed event one week ago and that they were to record only the information they remembered occurring in the video. In addition, a new researcher administered the free recall test so that participant witnesses were never in the uncomfortable position of having to point out inaccuracies to the person who presented them with the misinformation. Providing these instructions and a new researcher to the participants reduced the effects of demand characteristics. Lindsay (1990) defined demand characteristics as when the participants base their report of the witnessed event on information they knowingly obtained from the narrative (misleading information presented after the event). However, the demand would now be to report only the information from the witnessed event, and despite this, false items were still reported. This thereby demonstrates that participants' false reports were not the result of

experimenter demand.

We can also be confident that the participants did not merely think these items occurred in the video at the time of the power point (when they were presented with the false-event questions) because of the confidence ratings the participants recorded. A low confidence rating of one or two implies that the participant was fairly certain the item did not occur in the video. As figure 4 shows, the number of items that were falsely recalled for items given a low confidence rating is nearly identical to the number of items falsely recalled when they have a confidence interval. This means that in the confidence condition almost all of the false-event items that were recalled had a low confidence rating, and thus the participants originally knew that the item did not occur in the eyewitnessed event. Therefore, the design of the experiment did not "trick" participants into thinking the item was in the video right after viewing it; rather the participants were indeed forming false memories after the power point phase and then reporting them one week later.

That these suggestive interview techniques are dangerous is a finding demonstrated by others (e.g. Ackil & Zaragoza, 1998; Zaragoza et al., 2001). However, few have shown that forcing participants to confabulate can lead to false memories on tests of free recall (see Thomas & Johnson, 2007) and to date, no published studies have demonstrated that forced confabulation can lead to false memories in a large group. Previous studies have used one-on-one interviews to provide the false information, force participants to confabulate misinformation and to assess their memory for the eyewitnessed event. This study demonstrated that both implanted and confabulated false-event memories can be created within a larger group of participants, thus enabling

researchers to utilize a larger research pool in a shorter amount of time. It must be noted along with this that it does take extra monitoring on the part of the researcher to ensure that participants record tangible, plausible answers for the confabulated items during the Power Point phase. This is a mere detail as the benefits of running numerous participants at once (as many as twenty has been done) are very valuable.

Despite the fact that there were no statistically significant results for the confidence interval conditions or an interaction between the condition and item type, an interesting trend did appear. The confabulated items did not show much difference at all between the confidence and no confidence conditions. This may be due to the fact that the confabulated items were already causing a lot of reflection by the participant. When forced to fabricate an answer to a false-event question, participants had to think about the witnessed event, try to remember what happened, and then make up something that did not exist. This fabrication may have been accompanied by negative emotions and self reflection, thereby leading the participants to realize or tell oneself that the answer was a fabrication that did not reflect what one truly witnessed. Therefore, the added reflection required by the confidence judgments may not have significantly increased the amount of reflection that was naturally elicited by confabulation. Conversely, the implant condition showed an increase in the number of false memories reported when they were asked to indicate confidence relative to when they did not. This increase is most likely mediated by the reflection required by the confidence judgment. In the no confidence condition participants simply copied down the answer and most likely did not engage in much thinking about it. In contrast, the confidence condition required participants to think about the answer they copied down, remember back to the eyewitnessed event and

analyze whether they recalled the item in order to establish how confident they are that it occurred in the scene. This reflection may be similar to the kind of natural reflection (e.g. emotion, cognitive processing) that occurs during forced confabulation. Therefore, this trend suggests that the added reflection caused the implanted items to be more likely to be falsely recalled one week later.

The apparent increase in false memories for the implanted items in the confidence condition may be related to Craik and Lockart's Levels of Processing Theory. The further reflection which was mediated by the confidence judgment for the implanted items probably caused the item to be processed more deeply. This deeper processing thus made the item more memorable. Without carefully monitoring the origin of their memory (i.e. that the item was implanted) it was especially susceptible to false memory one week later. The application of this theory would also predict that similar to the generation effect, confabulated items would be more likely to be falsely recalled on the free recall test than implanted items. Preliminary studies do in fact show this to be true in one-on-one interviews (Thomas & Johnson, 2007); however this experiment did not replicate this. More participants may be needed in order to reach statistical significance in this area. Regardless, the added reflection to the implanted items seemed to lead to deeper processing and therefore increased the likelihood that the item would be falsely recalled in the free recall test.

Even though participants may have been engaging in deeper processing, it is still somewhat surprising that they falsely recalled items they were once confident (during the power point) did not occur in the video. In other words, why would items given a “1” or “2” rating later become false memories? One possibility is that participants did not

carefully monitor the source of the information they were recalling. When typing what they remembered occurring in the video, participants may not always reflect upon or accurately recall where a memory originated. If they were thinking about this, we can presume they would not have reported confabulated and implanted false-event items that they previously knew did not happen in the video.

False memory research has implications far beyond just running participants in the laboratory. Our court system relies heavily upon eyewitness testimony and this research adds to the evidence that our memories may not be as accurate as we like to believe. In addition to the court, we rely on our memories and other people's memories everyday. We tend to not question people when they tell us what they saw happen; we take them at their word. However, their memory may not be as pure as we think; they may have encountered a situation that simulated an implant or confabulate condition.

An implant-like condition may arise at any eyewitness scene. For example, imagine being at the scene of a house fire. You are standing outside observing the tragedy along with six other people. After the firefighters have gotten the situation under control, one of the other bystanders makes a comment about how brave it was of the woman to carry the cat out of the house to safety. However, you saw the woman come out of the house, but have no recollection of her carrying a cat and are fairly certain there was never a cat anywhere in the scene. This research suggests that despite your own personal convictions, you are significantly more likely to later recall that a woman carried a cat out of the house than if you had not heard the bystander's comment.

Situations that may be especially similar to confabulated items may arise in a coercive interview. A coercive technique could be employed intentionally or

unintentionally by a police officer, a parent, or any number of other people in authority. Return yourself to the previous scenario, except this time imagine that no one said anything about the woman carrying a cat. Therefore, you were watching this fire and did see a woman come out of the house. However, this time a man approaches you and asks what type of animal the woman was carrying. You may feel inclined to make up an answer in order to preserve your image. Despite this feeling, imagine that you told the man that you do not recall an animal; regardless, he says that there was and insists you tell him the type. In order to appease the man you tell him she might have been carrying a cat. Again, the current research findings suggest that you may be in danger of later reporting that there was a cat in the scene. Whereas this particular example may not have devastating consequences, it is easy to see that within a court case, false memories can be a significant problem and have serious detrimental consequences.

That memory implantation and forced confabulation can lead to false memories despite witnesses' confidence at initial exposure that these events were not present, and that they can occur even in the absence of the pressure inherent in individual interviews is important to know. However, the ideas of resistance and reflection deserve more attention and investigation as the results seem to suggest that deep reflection, the kind that may be encouraged by investigative professionals may in fact be particularly harmful to the accuracy of subsequent recall. Eyewitness testimony is crucial to the functioning of our society and this research continues to contribute to the existing literature that suggests there are many factors that interfere with witnesses ability to report from memory, "The truth, the whole truth, and nothing but the truth."

References

Ackil, J.K. & Zaragoza, M.S. (1998) Memorial consequences of forced confabulation: Age differences in susceptibility to false memories. *Developmental Psychology, 34*(6), 1358-1371.

Chambers, K.L. & Zaragoza, M.S. (2001) Intended and unintended effects of explicit warnings on eyewitness suggestibility: Evidence from source identification tests. *Memory and Cognition, 29*(8), 1120-1129.

Craik, F.I.M. & Lockart, R.S. (1972) Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11,* 671-684.

Craik, F.I.M. & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology: General, 104*(3), 268-294.

Geghman, K.D. & Multhaup, K.S. (2004). How generation affects source memory. *Memory & Cognition, 32*(5), 819-823.

Jensen, K.L. & Engebretsen, A. (2007, December). *False memories: Forced choice questionnaire leads to creation of false memories.* Poster session presented at the Gustavus Adolphus Psychology Symposium, Gustavus Adolphus College, St. Peter, MN.

Jurica, P.J. & Shimamura, A.P. (1999). Monitoring item and source information: Evidence for a negative generation effect in source memory. *Memory & Cognition, 27*(4), 648-656.

Lindsay, D.S. (1990). Misleading suggestions can impair eyewitnesses' ability to remember event details. *Journal of Experimental Psychology: Learning, Memory,*

*and Cognition, 16*(6), 1077-1083.

Lockart, R.S. & Craik, F.I.M. (1990). Levels of processing: A retrospective commentary on a framework for memory research. *Canadian Journal of Psychology, 44*(1), 87-112.

Loftus, E. F. (1992). When a lie becomes memory's truth: Memory distortion after exposure to misinformation. *American Psychological Society, 1*(4), 121-123.

Loftus, E.F. (1996). Memory distortion and false memory creation. *Bulletin of the American Academy of Psychiatry and the Law, 24*(3), 281-295.

Loftus, E.F. (2005). Memory for a past that never was. *Key Readings in Social Psychology* (539-564). New York: Psychology Press.

Slamecka, N. J., & Graf, P. (1978). The generation effect: Delineation of a phenomenon. *Journal of Experimental Psychology; Human Learning and Memory, 4*(6), *592-604.*

Thomas, K. & Johnson, S. (2007, April). *False memories: An interaction between suggestive interview technique and memory test.* Poster session presented at the Annual Minnesota Undergraduate Psychology Conference, St. Olaf College, Northfield, MN.

Zaragoza, M.S. & Lane, S.M. (1994). Source misattributions and the suggestibility of eyewitness memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20*(4), 934-945.

Zaragoza, M.S., Payment, K.E., Ackil, J.K., Drivdahl, S.B., & Beck, M. (2001). Interviewing witnesses: Forced confabulation and confirmatory feedback increase false memories. *American Psychological Society, 12*(6), 473-477.

## Figure Captions

*Figure 1*. The mean false memory rate shows how likely a participant is to falsely recall an item previously encountered as false information. There were no statistically significant differences between the implanted and confabulated items or the different confidence conditions. However, there does appear to be a trend forming where the implanted items are being falsely recalled more frequently in the confidence interval condition.

*Figure 2.* Participants were significantly more likely to develop false memories for implanted items (the blue bars) relative to control items (yellow bars). The difference between the confidence and no confidence conditions was not statistically significant.

*Figure 3.* Participants were significantly more likely to develop false memories for confabulated items (the red bars) relative to control items (yellow bars). The difference between the confidence and no confidence conditions was not statistically significant.

*Figure 4.* Even when participants gave a confidence rating of a “1” or “2” (indicating low confidence that the item occurred in the video) they were more likely to falsely report the item on a free recall test one week later as compared to control items (note the similarity between the confidence ratings of one or two and the confidence ratings conditions). This demonstrates that even though participants knew that the item did not occur at the time of the misinformation, they nonetheless came to develop a false memory of the information happening in the video.

Figure 1: Implanted and Confabulated Items

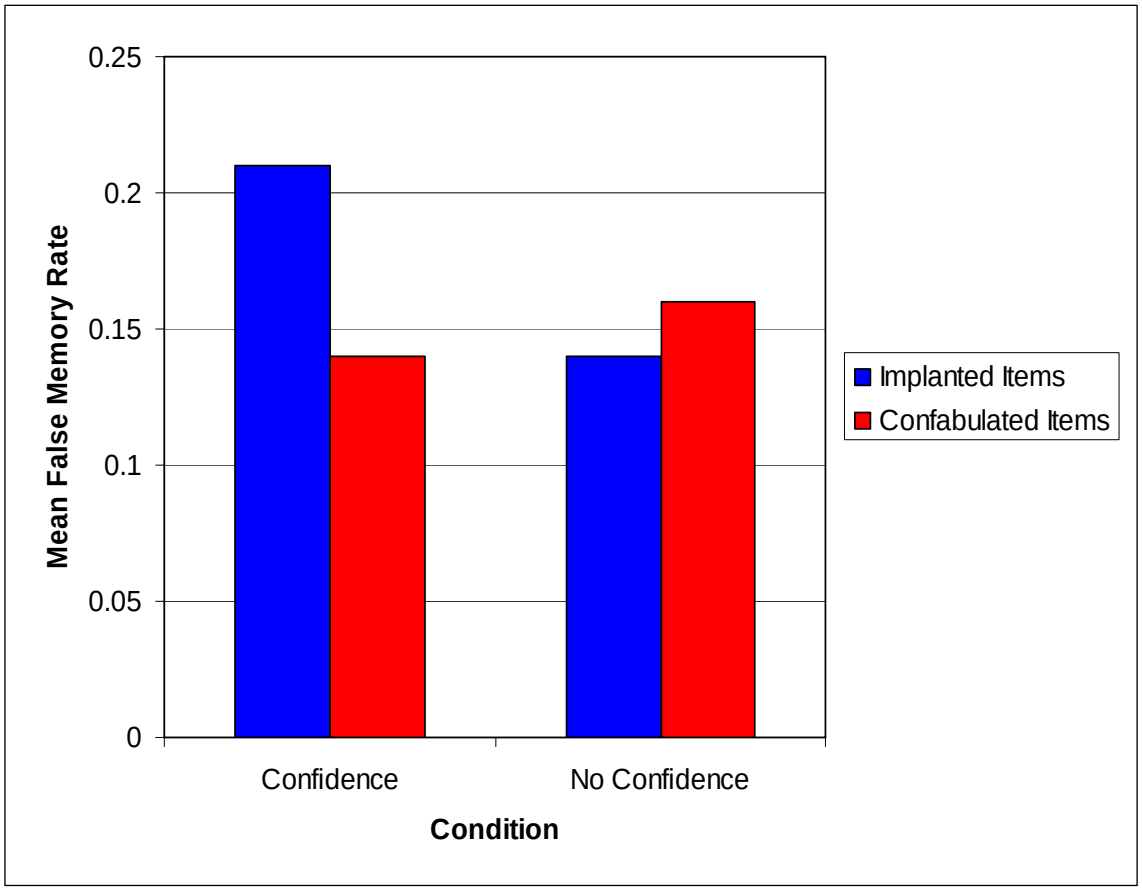


Figure 2: Implanted Items

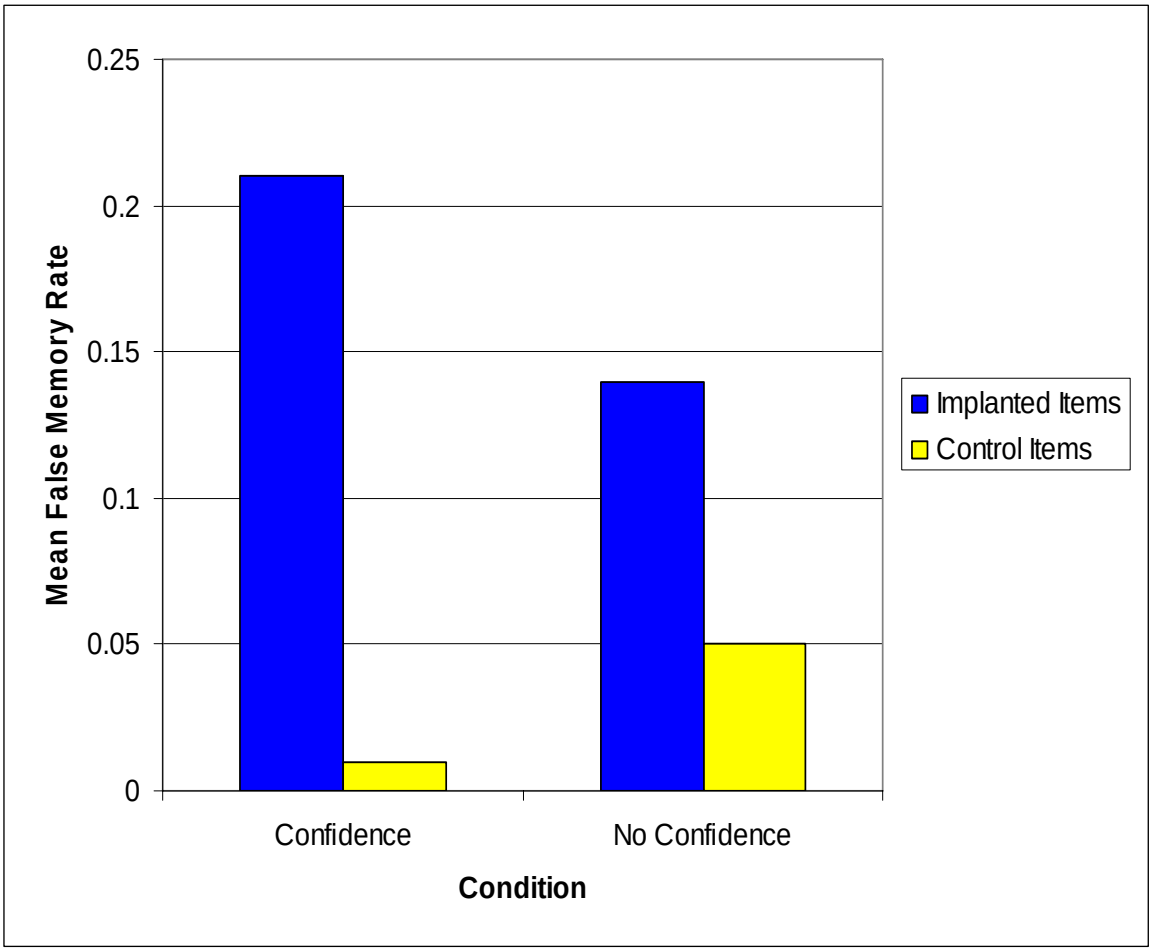


Figure 3: Confabulated Items

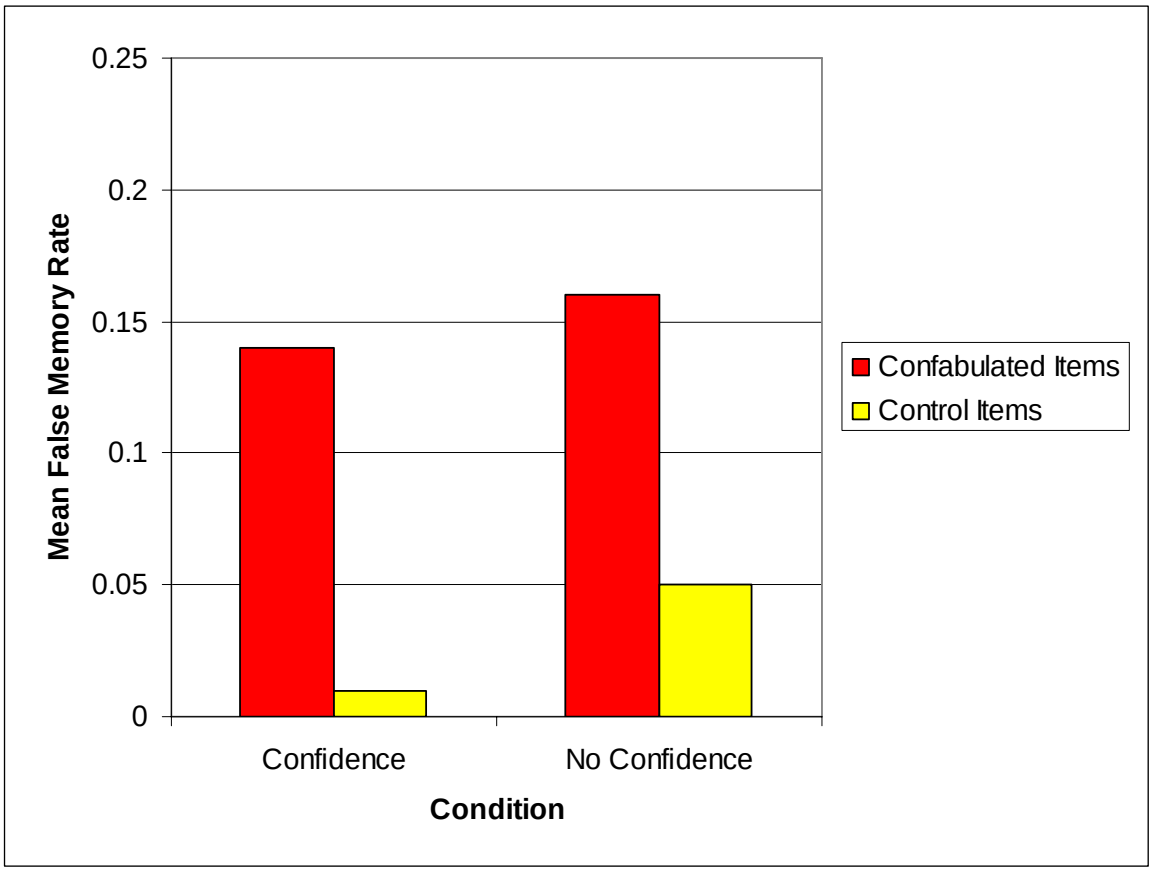
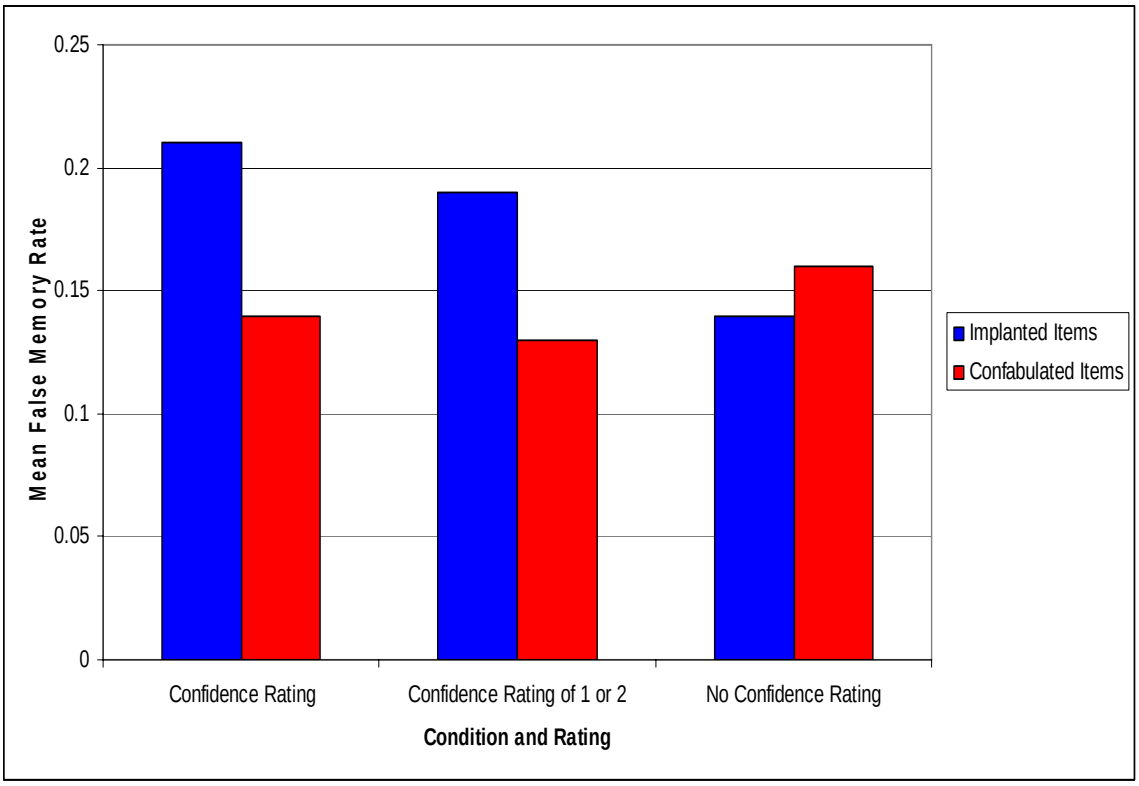
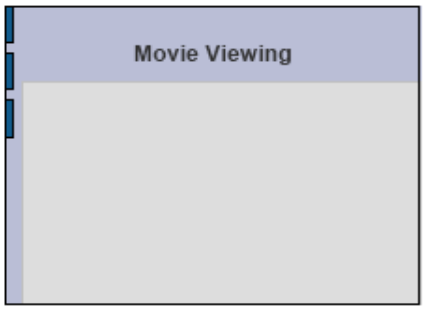


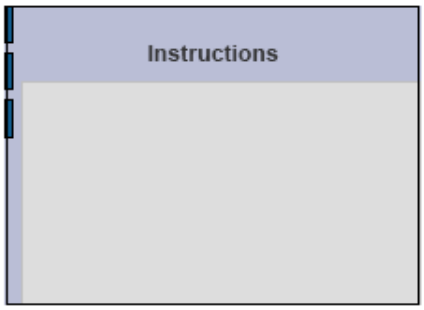
Figure 4: Confidence Ratings of 1 or 2

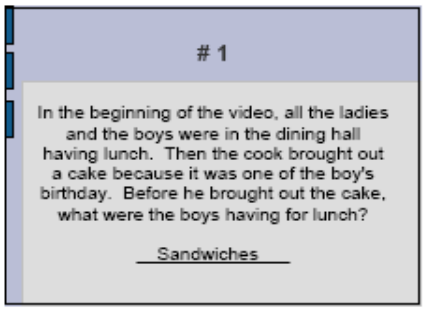


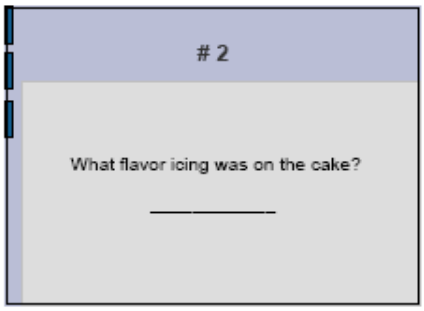
# Appendix A

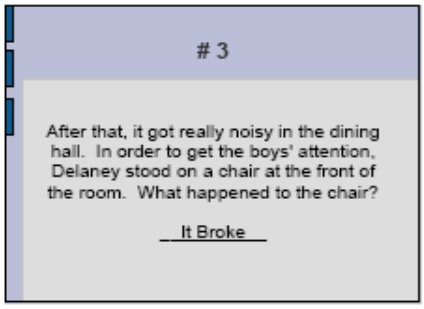
## Version A Power Point

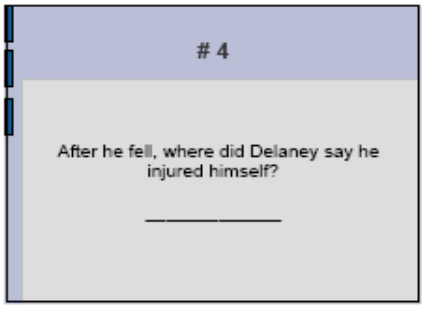


# 5

In the next part, everyone was outside walking down a dirt path, and some of the ladies had a hard time walking on their high heels. Where was everyone going?

The Lake

# 6

Then the ladies took a ride around the lake in the boats. While Delaney talked about Indian folklore, the ladies screamed. What was it that scared the ladies?

A Snake

# 7

What did the ladies do when they saw the snake in their boat?

Jumped out

# 8

The ladies swam toward the other boat in their clothes. While swimming to the other boat what did one of the ladies say she had lost?

_____

# 9

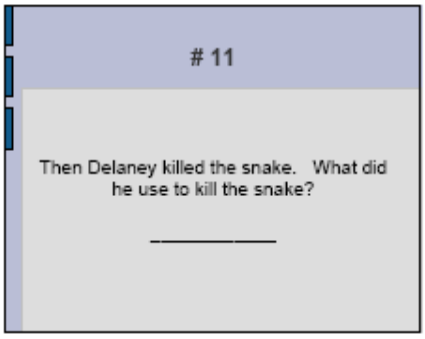
Who was the only person who stayed in the boat with the snake in it?

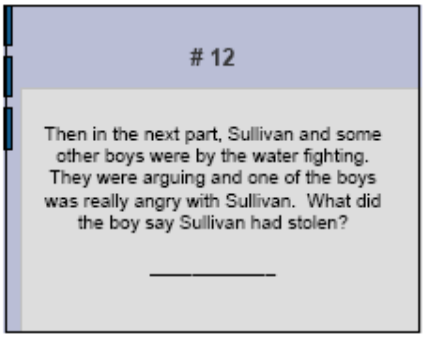
_____

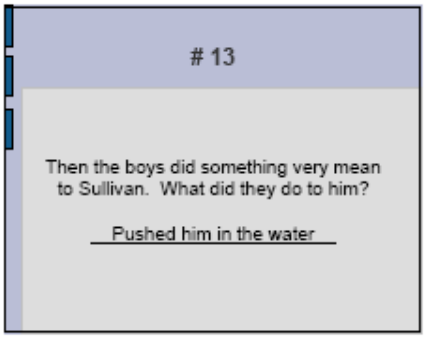
# 10

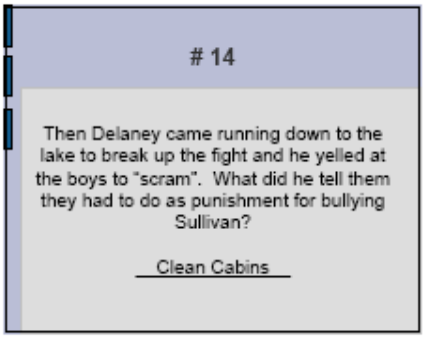
Meanwhile, Sullivan and the other boys were standing on the dock watching anxiously as Delaney tried to kill the snake with his paddle. What was Sullivan wearing around his neck?

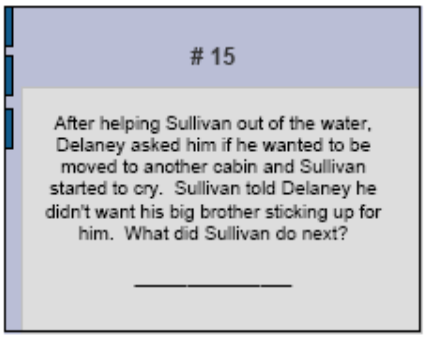
Bandana

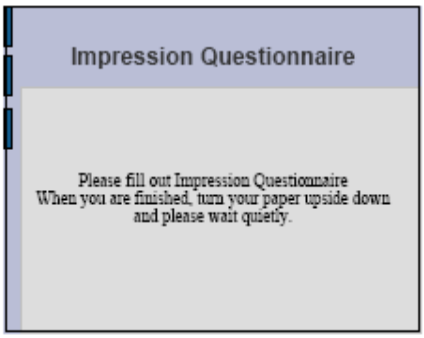

# 11
Then Delaney killed the snake. What did he use to kill the snake?
_____


# 12
Then in the next part, Sullivan and some other boys were by the water fighting. They were arguing and one of the boys was really angry with Sullivan. What did the boy say Sullivan had stolen?
_____


# 13
Then the boys did something very mean to Sullivan. What did they do to him?
Pushed him in the water

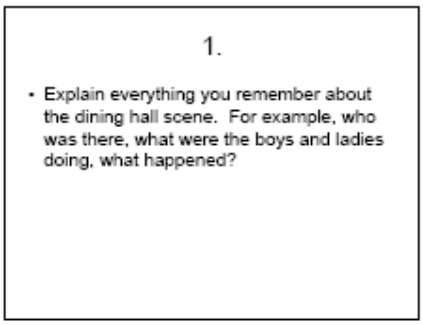

# 14
Then Delaney came running down to the lake to break up the fight and he yelled at the boys to "scram". What did he tell them they had to do as punishment for bullying Sullivan?
Clean Cabins

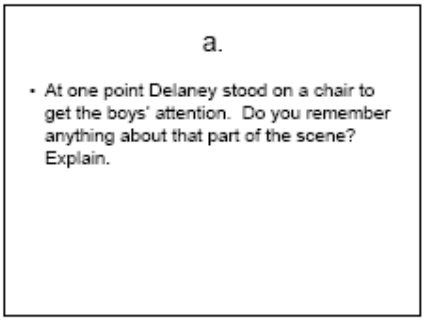

# 15
After helping Sullivan out of the water, Delaney asked him if he wanted to be moved to another cabin and Sullivan started to cry. Sullivan told Delaney he didn't want his big brother sticking up for him. What did Sullivan do next?
_____

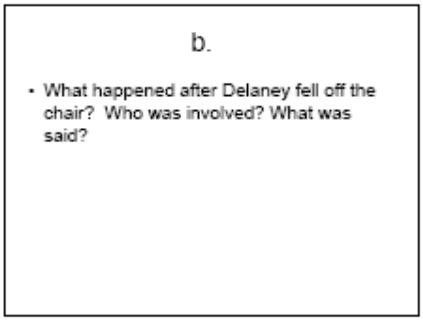

Impression Questionnaire
Please fill out Impression Questionnaire
When you are finished, turn your paper upside down and please wait quietly.

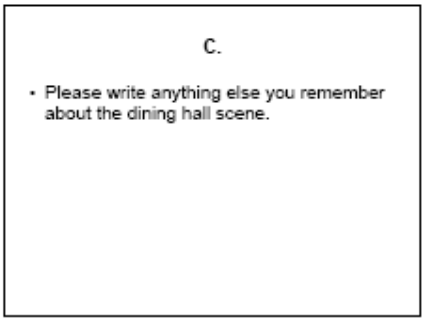
# Appendix B

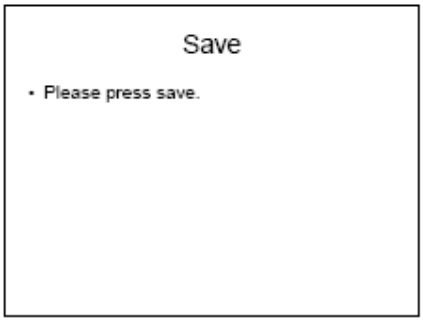
## Free Recall Test

## Boat Ride Scene

- In the boat ride scene, everyone went down to the lake to take a ride in the boats.

## 2.

- Can you tell me who was there?

## a.

- Was Sullivan in this scene?

## b.

- What were the ladies wearing?

## c.

- What was Delaney wearing?

## d.

- What was Sullivan wearing?

e.

- Now explain everything you remember happening in the lake scene.

f.

- Do you remember anything else happening after Delaney killed the snake? Explain.

g.

- Please write anything else you remember happening in this scene.

Save

- Please press save.

Fight Scene

- In this part, Sullivan and some other boys were by the water arguing and fighting.

3.

- Please write everything you remember about the first part of this scene when the boys were fighting. For example, what happened?, what did the characters say? Why were they fighting?

a.

- Then, Delaney ran down to break up the fight. What happened next?

b.

- What happened at the end of the scene?

c.

- Please write anything else you remember from this scene.

Overall (4.)

- Please write anything else you remember from the video.

Save

- Please press save.

Directions:

- If you have not already, Please save this and make your participant number the document name.
- Print your document.
- Please leave your document open on the computer when you leave.

# Appendix C1

## Answer Sheet with Confidence Interval

S#_____

Have you seen this video before? Yes No

1. _____ 1 2 3 4 5
2. _____ 1 2 3 4 5
3. _____ 1 2 3 4 5
4. _____ 1 2 3 4 5
5. _____ 1 2 3 4 5
6. _____ 1 2 3 4 5
7. _____ 1 2 3 4 5
8. _____ 1 2 3 4 5
9. _____ 1 2 3 4 5
10. _____ 1 2 3 4 5
11. _____ 1 2 3 4 5
12. _____ 1 2 3 4 5
13. _____ 1 2 3 4 5
14. _____ 1 2 3 4 5
15. _____ 1 2 3 4 5

# Appendix C2

## Answer Sheet without Confidence Intervals

S#_____

Have you seen this video before? Yes No

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

# Appendix D

## Impression Questionnaire

Impression Questionnaire

1. Do you think the person who provided these answers was male or female?
   a.) male b.) female

2. If you had to guess, would you say this person was a first year student, a sophomore, a junior or a senior?
   a.) first year student
   b.) sophomore
   c.) junior
   d.) senior

3. If you had to rate this person's creativity, would say the he or she is,
   a.) highly creative
   b.) somewhat creative
   c.) not at all creative
   d.) unsure

4. How responsible would you judge this person to be on a scale from 1 to 5, where 5 is extremely responsible, 1 is not at all responsible, and 3 is unsure?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| not at all responsible | | unsure | | extremely responsible |

5. Would you like to meet this person?
   a.) definitely yes
   b.) probably yes
   c.) not sure
   d.) probably not
   e.) definitely not