THE EFFECTS OF MISINFORMATION, INTENT TO REMEMBER, AND AGING ON EVENT MEMORY

By

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To my parents

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THE EFFECTS OF MISINFORMATION, INTENT TO REMEMBER, AND AGING ON EVENT MEMORY

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Two studies were conducted to examine eyewitness memory. In Study 1, a live event was enacted to assess the effects of misinformation on eyewitness memory under intentional and incidental encoding conditions. The relationship between confidence and accuracy was assessed. As expected, performance on a recognition and directed recall memory test was better in the intentional condition than in the incidental condition. Encoding condition had no effect on free recall performance. Participants in both encoding conditions who received misinformation reported more false details in free recall and directed recall than those who were not misinformed, and were just as confident in their false memories as their accurate memories. The effects of misinformation were just as salient in the intentional as the incidental encoding condition.

In Study 2, the same event was used to examine the misinformation effect in older adults (OA) as compared to younger adults (YA) in incidental and intentional encoding conditions. Confidence and memory self-efficacy were also assessed. The main findings of Study 1 were replicated. In addition, YA scored higher on all recall tests and recognized the target face more often than OA in both encoding conditions.

Furthermore, in the intentional condition, YA and OA made an equal number of misinformation errors, but in the incidental condition, YA made more misinformation errors than OA.

This is one of the first studies to examine the misinformation effect in a real-world setting while directly comparing age differences in intentional and incidental memory conditions. These results demonstrate that age-related memory deficits are present in real world situations, and that people of all ages are misled by misinformation even when they are focused on trying to memorize everything about an event. Furthermore, people of all ages are often confident about their false memories. These results emphasize the fallibility of everyday memory even under supportive learning conditions.

CHAPTER 1
STUDY 1: BACKGROUND

The following quote, from the movie *Memento* (2001), summarizes quite accurately the nature of human memory: "Memory's unreliable. Memory's not perfect. It's not even that good. Ask the police; eyewitness testimony is unreliable. Memory can change the shape of a room or the color of a car. It's an interpretation, not a record. Memories can be changed or distorted, and they're irrelevant if you have the facts." Considering the already fragile state of the human memory it is important to understand fully its accuracy, limitations, and ability to be distorted in order to find ways to improve and interpret memories of events.

Our memories for events lay the foundation for how we live our day-to-day lives. We base our decisions today on what we remember from past experiences. The events in our lives, from the mundane to the life changing, are of consequence because they are remembered. Our recollections have lasting consequences not only for ourselves but also for others. In the criminal justice system, eyewitness testimony can determine whether another person lives in prison, lives in freedom, or doesn't live at all. Civil cases, such as who is at fault in a car accident, rely on eyewitness testimony as well. Eyewitness testimony is a result of memory and a great deal of faith is placed in the reliability of human memory. Loftus illustrates this point:

> Several years ago I conducted an experiment in which subjects acted as jurors in a criminal case. First they heard a description of a robbery-murder, then a prosecution argument, then an argument for the defense. In one version of the experiment, the prosecutor presented only circumstantial evidence; faced with this evidence, only 18 percent of the 'jurors' found the 'defendant' guilty. In a second version, the prosecutor pled the exact case with one difference: There was testimony from a single eyewitness--a clerk who identified the defendant as the robber. Now 72 percent of the jurors found the defendant guilty (Loftus & Ketchman, 1991, para. 14).

The power of eyewitness testimony is very apparent. Memory, however, is not a video representation of events, but instead it is a process of re-gathering old information and putting it back together. Thus, it is important to understand this process in order to find ways to improve and interpret memories of events for adults of all ages.

Overview of Memory Processes

It is understood that there are three processes involved in our memory system: encoding, storage, and retrieval. During encoding, memory is transferred from short-term to long-term memory when neurons are linked together to form new circuits (Loftus, 1991). Memories that reach long-term storage are placed into three categories: 1) explicit memory, including memory of facts and knowledge (semantic memory), and memory for personal life experiences (episodic memory); 2) implicit memory, and 3) procedural memory (Griggs, 2009). The present research focuses on episodic memory. Retrieval is the process of retrieving what was stored in long-term memory to short-term memory in order to bring it to conscious awareness (Griggs, 2009). Encoding can happen either by automatic processing (subconsciously) or effortful processing (consciously).

In order for a memory to be accurately retrieved it must first be accurately encoded. If a memory is never encoded into long-term memory, then accurate retrieval is not possible. Retrieval is measured in two ways: recall and recognition. Recall occurs when a memory is reproduced verbally or in writing. This can occur by means of cues (directed recall) or without cues (free recall). Recognition merely requires the identification of images or information previously viewed. Another important aspect of memory is that it is known to decay over time, but the periodic use of information will help to maintain it (Griggs, 2009). This important fact emphasizes that our memories are far from perfect and are by no means permanent.

Our memories are generally good enough for day to day function. We share experiences and stories with one another and reminisce without much thought of whether exact details are accurate. In these situations, it is acceptable if only the gist is remembered. But when our memories are relied upon to recall specific details and recognize unfamiliar faces, emphasizing the reliability of memory, the negative consequences resulting from a memory error may be greatly increased. The present study seeks to address the impact of misinformation on recall of a real life event.

Misinformation

It is well established that the accuracy of eyewitness testimony can be significantly compromised by misleading post-event suggestion (Loftus & Palmer, 1974; Zaragoza & Lane, 1994; Sutherland & Hayne, 2001). Research has shown that participants can be influenced to report details in a scene that differ from what they actually witnessed. This phenomenon is known as the misinformation effect, which occurs when a memory is "distorted by subsequent exposure to misleading information" (Griggs, 2009). Misleading information can be presented in the form of a narrative or the subtle rewording of a question. A classic example of this is shown in the experiment conducted by Loftus and Palmer (1974) in which participants viewed a video of a car accident and were asked questions about the event. When asked, "About how fast were the cars going when they smashed into each other," participants estimated that the car was travelling faster than when other verbs were used (Loftus and Palmer, 1974). Furthermore, when participants were tested a week later, those who were presented with the word *smashe*d were more likely to report seeing broken glass at the scene even though there was none. The results of this study illustrated the power of suggestibility and how it can be used to distort memories.

Research has also focused on which aspects of an event are most susceptible to distortion. Sutherland and Hayne (2001) focused specifically on central details and peripheral details. Participants viewed a 4.5 minute video of a child becoming separated from her parent in a grocery store. With the help of a policeman she was eventually reunited with her parent. Participants were told they were viewing the video to evaluate whether or not it was acceptable for children. They were not aware that they would be asked to recall details. In a second experiment, holding everything else equal, participants were exposed to misinformation that was neutral, leading, or misleading. It was found that when memories for minor aspects of an event were weak (peripheral details), the presence of misinformation increased the number of commission errors reported. In contrast, when participants' memories for crucial details of an event were strong (central details) the effect of misinformation was much smaller (Sutherland and Hayne, 2001).

Source Memory

It is believed that memory impairments occur when misinformation is provided because the memory for the source of that information is blocked or hindered (Belli et al., 1994). This phenomenon is referred to as source misattribution or a source memory error. In other words, source misattribution occurs when we do not remember the original source of a memory and falsely assign a different source to that memory (Griggs, 2009). For example, you may think about taking medication, then later believe you took it when you actually only thought about taking it. In this case, you attribute the source to reality when the event actually occurred only in your mind. This is especially likely to happen if the false source is realistic, or believable. This effect can also be caused by dreams or conversations. As time goes on, even though the actual memory remains, the source of the memory decays and can be misattributed to a dream, imagination, or a combination of other real-life events. Loftus comments that false memories usually involve elements of truth, but the source of these memories often becomes unclear (Goleman, 1994).

Belli and colleagues (1994) tested the effects of misinformation and source misattribution by having participants view slides, then, after a five-minute filler task, read a narrative that contradicted two events in the slides. Recall was tested after a short delay. Before taking the recall test, participants were informed that there was some false information in the narrative, but it was mostly accurate. For the recall test, they were told to write down every detail they could remember, even if that detail was thought to be inconsistent between what was seen on the slides and read in the narrative. Specific instructions were given to distinguish what they thought was consistent information and what was thought to be inconsistent. Guessing was encouraged. It was found that suggested details were often remembered by participants as details actually seen in the event. This indicates that misinformation has the ability to impair details of an event for the reason that participants could not remember the original source of that detail (Belli et al., 1994). Belli and colleagues (1994) conducted further experiments in order to control for the possibility of some other memory impairment as a cause for performance, as opposed to source misattribution, and found that slides for control items were answered reliably more correctly than slides involving misinformation. It was also consistently found that even when warned about the presence and effects of misinformation, participants still reported misinformation as being accurate (Belli et al., 1994).

The presentation format of misinformation has also been examined. Zaragoza and Lane (1994) presented misinformation in the context of questions or a narrative description. To test the effects of each format, participants viewed a series of slides and were then asked to explain the event depicted in the slides. Following the viewing of the slides, participants were presented with misinformation in one of two formats. One group received misinformation in the form of questions that were asked about the slides. The other group received a written narrative that contained misinformation about what was shown in the slides. The researchers tested for the possibility that the participants may have reported the suggested items even if they had not been misled by false information, and found that this was not the case. A source memory test was administered. It was found that the source misattribution effect was significant for both the questions and narrative conditions. This source misattribution effect was more prevalent in the questions condition and smaller, but still reliable, in the narrative condition. In other words, when participants were exposed to misleading information in writing (either by questions or a narrative) they came to believe that they had actually seen the events suggested by the misinformation (Zaragoza & Lane, 1994).

Additionally, Nash, Wade, and Lindsay (2009) have shown the effects of source misattribution and misinformation. In Session 1 of their study, participants watched an experimenter complete a simple action and then mimicked each action. Two days later, during Session 2, they were shown videos that had been altered to suggest that they had performed additional actions that they in fact never performed. That is, the video was manipulated to make it appear as though they had watched an experimenter perform an action, implying that they then mimicked that action, as they had previously done with other actions. The fake clips did not show the participant performing the actions, only observing the experimenter perform them. In order to make this false evidence believable, the fake clips were interspersed among 10 untouched clips of the participants observing the experimenter perform actions that the participants themselves had also previously performed in Session 1. After viewing the manipulated videos in Session 2, the participants were then shown a video of an action and told to close their eyes and imagine themselves completing that action. Of the 15 actions, two were defined as critical: one of these was in the manipulated video, and the other was not. The memory test was conducted two weeks after the first session. In the memory task, the participants were told to rate the extent to which they believed they performed each action, using an 8-point scale, where "1 = *I definitely did not do this* and 8 = *I definitely did do this*. Next, they rated their memory of performing each action, using an 8-point scale, where 1 = *no memory of doing this* and 8 = *clear and detailed memory of doing this*" (Nash et al., 2009, p. 416). It was found that false evidence was adequate to cause memory distortions:

> *The present results lead us to conclude that watching a 10 sec doctored video clip was just as hazardous as imagining a critical action for 40 sec. Even without imagination, our doctored videos were sufficient to cause significant belief and memory distortions…when the two forms of suggestion were combined, they had an additive or superadditive effect (Nash et al., 2009, p. 418).*

In a second experiment these results were replicated (Nash et al., 2009). It was also found that even when warned about the effects of image editing (in order to prime the participants to the altered videos), and when warned that what appears to be a clear memory could actually be an imagined event, these effects were not significantly reduced.

Why is it relatively simple to mislead people and distort their memories? Reyna and Brainerd (1995) introduced fuzzy-trace theory as an explanation. Their view is that memories are represented as exact details as well as gist representations of an event. A false memory may occur when an exact representation from a different event is retrieved along with a gist representation of the event trying to be remembered. False details that are gist consistent may lead to a feeling of familiarity, and when combined with exact details from the true event, distortions and false memories can occur (Reyna & Brainerd, 1995). Also, in order to compensate for an imperfect memory of an event, people may make inferences about what may have happened to fill in their memory gaps, causing confusion of the sources (Goleman, 1994). Furthermore, Loftus (2002) comments that, "All memory involves reconstruction. We put together pieces of episodes that are not well connected, and we continually make judgments about whether a particular piece belongs in the memory or not. One expects to see shuffling of pieces with a process that works like this" (p. 7). Mesulam sheds light on the neural basis for this type of memory error:

> What we witness is encoded over neurons that were involved in remembering things we witnessed earlier, and later ones was encoded over the new one. There are no fresh neurons, like a clean diskette. There's a constant remolding of memory in the brain as older memories are redistributed by newer ones… [Given the scientific evidence for the frailty of memory], the miracle is that anything we remember is true…not that there is distortion (Goleman, 1994, C8).

Due to the presentation of misinformation and difficulty remembering the source of a memory, it is clear that memories for events are prone to inaccuracy. Another factor that has been shown to affect memory performance, and the misinformation effect, is intent to remember.

Incidental and Intentional Memory

Awareness and intention to remember information play a key role in memory performance. Intentional encoding conditions are enacted when participants actively try to remember what they see, whereas incidental encoding conditions are conditions in which participants are aware of what’s going on but are not making an effort to remember what they see. It has been shown that intentional memory conditions result in more accurate memory recall and recognition than incidental encoding conditions (Davies & Hine, 2007; Block, 2009; Migueles & Garcia-Bajos, 1999). It is theorized that intentional conditions produce better recall and recognition results than incidental conditions because of more frequent rehearsal. Kausler (1985) explains that without rehearsal, memories decay after about 12 seconds. In incidental conditions, participants have no reason to actively remember what they see, causing the memories to decay. Conversely, intentional conditions encourage participants to rehearse what they see, causing it to remain in short-term memory and even transfer to long-term memory.

Although intent to remember is clearly an important variable affecting recall and recognition accuracy, it has rarely been examined in studies of event memory and misinformation. There is evidence that misinformation occurs in incidental memory conditions (Loftus & Palmer, 1974) and in intentional memory conditions (Belli et al., 1994) but the two types of circumstances are rarely compared directly, even though both types of conditions could occur in eyewitness scenarios. For example, police may want to question a witness about who came into his office to rent a car, if the car was later used in a crime (incidental), or a witness may observe a beating from the safety of his home and want to recall the details to give to the police whom he has just called (intentional). Not including studies that examine the effects of being warned about the presence of misinformation (Belli, 1994, Jacoby, 1999, Nash et al., 2009), to our knowledge, there are only two studies of eyewitness memory comparing directly incidental and intentional encoding conditions (Davies & Hine, 2007; Migueles & Garcia-Bajos, 1999).

Davies and Hine (2007) conducted a study in which participants viewed a video depicting a robbery. Halfway through this 2-minute video, the actor playing the robber was replaced by a different actor. Participants were tested for the recall of the video content, awareness of the change in actor, and ability to identify either or both of the burglars. Some participants were placed in an experimental group where they were told they would need to remember the video's content (intentional condition), while other participants were just told to watch the video as a demonstration of the importance of keeping houses secure (incidental condition) (Davies & Hine, 2007). The results indicated that participants in the intentional condition noticed the change of actor significantly more often than those in the incidental condition. It was also found that there were significant differences in the way participants of each gender responded. In the intentional condition, more women than men detected the change, but for the incidental condition, there was no gender difference. Of those who noticed the change, 56% were able to identify both robbers in a line-up, compared with none of the participants who did not notice the change (Davies & Hine, 2007).

In incidental and intentional memory conditions, Migueles & Garcia-Bajos (1999) examined recall and recognition of details of a video of a kidnapping. More details were recalled and confidence ratings were higher by participants in the intentional condition than the incidental condition. With so many factors affecting memory, many of which lie below awareness, it is often difficult to know when someone is remembering correctly or not, even when they are highly confident. As a result, a common practice in memory research is to assess confidence-accuracy relationships.

Confidence

Confidence in memory is assessed after someone has made a decision about a photo in a lineup or answered a question regarding details in an event. It is important to assess the confidence of recall or recognition. After all, the more confident an eyewitness is in their testimony, the more believable they are perceived to be. There is conflicting research, however, regarding whether or not confidence is a reliable predictor of accuracy. Some studies report a positive relationship between confidence and accuracy (Adams-Price, 1992; Karpel et al., 2001), and others find no such relationship (Deffenbacher et al., 1981; Adams-Price, 1992).

Research has also noted that high levels of confidence can be associated even with false memories using lists (Roediger & McDermott, 1995) and eyewitness memory scenarios (Migueles, & Garcia-Bajos, 1999). In a study conducted by Roediger and McDermott (1995) participants listened to a list of 12 words and then immediately wrote down as many as they could remember. They were then shown a sheet containing a second list of words and were told to determine whether or not each word they heard was on that second list and to indicate how confident they were of their decision. Finally, a third list of six words (some on the original list and some not) was read aloud and participants were told to indicate whether or not they thought each word was on the original list. It was found that false recognitions were frequently made with high levels of confidence. In an eyewitness memory situation, Migueles and Garcia-Bajos (1999) found that confidence in false alarms was higher than confidence in correct rejections.

In the general context of event memory, Kebbell, Wagstaff, and Covey (2006) assessed whether or not confidence varied based on the difficulty of a question. Participants in this study viewed a 5.5 minute video of an older couple in their home with a doctor. Following the vido, participants completed a short filler task and a recall questionnaire. The questionnaire consisted of easy and hard questions. They found that confidence was significantly higher in easy and correctly answered questions than in hard and incorrectly answered questions. Adams-Price (1992) also found that participants were more confident in their identification of people who were highly visible in a video, as opposed to those who were less easy to see. These finding support Deffenbacher's (1980) optimal information processing theory, described below.

Under optimal information processing conditions during encoding and retrieval, witnesses should be able to more accurately assess their memory performance as compared to witnesses under less ideal processing conditions (Deffenbacher, 1980). When witnesses are unsure of their confidence level, they may tend to express a level of confidence based on some other variable – as simple as their personality. Factors that may contribute to an optimal encoding environment include knowledge of a memory test to come (intentional encoding condition), the proper amount of stress to increase vigilance, enough time to view stimuli, familiarity with stimuli, similar conditions for encoding and retrieval, etc… (Deffenbacher, 1980). After applying specific Optimal Processing Conditions criteria to 25 reviewed studies of confidence and memory, Deffenbacher (1980) found strong support for the optimal processing hypothesis. That is, when examining the reason why some studies found positive correlations between confidence and accuracy and others did not, those studies that contained optimal processing conditions resulted in positive correlations between confidence and accuracy, whereas those that did not have optimal processing conditions resulted in no correlation between confidence and accuracy. Specifically,

> 77% of available research findings are supportive of the notion that the strength of the accuracy/confidence relation and the optimality of the information processing conditions are directly related: High optimal conditions tend to produce a significant positive relationship, while low optimal conditions tend to result in a zero, or even reversed relationship (Deffenbacher, 1980, p. 247).

This is relevant in the sense that credibility is often falsely tied to confidence as illustrated by Bell and Loftus (1988) who have shown that witnesses who present more details are interpreted as more reliable. But, confidence may only be an accurate predictor of memory under optimal conditions and should not always be viewed as an indicator of accuracy.

Memories are not perfect video portrayals of events; they require the retrieval and reconstruction of information. That information must first be fully encoded in order for it to be fully retrieved. This literature review suggests that even if it is fully encoded, it is still susceptible to distortion by misinformation (Loftus & Palmer, 1974; Zaragoza & Lane, 1994; Sutherland & Hayne, 2001). Misinformation is thought to occur because of an inability to remember the true source of information, thus confusing information from the actual source with information from a false source (Belli et al., 1994; Zaragoza & Lane 1994; Nash et al., 2009). Past memory research also shows that information is more likely to be recalled and recognized accurately in intentional memory conditions as opposed to incidental conditions (Block, 2009). Confidence-accuracy relationships are more likely to be significantly positive in optimal information processing conditions; however, when processing conditions are not optimal this relationship is not likely to be significant. (Deffenbacher, 1980). Given this evidence from previous research, summarized here, the present study was designed to address similar issues, but with conditions more closely resembling a real-life situation.

Ecological Validity

The present study was designed to address issues similar to those explored in past research, but with conditions more closely resembling a real-life situation. Most research regarding event memory has employed slides or videos. We were able to identify only a handful of studies examining memory for an actual *in vivo* event (e.g., Yarmey, 1993; Luus & Wells, 1994, Yarmey & Yarmey, 1997; Sauerland & Sporer, 2009) and none of these studies examined intentional memory and the effects of misinformation. Although Banaji and Crowder (1989) argued that studies high in ecological validity are not necessarily high in generalizability, they also noted that it is often better to implement methods that closely resemble real-life situations. They explain, "…if research is scientifically sound it is better to use ecologically lifelike rather than contrived methods. On some occasions the ability to exert a great deal of control in real-world settings is possible, and in such instances an ingenious experiment, high on both dimensions of ecological validity and scientific generality, is possible" (Banaji & Crowder, 1991, p. 78). We implemented a well-controlled live event in this study in order to enhance ecological validity in two ways.

First, participants were placed in the center of the event and were allowed to experience it in a meaningful context. Eyewitness research regarding children has shown that those who viewed a live event had better memory of the event and were less susceptible to misinformation than those who viewed a video of the same event (Thierry & Spence, 2004; Roebers, Gelhaar, & Schneider, 2004). It is essential then to study eyewitness memory and misinformation effects during live events that closely represent real-life scenarios and provide a richer and more personal encoding context than a video.

The use of a live event in this study also served to enhance the incidental memory condition. Most studies regarding eyewitness memory use videos and slides to depict events. Researchers must then convince participants in the incidental condition that the stimulus they are about to view is for some purpose other than memory testing. It may be possible to distract participants somewhat from the true purpose of a study, but a spontaneous live event creates a more believable incidental memory condition. These two important issues led us to create a well-controlled live event in order to study event memory and misinformation effects.

CHAPTER 2
STUDY 1: METHOD

The purpose of this research is to examine event memory, and factors that are known to influence event memory, using a realistic stimulus. Most research regarding event memory has employed the use of slides or video to depict events. We were able to identify only three studies using an actual *in vivo* event when examining individual eyewitness memory (Yarmey, 1993; (Yarmey & Yarmey, 1997; and Sauerland & Sporer, 2009). In each of these studies the "event" was a conversation each participant had with a stranger on the street. However, none of these studies examined intentional memory conditions or misinformation (considered in both studies here), or age differences (to be examined in study 2).

In the present study, a live event was enacted in order to increase external validity, that is, to make the situation more like an event that an individual might experience in real life. The accuracy of event memory was examined for incidental memory (participants not encouraged to remember the event) and intentional memory (participants are asked to remember what they see) conditions. Misinformation was presented following the event to half of the participants to assess its impact on memory. An initial directed recall test (requesting specific responses to questions about event details) was compared with a second directed recall test (given after exposure to misinformation). Participants were also asked later to describe the event (free recall) and identify a target face from a photo line-up that included five distracter faces. Finally, confidence measures for each directed recall item and for recognition were used to assess the relationship between confidence and memory accuracy.

Hypotheses

Hypothesis 1: Intentional memory conditions will lead to more correct recall of details (Block, 2009) and better recognition of faces than incidental memory conditions (Davies & Hine, 2007; Block, 2009).

Hypothesis 2: As compared to a condition with no misleading information, the presence of misinformation will lead to more memory errors on memory tests occurring after the misinformation manipulation. (Loftus and Palmer 1974; Belli et al., 1994; Zaragoza & Lane, 1994).

a) Participants receiving misinformation will have lower scores on the second directed recall test than the first directed recall test, and participants not receiving misinformation will score the same on both directed recall tests.

b) Misinformation will have a greater effect in the incidental condition than the intentional condition for performance on the second directed recall test and free recall test.

Hypothesis 3: There will be no relationship between confidence and accuracy in incidental conditions, but there will be a positive relationship in intentional conditions (Deffenbacher, 1980).

Method

Participants

Data was collected from 83 undergraduate college students aged 18- to 21-years-old (*M*=18.93, *SD*=.89). The sample was 60% White, 20% Black, 10% Hispanic, and 10% Other. The participants were mainly female (82-95% female in each condition). All participants were recruited from university courses and compensated for their participation with course credit.

Procedure

Participants were tested in groups (1-6 participants each, M = 4.73 SD = 1.23), which were comprised entirely of members of the same condition. Groups were assigned to conditions by counterbalancing, forming a 2 (encoding condition: incidental or intentional) X 2 (misinformation condition: misleading or non-misleading recall questions) experimental design.

In the intentional condition only, before the filler task was distributed, participants were told “Shortly, someone will be interrupting this experiment. Pay close attention to every detail involved in the interruption.” In all conditions, shortly after the filler task materials were distributed, a research confederate knocked on the door, and then opened the door, interrupting the procedure (the interrupter was blind with regard to experimental condition). The experimenter and research confederate (interrupter) engaged in a short, scripted conversation created especially for this experiment to ensure novelty. In general, the interrupter reported that she was on the phone conducting an interview and the respondent was having some difficulty answering the questions. She wanted to know what to do. The experimenter offered two possible solutions to the problem, and then the interrupter left. Three different, but similar looking, female actors acted as interrupters. Counterbalancing of actor assignment to conditions ensured that each interrupter had an equal chance of interrupting each condition.

The scripted dialogue between the interrupter and experimenter lasted about one minute, and the confederate then left the room. A demographics questionnaire was then distributed (including questions about age, gender, race, and education level), followed by the administration of four memory measures, assessed in the following order: directed recall 1 (DR1: participants answered specific questions about the event; misinformation was embedded in these items for half of the participants), face recognition, directed recall 2 (DR2: to test for misinformation effects), free recall. After all memory measures were completed, a manipulation check was presented. Each session lasted approximately 20-30 minutes.

Materials

Filler task

A filler task was used to provide participants with an activity to do before the scripted event occurred. For the filler task, all participants were given a short, one page story of 24 sentences (Dixon, Hultsch, & Hertzog, 1989) to remember, with the intent to answer questions regarding various details in the story afterward. See Filler Task in Appendix C. No such memory test was ever given. Participants spent approximately 15-20 seconds reading the story before they were interrupted, then another 15-20 seconds for reading was provided after the interruption.

Directed recall (DR1 and DR2)

In the directed-recall tests, participants were asked a total of 22 specific, open-ended questions regarding different aspects of the event (e.g., “After the experimenter greeted the interrupter, what problem did she report?” “What was the name of the interrupter?”). Questions about specific details were presented in the same order that these details occurred in the event. Following a common misinformation paradigm (e.g., Cohen & Faulkner, 1989), for half of the participants in each encoding condition (based on counterbalanced assignment), misinformation was embedded in the first directed recall test (DR1), which assessed the participants’ memory for 11 details in the event. The participants who received misinformation had a false detail embedded into 6 of the

11 questions on DR1, following procedures used by Zaragoza and Lane (1994). Appendix A includes a copy of the DR1 items.

Here is an example of how misinformation was presented. In the scripted event, the interrupter knocked twice on the door and then immediately entered. An example of a question in DR1 was: “After the interrupter knocked on the door, did the experimenter invite her in or did she enter on her own?” Now with the addition of misinformation: “After the interrupter knocked on the door *three times*, did the experimenter invite her in or did she enter on her own?” Then all participants later received this question in the second directed recall test (DR2, see below): “How many times did the interrupter knock on the door?”

DR2 was used to assess memory for 11 additional details as well as to evaluate the impact of the misinformation. All participants received the same questions on DR1 (with slight re-wording of six questions to add misinformation for half of participants). All participants received identical questions on DR2, six of which specifically asked about details related to the misinformation that was presented to half of the participants in DR1. Appendix B contains the DR2 items. Answers to the directed recall questions on DR1 and DR2 were scored as either correct or incorrect. For both directed recall assessments, the total number of correct answers was used as the dependent measure. Misinformation items were also separately examined for accuracy.

Confidence

Each question on both directed recall tests was immediately followed by a confidence measure, referring to that question, on a scale from 0 – 100 (with “100” being extremely confident and “0” being no confidence that the answer is correct). For example, participants may have circled “40” to indicate they were 40% confident in their answer. Confidence was averaged across relevant items, ranging from 0 – 100 for each item or set of items that were examined.

Face Recognition

The recognition test was administered after DR1 and before DR2 using a photo lineup consisting of six different faces (Sutherland & Hayne, 2001). Each photo was a front face shot in color, measuring 2 in. x 3 in. There were three faces per row, separated by ¼ in. of space within each row. All people in the lineup wore gray shirts, and were photographed on a neutral backdrop, with neutral facial expressions. The face of the interrupter was mixed in with faces of similar-looking decoys on the same page (taken from Ebner, Riediger, & Lindenberger, 2010). Faces were counterbalanced across line-ups, placing the target face of the interrupter in a different position for each, resulting in six different line-ups to be shown to the six different participants in each group. The different lineups were distributed using counterbalancing based on seat position in the room. Centered above the photograph (for the three pictures in the top row) or below the photograph (for the three pictures in the bottom row) was a number (1-6). Participants were instructed to record the number corresponding to the interrupter. Responses were scored as correct or incorrect. Errors of omission (responding “not present”) were coded as incorrect. Target identification (correct/incorrect) was the dichotomous dependent measure.

Free recall

Free recall was tested by asking viewers to describe the interruption in as much detail as possible in writing. These recall protocols were transcribed and compared to a template “ideal” description of the event. To determine what should be included in this template, the event script was used to generate details about the conversation. See script in Appendix D. In addition, before testing began, the to-be-remembered details were recorded by an independent group of 22 coders who described the event details in writing as the scripted event was occurring. The event was acted out three times for the coders (using all three interrupters) and a new list of details was generated by each coder for each reenactment, to create a complete list of all possible to-be-remembered details about the event (details concerning the content of the interruption, information about the appearance of the interrupter, etc.).

Each correctly reported detail was assigned one point. For example, for the statement, "The interrupter knocked twice on the door and then opened it," the participant received three points; one point each for *knocked*, *twice*, and *opened* it (Sutherland & Hayne, 2001). Text analysis software (SPSS Text Analysis for Surveys 2.0) was utilized to compare the participants' recalled text to the template developed by the coders. The total number of details correctly recalled was the dependent measure. Errors of commission (intrusions resulting from misinformation) were noted as another dependent measure.

Manipulation check

All participants were asked if 1) they were expecting a memory test on the interruption, 2) if they were trying to remember the interruption, 3) if they noticed any incorrect information within any of the questions that asked about their memory for the event, and 4) how much time (in seconds) they spent paying attention to the interruption. Participants responded on a 7-point Likert scale with 1=*No, not at all* and 7=*Yes, a lot* for the first three questions. On the last item, participants wrote in an estimate for the number of seconds they spent paying attention to the event.

CHAPTER 3
STUDY 1: RESULTS

Preliminary Analyses

In order to determine if group size had an effect on memory performance, Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) X Group Size univariate ANOVAs were examined with group size as a random effect. Results showed that group size and group size by condition interactions were not significant; indicating that group size did not contribute to performance on the memory measures (free recall, directed recall, recognition).

Two way analyses of variance (ANOVA) tested the effects of encoding condition and misinformation on each of the manipulation check questions. As expected, those in the intentional condition (*M*=5.27, *SD*=1.80) were significantly more likely to expect a memory test on the interruption than those in the incidental condition (*M*=3.16, *SD*=2.20), $F\ (1, 79) = 22.16$, p=<.001, η_p^2=.22. In addition, those in the intentional condition (*M*=5.65, *SD*=1.48) also tried to remember the interruption significantly more often than those in the incidental condition (*M*=3.16, *SD*=1.90), $F\ (1, 79) = 42.82$, p=<.001, η_p^2=.35. Those who received misinformation reported noticing it (*M*=4.41, *SD*=1.50) more so than those who did not receive misinformation (*M*=2.79, *SD*=1.37), $F\ (1, 79) = 26.84$, p=<.001, η_p^2=.25. Finally, those in the intentional condition spent significantly more time paying attention to the event (*M*=36s, *SD*=24s) than those in the incidental condition (*M*=21s, *SD*=17s), $F\ (1, 79) = 10.58$, p=<.005, η_p^2=.12.

On each of the manipulation check questions, we set a criteria of *5* or higher on the Likert-type scale (with 7 being *Yes, a lot*) to identify individuals who may have expected a memory test or noticed the presence of misinformation. About half of the participants (51%) who received misinformation reported noticing at least some incorrect information embedded in the questions, compared with 12% of participants who did not receive misinformation; 37% of participants in the incidental condition indicated that they were expecting a memory test on the interruption, compared with 73% of participants in the intentional condition. Finally, 25% of participants in the incidental condition indicated that they were trying to remember the interruption, compared with 85% of participants in the intentional condition. Given that one-third of the participants in the incidental condition were expecting a test and half of the participants who were misinformed may have noticed the misinformation, some analyses were conducted comparing those who were aware of the test and those who were not aware. The analyses were re-run without the participants who were expecting a memory test, and the effects of encoding condition on memory accuracy were not significant.

Directed Recall

Directed recall questions were coded into four categories: correct response, incorrect response attributed to a random error, incorrect response attributed specifically to misinformation, and errors of omission (i.e., the question was left unanswered or answered as “I don’t know”). Analyses were conducted separately for correct responses (all other categories were considered errors) and for incorrect items attributed specifically to misinformation.

To test the effects on correct directed recall, an Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) X Time of test (DR1 or DR2) mixed ANOVA was examined. There was a significant main effect of encoding condition, F (1, 79) = 9.14, p<.001, η_p^2=.10, with participants in the intentional condition scoring significantly higher overall, on DR1 and DR2 combined, than those in the incidental condition. There was also a main effect of misinformation: participants who received misinformation scored significantly lower overall than those who did not receive misinformation F (1, 79) = 27.66, p<.001, η_p^2=.26. Finally, there was a significant main effect of time of test, F (1, 79) = 17.53, p<.001, η_p^2=.18, due to higher scores on DR1 than DR2 (see Table 3-1 for all directed recall data).

Planned Bonferonni comparisons were used to examine the predicted interactions. It was predicted that participants who received misinformation would have lower scores on DR2 than DR1, and participants who did *not* receive misinformation would score the same on the two recall tests. The planned comparisons supported both predictions. Participants who received misinformation had lower scores on DR2 than DR1, F (1, 79) = 17.34, p<.001, η_p^2=.18, and participants who did not receive misinformation scored similarly on DR1 and DR2 (this result approached significance), F (1, 79) = 3.04, p=.09. It was also expected that those who received misinformation would score lower on DR2 than those who did not receive misinformation. This prediction was also supported, F (1, 82) = 23.47, p<.001, η_p^2=.23 (see Table 3-1).

In a three-way interaction, misinformation was expected to have a greater effect (as reflected in differences between DR2 and DR1 scores) in the incidental condition than the intentional condition. An examination of a priori comparisons indicated that this prediction was not supported. Lower scores on DR2 than DR1 occurred in both the incidental condition, F (1, 79) = 7.02, p<.01, η_p^2=.08, and in the intentional condition, F (1, 79) = 10.45, p<.005, η_p^2=.18. At the same time, scores for the misinformed intentional group were higher than scores for the misinformed incidental group on both

DR2, F (1, 79) = 4.13, p<.05, η_p^2=.05, and on DR1, F (1,79) = 9.75, p < .005, η_p^2= .11, with no greater effect for DR2 (see Table 3-1).

To consider the misinformation effect in more detail, we examined the number of errors specifically attributed to misinformation (seven questions total). There was a significant main effect of misinformation, F (1, 79) = 69.21, p<.001, η_p^2=.47, as shown in Table 3-2, such that those who received misinformation made more errors that were specifically attributed to misinformation. There was no main effect of encoding condition and the encoding condition by misinformation interaction was not significant, indicating that misinformation effects were comparable in both encoding conditions.

Further analyses examined differences between self-report measures on two of the manipulation check questions: 1) “Were you expecting a memory test on the interruption?” and 2) Did you notice any incorrect information within any of the questions that asked about your memory for the event?” On each of the manipulation check questions, we set a criteria of *5* or higher on the Likert-type scale (with 7 being *Yes, a lot*) to identify individuals who may have expected a memory test or noticed the presence of misinformation. A two-way ANOVA using these two independent variables (1) expectation of a memory test and 2) detection of false information), run only on those participants who were misinformed, revealed that those who noticed the false information reported significantly fewer misinformation errors on directed recall than those who did not notice it, F (1, 37) = 6.89, p<.01, η_p^2=.16. Expectation of the memory test was not a significant factor in determining number of misinformation errors reported.

Confidence: All Answers

An Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) MANOVA was conducted with two confidence variables (confidence for correctly answered questions, and confidence for incorrectly answered questions). Multivariate tests showed only marginal significance for the main effect for encoding condition, F (2, 78) = 2.61, p=.08, η_p^2=.06, but did show a significant main effect of misinformation, F (2, 78) = 8.44, p<.001, η_p^2=.18. Follow up univariate ANOVAs revealed a significant effect of encoding condition for confidence ratings on correctly answered questions, F (1, 79) = 5.25, p<.05, η_p^2=.06 (those in the intentional condition were more confident), but encoding condition had no significant effect on confidence ratings for incorrectly answered questions. There was a significant main effect of misinformation on confidence ratings for incorrectly answered questions, F (1, 79) = 15.13, p<.001, η_p^2=.16, but misinformation had no effect on confidence ratings for correctly answered questions (see Table 3-3). In other words, participants who were misinformed were more confident in their incorrect responses than those who were not misinformed. This was true in both encoding conditions. Additional analysis revealed that confidence in correct answers was significantly higher than confidence in incorrect answers across all groups, F (1, 79) = 422.73, p<.001, η_p^2=.85.

Pearson product moment correlations were used to examine the confidence-accuracy relationship. There was a significant, positive correlation between confidence on correctly answered questions and directed recall scores for all participants, r = .22, p < .01. The correlation was also significant for those who were misinformed, especially in the incidental condition, r =.43, p<.05, as seen in Table 3-5. Inspection of scatterplots for recall and confidence revealed that individuals who were not misinformed showed relatively high scores (50-80% correct) and relatively high confidence in their answers (70-85%). This indicates a considerable relationship between confidence and accuracy, but does not result in a high correlation, due to a lack of variability in both measures (see Figure 1A). In contrast, 19% of the variance in confidence for the incidental misinformed group was predicted by recall (see Figure 1B), with clear clustering of poor scorers (recall < 50%) having poor confidence (confidence < 75%) and higher scorers (recall > 60%) with higher confidence (confidence > 80%).

Confidence: Misinformation Answers Only

This analysis was limited only to those items that were related to misinformation details. To examine confidence differences between groups for questions that assessed misinformation, an Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) MANOVA was conducted with two confidence variables (confidence for correctly answered misinformation questions, and confidence for incorrectly answered misinformation questions). Multivariate tests showed a significant main effect of encoding condition, F (2, 58) = 3.27, p<.05, η_p^2=.10, and misinformation, F (2, 78) = 5.27, p<.01, η_p^2=.15. Follow-up univariate statistics revealed a significant effect of encoding condition for confidence ratings on correctly answered questions, F (1, 79) = 6.38, p<.05, η_p^2=.08 (those in the intentional condition were more confident), but not on incorrectly answered questions. There was a significant effect of misinformation for confidence ratings on incorrectly answered questions, such that those who received misinformation were 18% more confident in their incorrect answers specifically retrieved from false information, as compared to the errors made by those who did not receive misinformation, F (1, 63) = 10.54, p<.005, η_p^2=0.15 (see Table 3-4).

A subsequent repeated measures analysis of these same misinformation data revealed a significant main effect of response type (correct vs. incorrect), F (1, 59) =

16.26, $p<.001$, $\eta_p^2=0.22$, which was qualified by a significant response type by misinformation interaction, $F(1, 59) = 5.35$, $p<.05$, $\eta_p^2=0.08$. Bonferonni comparisons revealed that those who were misinformed were just as confident in their incorrect responses as their correct responses, $F(1, 59) = 1.56$, $p>.10$. Those who were not misinformed, however, were more confident in their correct responses, as compared to incorrect answers, $F(1, 59) = 19.13$, $p<.001$, $\eta_p^2=0.25$. There was no significant correlation, in any condition, between confidence and recall for the key misinformation items. See Table 3-6.

Face Recognition

The recognition task was scored to create a single dichotomous variable. As expected, significantly more participants in the intentional condition recognized the target face than in the incidental condition, χ^2 (1, N=79) = 4.95, p<.05. In the intentional condition, 71% of the participants recognized the target face, whereas only 46% of the participants in the incidental condition recognized the target face. The presence of misinformation, where the target was placed in the photo lineup, seat position for participants, and the specific person serving as the interrupter had no significant effect on face recognition.

Free Recall

A two way analysis of variance (ANOVA) examined the effects of encoding condition and misinformation on the number of details correctly provided in free recall. Encoding condition (intentional or incidental) had no significant effect on free recall, $F(1, 82) = 1.30$, $p>.05$. The presence of misinformation also had no significant effect on the total number of details recalled, $F(1, 82) = 0.17$, $p>.05$, as seen in Table 3-7.

It was expected that those in the incidental condition would report more false information in their free recall than those in the intentional condition. Because the data for free recall intrusions were not normally distributed, with only a few intrusions made by each participant, Kruskall-Wallis tests were run to examine the intrusions. Those who received misinformation made significantly more intrusions (M=1.05, SD=1.38) than those who did not receive misinformation (M=.33, SD=.53), χ^2 (1, N=83) =7.06, p<.01. When examined separately, this effect was marginally significant in both encoding conditions: (incidental condition, χ^2 (1, n=43) = 3.35, p=.07; intentional condition χ^2 (1, n=40) = 3.52, p=.06), indicating no difference between incidental and intentional encoding on the misinformation effect for free recall.

Table 3-1. Means and standard deviations on directed recall questionnaires as a function of experimental condition

	DR1		DR2		Total	
Condition	M	SD	M	SD	M	SD
Intentional	7.20	1.40	6.45	1.88	13.65	2.73
Not Misinformed	7.55	1.23	7.30	1.52	14.85	2.48
Misinformed	6.85	1.50	5.60	1.85	12.45	2.48
Incidental	6.37	1.68	5.53	2.10	11.91	3.44
Not Misinformed	7.23	1.38	6.55	1.54	13.77	2.49
Misinformed	5.48	1.50	4.48	2.11	9.95	3.23
Combined						
Not Misinformed	7.38	1.31	6.90	1.56	14.29	2.51
Misinformed	6.15	1.64	5.02	2.04	11.17	3.12

Table 3-2. Means and standard deviations on misinformation errors as a function of experimental condition (seven possible errors total)

Condition	M	SD
Intentional	2.45	1.89
Not Misinformed	1.15	1.04
Misinformed	3.75	1.65
Incidental	2.58	2.21
Not Misinformed	1.14	0.89
Misinformed	4.10	2.17
Combined		
Not Misinformed	1.14	0.95
Misinformed	3.94	1.92

Table 3-3. Means and standard deviations for confidence ratings as a function of experimental condition and accuracy

	Correct Answers		Incorrect Answers	
Condition	M	SD	M	SD
Intentional	81.55	10.87	47.39	18.87
Not Misinformed	81.68	9.46	39.50	19.04
Misinformed	81.42	12.38	55.28	15.39
Incidental	75.96	11.07	42.29	17.29
Not Misinformed	74.02	10.68	36.02	15.24
Misinformed	77.99	11.35	48.87	17.18
Combined				
Not Misinformed	77.67	10.72	37.68	17.03
Misinformed	79.66	11.84	51.00	16.45

Table 3-4. Means and standard deviations for confidence ratings of misinformation questions as a function of experimental condition and accuracy

Condition	Correct MI Answers M	SD	Incorrect MI Answers M	SD
Intentional	80.11	16.26	69.31	23.41
Not Misinformed	78.10	14.26	59.10	26.55
Misinformed	81.56	17.82	76.67	18.24
Incidental	67.94	20.17	58.26	21.32
Not Misinformed	64.82	19.63	50.29	24.04
Misinformed	71.48	20.87	67.28	13.48
Combined				
Not Misinformed	70.58	18.48	54.11	25.10
Misinformed	76.97	19.63	72.40	16.70

Table 3-5. Confidence and accuracy correlations for all answers as a function experimental condition

Condition	Conf. for Correct Answers r	sig.
Intentional	.12	.45
Misinformed	.34	.15
Not Misinformed	-.13	.58
Incidental	.20	.20
Misinformed	.44*	.05
Not Misinformed	.29	.19
Combined		
Not Misinformed	.17	.28
Misinformed	.41**	.01

Note.
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Table 3-6. Confidence and accuracy correlations for misinformation answers only as a function experimental condition

Condition	Conf. for Correct Answers r	sig
Misinformed	.06	.72
Intentional	-.03	.91
Incidental	13	.64

Note.
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Table 3-7 Means and standard deviations for free recall as a function of experimental condition

Condition	M	SD
Intentional	17.38	7.33
Not Misinformed	17.50	8.04
Misinformed	17.25	6.77
Incidental	15.65	6.35
Not Misinformed	16.14	5.75
Misinformed	15.14	7.04
Combined	16.48	6.86
Not Misinformed	16.79	6.88
Misinformed	16.17	6.90

CHAPTER 4
STUDY 1: DISCUSSION

When considering research on event memory it is essential to understand how the human memory functions in real-world settings. Conducting research on memory using a live event provides researchers with the opportunity to assess memory in a setting that is more likely to represent daily memory, as compared to viewing a video or slides depicting an event. For example, most eyewitnesses don't witness an event on a video monitor (although this is sometimes the case). Most are present in the setting where the event takes place. This creates an environment in which emotion and all senses play a part in the memory. Furthermore, the use of a live event makes it easier for researchers to enact a realistic, spontaneous, incidental condition. Past research has shown that false information can distort memories for events (Loftus & Palmer, 1974; Zaragoza & Lane, 1994; Sutherland & Hayne, 2001) but most researchers have shown slides or videos to depict events, and have not employed a real-world setting. Additionally, most research has not directly compared the effects of misinformation in intentional and incidental memory conditions. We sought to examine the misinformation effect for a real-world event while examining its impact under both intentional and incidental memory conditions.

As expected, our results indicated that participants in intentional encoding conditions had higher scores on directed recall memory tests and better recognition of the target face than those in incidental conditions. Additionally, as predicted, participants who were misinformed made more memory errors involving misinformation than those who were not misinformed. It was not the case, however, that this effect was stronger in the incidental condition, as the misinformation effect (lower scores on DR2 as compared to DR1) was comparable across the two encoding conditions. Similarly, confidence in memory errors did not vary as a function of encoding condition. Finally, as expected, misinformed participants in both encoding conditions were just as confident in their false memories as they were in their accurate memories.

Misinformation

Previous research has offered evidence that the misinformation effect occurs in incidental (Loftus & Palmer, 1974) and in intentional memory conditions (Belli et al., 1994), but these two types of conditions had rarely been compared directly in studies of eyewitness memory. This study revealed that participants who received false information were consistently more prone to memory errors than those who did not receive false information, although their free recall of event details was quite good. Even though about half of the participants recognized that misinformation was present, surprisingly, our data also showed that the effect of misinformation was equally strong in both encoding conditions for directed recall. Evidently, source memory errors can undermine memory regardless of intent to remember, even when misinformation is noticed. The misinformation effect is thought to occur because of an inability to remember the true source of information, thus confusing information from the actual source with information from a false source (Belli et al., 1994; Zaragoza and Lane 1994; Nash et al., 2009). For example, people find it difficult to distinguish between what they read and what they see or hear (Zaragoza & Lane, 1994). So although participants in all conditions were able to report on significant numbers of details in free recall, the false information in the misinformed group still disrupted memory processing. Given that many people can be unsure about the source of information, those in the intentional memory group who were misinformed may have recalled what they read on the test form as opposed to what they saw and heard during the real event, leading to lower scores on the second directed recall test.

In other words, receiving false information can cause someone who paid attention to show memory errors on specific questions, due to a disrupted memory reconstruction processes. This suggests that it might be useful to encourage individuals to first provide an open-ended free recall of all details of an event, before asking specific questions, some of which could result in misdirection. To our knowledge only one previous research study has considered the timing of recall. Chan and Langley (2010) asked cued recall questions about an event before introducing misinformation. He found that this actually enhanced the later effects of misinformation. However, he presented cued recall questions first, as opposed to an open-ended free recall, so it is yet to be determined how the accuracy of an initial free recall test compares to the accuracy of free recall that takes place after recall questions are asked (with and without the presence of misinformation).

Intentional and Incidental Memory

The purpose of comparing intentional and incidental conditions in this study was to fill a gap in the existing literature by directly comparing the effect of misinformation in these two encoding conditions, as well as testing Deffenbacher's (1980) optimal information processing explanation of confidence-accuracy relationships. In the present study, the participants in the incidental condition remembered fewer details when answering directed recall questions and were less accurate at recognizing the target face from a photo lineup. These findings are consistent with previous research (Davies & Hine, 2007; Block, 2009; Migueles & Garcia-Bajos, 1999).

In terms of free recall of the event, intent to remember did not affect the total number of accurate details provided. This finding is not consistent with those of past research in this area (Migueles & Garcia-Bajos, 1999). This may be due to the fact that free recall of the event was assessed after directed recall, allowing those in the incidental condition to pick up on details presented in the directed recall questions which they later included in their free recall. In effect, those in the incidental condition engaged in semantic processing of the event immediately after seeing it (during directed recall), which may have aided their memory for the event (Fisher & Craik, 1977). Perhaps, if free recall was the first memory measure to be assessed, differences between the intentional and incidental group may have been present. It is the case that those who viewed the event with the intent to remember correctly answered more directed recall questions than those with no memory intention. Finally, participants who viewed the event intentionally recognized the target face more often than those who did not view it intentionally. These results are consistent with past research (Davies & Hine, 2007; Migueles & Garcia-Bajos, 1999) showing that intent to remember plays a significant role in participants' recognition ability and directed recall memory for an event.

These findings are important for eyewitness memory in the sense that even if a witness was not paying full attention or actively trying to remember an event or the appearance of a person of interest, they may be able to recall just as many relevant details as someone who was paying attention. However, they are less likely to accurately recognize people of interest and may even identify a person who was not present. Furthermore, depending on the wording of a question about the event, or person of interest, the eyewitness in an incidental memory situation is less likely to answer specific questions correctly. This suggests that some kind of free recall format for questioning would be more likely to yield valuable information from incidental eyewitnesses to a real-world event.

Confidence

Confidence measures were assessed for each question regarding directed recall of the event. It is essential to understand the relationship between confidence and accuracy because the more confident an eyewitness is in his or her testimony, the more believable the eyewitness is perceived to be, regardless of the veracity of the witness. In this study, overall confidence and overall accuracy were higher in the intentional condition than the incidental condition. This is consistent with previous research (Migueles & Garcia-Bajos, 1999). Furthermore, confidence on correctly answered questions was higher in the intentional condition than the incidental condition. Participants who received misinformation, in both encoding conditions, were highly confident in their incorrect memories, including their false memories caused by misinformation. This is consistent with the other studies showing high levels of confidence associated with false memories (Migueles & Garcia-Bajos, 1999; Roediger & McDermott, 1995). In fact, participants were just as confident in these false memories as they were in their accurate memories, which is consistent with the findings of Loftus and colleagues (1989). This suggests that participants in both encoding conditions were unaware that they were recalling false details from DR1 instead of accurate details from their actual memory of the event.

When examining the relationship between confidence and accuracy, across all conditions, confidence was higher for correctly answered questions than incorrectly answered questions, suggesting that participants in every condition made a distinction between their errors and their correct responses. That is, they made fairly accurate assessments of their performance regardless of experimental condition. How well do these data correspond with the optimal processing hypothesis? Deffenbacher (1980) implements an arbitrary 70% criterion for accuracy to distinguish high from low optimal information processing conditions. In this study, some conditions were more optimal than others, but none met the arbitrary 70% criterion for accuracy. Thus, it is challenging to fully apply Deffenbacher's (1980) model to these data. Consideration of the scatterplot figures may help explain the observed confidence-accuracy relationship.

The correlation between accuracy and confidence was significant only for participants who received misinformation in the incidental condition (i.e., for the group with the lowest recall scores). This is likely due to the greater variability in scores for this group (See Figure 1B). On the other hand, Figure 1A shows that recall and confidence were well matched (both relatively high) when no misinformation was presented. These findings do tend to support Deffenbacher's (1980) notion that optimal information processing conditions should allow viewers of an event to assess their memory performance more accurately than those under less ideal processing conditions. It is important to note, however, that we did not examine central details separately in this research. It may be that those in the incidental condition were still able to recall central details, and be confident about them. It might be interesting, in future research, to look at memory for central and peripheral details (Sutherland & Hayne, 2001). Perhaps confidence-accuracy relationships would be better under intentional conditions for central details which were likely to be the focus of attention.

CHAPTER 5
STUDY 2: BACKGROUND

The purpose of Study 1 was to assess the effects of event memory and misinformation in different encoding conditions in adults. However, a key age group that is often overlooked in research involving event memory is older adults (OA). OA (65+ years-old) are often witnesses to events that need to be remembered. It is unwise to generalize results from research regarding event memory of young adults (YA) to OA because of clear and well-established differences in the overall memory abilities of OA. Although overall memory decline in OA has been shown, it is important to also understand aging in relation to event memory. Past research on eyewitness memory and aging has mainly used slides, and occasionally, video to depict events. The purpose of the second study is to consider what is known about aging and event memory and take a closer look at age differences in event memory and the effects of misinformation in incidental and intentional conditions, using more realistic stimuli than past research.

Overview of Memory and Aging

Research has consistently demonstrated that cognitive abilities, including various forms of memory, decline in later life. These results have been shown in cross-sectional (Tubi & Calev, 1989; McDougal & Kang, 2003) as well as longitudinal studies (Hultsch et al., 1998). As adults age normally, processing speed gradually slows and maintaining attention becomes more difficult (Cavanaugh & Blanchard-Fields, 2006). Both of these processes affect memory. In his review of cognitive aging, Kausler (1991) emphasized that episodic memory declines with normal aging. For instance, in tests of recall and recognition, OA require more memory cues and do not use effective memory strategies as often as YA. Some memory abilities that do not change with age, however, include immediate memory and retention of world knowledge (semantic memory). Also, recall becomes more difficult as adults age, while recognition abilities remain fairly stable. An explanation for this is that memory cues for recognition are typically much stronger and more distinctive than for recall. Interestingly, these age-related memory deficits appear to occur on both everyday memory tasks as well as laboratory assessments (McDougal & Kang, 2003; West, Dennehy-Basile, & Norris, 1996) and are present in studies that attempt to isolate encoding deficits as well as those that focus on retrieval (Anderson et al., 1998).

In one of the most thorough investigations of aging and memory, Hultsch and colleagues (1998) conducted a longitudinal study involving a large sample of OA from multiple cohorts. Participants completed several cognitive tasks and were tested at their baseline level and then re-tested three years later. Among other declines, a significant average decline in episodic memory was shown to begin at middle-age and that decline was even more evident after age 70. Aging effects were also determined to be the greatest predictor for performance (as opposed to cohort effects, for example) (Hultsch, et al., 1998).

Considering these findings, it is important to remember that memory is not unidimensional, meaning that memory performance may decline with age in some areas (e.g., word recall, episodic memory) but may remain fairly stable in other areas (e.g., implicit memory, semantic memory). Accordingly, age related changes are considered in further detail below, in the areas of incidental/intentional memory, misinformation, recall, recognition, and source memory, which are of special interest to the present study. With a focus on eyewitness memory in this research, it is also necessary to understand how these age-related changes relate specifically to event memory.

Incidental and Intentional Memory

As described previously, people perform better at all types of memory tasks (e.g., recall and recognition) in intentional conditions as opposed to incidental conditions. In other words, when people try actively to remember details from a scene or words from a list, they recall and recognize more items than when viewing information passively. There is considerable research showing that this intentional-incidental difference is present in both OA and YA in traditional word recall tasks and that YA, who are better memorizers in general, show a clear advantage over OA in intentional recall (Block, 2009). But what does the research tell us about tasks, like name and face recalls, that are more relevant to eyewitness scenarios?

Research conducted by Crook III, Larrabee, & Young (1993) examined participants' name recall across five age groups (18-39; 40-49; 50-59; 60-69; 70+) using video presentation of individuals who stated their names and birthplaces. The individual's name was remembered intentionally and the birthplace was an incidental recall item. They found that birthplace recall was related to age, and the age differences were first noticed among participants in their 40s, with significantly more decline in the 60s. More specifically:

> …the 70+ and 60- to 69-year-old age groups differed from the three younger age groups but not from one another. The late-middle adult group (50-59 years old) differed from the 40-49 age group, which performed at a significantly lower level compared with the 18- to 39-year-old subjects (Crook III et al., 1993, p. P46).

In the intentional recall task, age served as a more continuous reflection of performance (no drastic decline at any particular age). These findings reflected stronger associations with age in intentional than incidental conditions (Crook III et al., 1993). In another investigation to examine the impact that encoding condition had on OA as compared to YA for face recognition, Smith and Winograd (1978) conducted a study regarding age differences in facial recognition of pictures. For incidental memory, YA had better face recognition scores than OA. In addition, OA had considerably higher false alarm rates for faces than YA. The results of this study implied that OA may be less reliable eyewitnesses than YA.

The data from research studies indicate that, although everyone performs worse in incidental than intentional conditions, this effect is more pronounced for YA, and that YA clearly outperform OA in intentional learning. This phenomenon has been shown in studies involving both recall (Crook III et al., 1993) and recognition (Smith & Winograd, 1978). Further research has also been conducted to examine how well OA recognize faces and recall details of events compared to YA, important issues in eyewitness memory research.

Recognition and Recall

Researchers have found that recognition for words, objects and figures is similar between YA and OA (Verhaeghen, et al., 2000; Palfai et al., 2003). The findings on recognition for faces are not as clear though. Some data suggest that OA are worse than YA in facial recognition, while other studies have found no age differences (cf. Yarmey & Kent, 1980; Rizzo et al., 2009; Smith & Winograd, 1978; Searcy, et al., 1999).

Searcy, Bartlett, & Memom (1999), summarize the cross-sectional literature on hit rates and false alarm differences between YA and OA. They concluded that:

> *Hit rates* are generally similar for young and older subjects, averaging .82 versus .81, respectively, across the 12 published experiments ... In contrast, *false alarm rates* in young adult groups are consistently lower than

> those in older groups, averaging .20 versus .40, respectively, across the 12 experiments (p. 538).

One study can be used to illustrate these findings. Searcy and colleagues (1999) were interested in whether or not adding distracter faces to a lineup would cause more false alarms. To test this, participants viewed a video of a conversation between people that were involved in a crime. Then, after filling out questionnaires, they viewed a video of the actual crime. Later they viewed a photo lineup in which they were told the suspect was present. The results indicated that there was an age-related increase in false lineup choices (Searcy et al., 1999). It is possible that these age-related effects were caused in part because participants were not given specifics regarding the memory tests, although they were aware that the study concerned eyewitness memory, thus the conditions appeared to represent incidental memory. However, it is arguable that participants knew the research was about eyewitness memory and that they inferred a memory test would follow. This ambiguity over whether or not the condition was intentional demonstrates the importance of creating clearly defined experimental conditions in order to examine the effects of encoding condition on memory differences in YA and OA.

For experiment 2, which involved the same participants as experiment 1, participants were shown faces on slides and told that they would be asked to recognize them later, using unambiguous intentional memory conditions (Searcy et al., 1999). YA and OA performed equally well on the recognition task (hit rates and false alarms) for old faces. However, false alarm rates for entirely new faces increased with age. The procedures from experiment 1 to experiment 2 changed in that participants were not required to remember faces from a video, but were only shown pictures. In addition to creating a clear intentional memory condition, using pictures rather than an event scenario may have accounted for smaller age differences in experiment 2.

Given older adults' retrieval deficits, recognition and recall should be examined as separate abilities. The extant research points to converging evidence that OA are worse than YA not only in their abilities to recall words from lists, but also in recalling details from events (Yarmey & Kent, 1980). When shown a violent crime and theft in a sequence of 23 color slides, participants were told that they were going to be asked questions about the slides (intentional memory condition). It was found that YA were significantly more accurate in their overall verbal recall of the event than were OA, although recognition accuracy was comparable across age (Yarmey & Kent, 1980). This suggests that OA may be less reliable witnesses when describing an event, or people of interest involved in the event.

Despite some conflicting findings, it is generally agreed upon that OA show weaker recall skills than YA, with smaller age differences for recognition than for recall. Overall, Kausler (1991) concluded that OA are less likely to remember faces than YA, while Yarmey and Kent (1980) contended that there was no age difference in facial recognition, although YA consistently showed better verbal recall of events. Past evidence suggests that the type of stimulus may also affect age differences (Searcy et al., 1999). To explore these issues further, in the present study we will use an ecologically valid stimulus, testing both facial recognition and recall of event details under conditions representing both intentional and incidental encoding.

Source Memory

Previous research has demonstrated that OA typically recall fewer accurate details from both lists and events than YA, recognize faces as well as YA, but have higher rates of false alarms. Some of this decline in memory ability for OA may be related to source memory difficulties. Although YA and OA both encounter issues with remembering the true source of information, source memory errors are especially prevalent in OA (Cohen & Faulkner, 1989).

Johnson, Hashtroudi, and Lindsay (1993) reviewed source memory and aging studies and emphasized that OA have difficulty remembering contextual information. They explained that “age differences tend to be greatest when testing procedures provide the least amount of contextual support for retrieval, as in free recall, in which subjects must reconstruct the original events” (Johnson et al., 1993, p. 16). With no cues presented in recall tasks, OA tend to be more prone to source memory errors than YA. This has been shown in tasks involving varying presentation modalities, names, and even personal events (Johnson et al., 1993). This may explain why recognition tasks are relatively unchanged by age. The presence of cues in recognition tasks reduces the potential for source misattribution. It is also noted that these pronounced age differences in source memory vary with the type of task. Specifically, OA tend to encounter more trouble in conditions where perceptual information is important. This effect is sometimes attributed to age changes in frontal lobe functioning (Glisky, Rubin, & Davidson, 2001; Roediger & Geraci, 2007).

Focusing specifically on source memory errors, Dodson and colleagues (2007) considered an explanation for the cause of episodic memory deficits in OA. They emphasized that OA generally show worse source memory than YA and proposed a new theory that they call the misrecollection hypothesis (Dodson et al., 2007). This theory contends that OA have a tendency to miscombine aspects of various events, which results in source memory errors and false memories, even though OA remain confident that they are reporting true memories.

To test this hypothesis, YA and OA were presented with 80 statements on a screen for seven seconds, spoken by either a male or female voice. Each speaker presented half of the statements and the statements appeared in a random order. A picture of the speaker, along with a name, was posted above each statement. Participants were told to pay attention to which speaker presented each statement because there would be a memory test (intentional condition). For the source memory test, participants were presented with 40 statements that were originally spoken by the male speaker, 40 originally spoken by the female speaker, and 40 new statements. Below each statement were pictures of both the male and female speakers and their names. Participants were told to indicate whether each statement was originally spoken by the male speaker, female speaker, or if it was new. They also rated the confidence of their source selections. Even though their basic recognition was relatively good and both groups had relatively poor source memory, OA were more likely than YA to misremember who said what. These findings provided support for the misrecollection hypothesis.

Source memory errors not only contribute to poorer performance in memory tests for OA, but may also contribute to an increased susceptibility to misinformation because they are more likely to attribute false information to the real source and accept it as true. Roediger and Geraci (2007) found that requiring participants to consider the source of information decreased the misinformation effect in OA, and decreased the number of false alarms, as compared to a condition where considering the source was not encouraged. Similarly, it has been hypothesized that focusing on the task, as one would do in an intentional memory condition, reduces source memory problems (Glisky, et al., 2001; Roediger & Geraci, 2007). If intentional memory reduces source memory errors, then it is possible that the misinformation effect would be weaker in OA and YA in intentional conditions. The current study will address this important issue.

Misinformation

One of the possible consequences of source memory errors is a greater susceptibility to misinformation. As described earlier, the presentation of misinformation can succeed in creating false memories in YA, but how does misinformation affect OA?

Jacoby (1999) tested the effects of misinformation on OA and YA using lists of words. Participants were presented with related word pairs and told they would need to remember them later for a memory test (intentional condition). They were then told to study a different set of words (which were used to prime them for misinformation) and were told that they should also remember this new list for a later test. They were specifically told not to confuse the two lists of words. For the cued-recall test, participants were shown a cue word and a word fragment (e.g., cherry p___). They were supposed to fill in the fragmented word (i.e., write “pie” or “pit” or whatever came to mind), using the first word as a cue. They were asked to use their memory for the first list to fill in the fragments and were again warned about not confusing the two lists. The results indicated that, participants were likely to give the response they were primed to give, even when the prime was invalid, causing them to report inaccurate information (Jacoby, 1999). OA were more vulnerable to this effect than YA.

Similarly, in the Roediger and McDermott (1995) misinformation study, OA performed worse than YA, suggesting that OA are more susceptible to misinformation than YA, at least on tasks involving lists of words. However, when warned in advance to pay close attention to the original source of information, the effect of misinformation can be reduced (Dehon & Bredart, 2004), lending support to the theory that OA are more affected by misinformation because of source memory problems. This effect may cross over into memories for events, causing OA to be more susceptible to misinformation than YA.

The misinformation effect has also been examined with more realistic stimuli, such as videos. In a study involving a 3 minute video in an intentional memory condition, Coxon and Valentine (1997) found no age differences between YA and OA for the misinformation effect. In their study four items of misinformation was presented in the form of questions. However, overall, OA did produce more incorrect responses, fewer correct responses, and more “I don’t know responses” than YA. Likewise, Gabbert, Memon, and Allan (2003) also reported that OA were no more susceptible than YA to misinformation. In their procedure, participants viewed a 1.5 minute video in an intentional memory condition. Misinformation in this study was not presented by researchers, but by other participants: Two participants viewed the same video from different perspectives and then discussed the video before answering any questions. In their discussions, each participant shared information that was only available from their perspective. Participants did not know they were viewing the video from alternative perspectives. So misinformation was defined as details that could not be seen from the perspective of the participant, but were presented in the discussion following the video. A significant proportion of participants who discussed the event reported information that they had acquired only from the discussion. There were no age differences between YA and OA in this finding. However, OA did recall significantly fewer correct details than YA (Gabbert et al., 2003). This research suggested that OA were no more prone to memory errors than YA.

On the other hand, there is also substantial evidence that indicates that OA are more prone to misinformation regarding event details than YA (Cohen & Faulkner, 1989; Karpel, Hoyer, & Toglia, 2001; Mitchell, Johnson, & Mather, 2003). In an intentional memory setting, Cohen and Faulkner (1989) showed a 2 minute video clip, and then presented misinformation to half the participants in a narrative describing the video. Participants in the control group were given an accurate narrative description of the video. Memory was assessed using a recognition test and OA remembered as much as YA. This is consistent with other research showing that recognition abilities do not decline with age (Verhaeghen, et al., 2000; Palfai et al., 2003). However, OA were more likely to be influenced by misinformation than YA (Cohen & Faulkner, 1989). Karpel, Hoyer, and Toglia (2001) found similar results in their research that depicted a theft on a series of 62 slides in an intentional memory condition. Older adults' overall memory accuracy was worse than YA, and OA were more susceptible to misinformation than were YA (Karpel et al., 2001). Roediger and Geraci (2007) attempted to reconcile these earlier conflicting findings by using a yes-no recognition test and a source monitoring test. The source monitoring test focused the attention of the viewer to possible sources of information, whereas the yes-no test did not. The thought here is that attentional direction to the source may help increase participants awareness of misinformation, and reduce errors. Their hypothesis was confirmed in that the OA were more likely to make misinformation errors than YA (Roediger & Geraci, 2007) in the typical yes-no test condition, but not in the source monitoring test.

Roediger and Geraci (2007) suggested varying hypotheses regarding the misinformation effect and aging. On the one hand, OA may be less affected by misinformation because they may not successfully encode and retrieve the misinformation embedded into questions or a narrative, causing its impact to be diminished. On the other hand, prevalent source memory errors in OA may cause the misinformation effect to have a greater impact on them than YA. Or it is possible that OA may simply not remember the original event as well as YA, causing them to be more prone to believe false information. Finally, the presentation of misinformation could result in some combination of these hypotheses, causing the misinformation effect to be similar for YA and OA (Roediger & Geraci, 2007).

In summary, OA tend to perform worse on recall tasks than YA, but perform similarly on recognition tasks. This effect has been shown in tasks using word lists, symbols, faces, and events depicted on slides and video. OA also perform worse than YA when memory conditions are intentional as opposed to incidental in tasks involving word lists, but to our knowledge, this effect has not been clearly examined with event memory. The present study is interested in looking at the possible interaction of misinformation and encoding condition, specifically creating a condition in which misinformation is presented to OA after viewing an event in incidental or intentional conditions. Some research has shown that OA and YA are equally susceptible to misinformation, but there is also strong evidence that indicates that OA are more prone to misinformation regarding event details than YA. Are OA aware of their decreased memory abilities, and, how is this related to their performance?

Self-Evaluation

Self-evaluation of memory can be assessed in several ways, ranging from confidence, to self-efficacy, to other forms of metamemory. In this particular study, we are interested in confidence measures (because these are commonly examined in eyewitness memory studies) and in self-efficacy (because this type of self-evaluation has proven to be very important in the memory aging literature). Perceived self-efficacy refers to people's beliefs about their ability to perform at designated levels (Bandura, 1994). Self-efficacy may be assessed before or after testing. As noted earlier, confidence measures are examined following a memory test; participants rate their confidence about the accuracy of a specific memory response.

Self-Efficacy

Self-efficacy beliefs determine, among other things, how people motivate themselves. People who believe that they can perform a specific task well (those with high levels of self-efficacy) will work harder at accomplishing it even when faced with obstacles. On the other hand, people who doubt their capabilities (those with low levels of self-efficacy) give up much more quickly (Mager, 1992). In other words, self-efficacy beliefs partly determine how much effort was put into a task (Pajares, 2002). Self-efficacy varies from one domain to another for every individual. That is, self-efficacy for test taking may be higher or lower than self-efficacy for memory, depending on the person’s beliefs about their potential skill in these two domains. The literature consistently shows that YA possess higher memory self-efficacy scores than OA (McDougall & Kang, 2003). It is also the case that self-efficacy is correlated with performance in OA (McDonald-Miszczak, Gould, & Tychynski, 1999; McDougal & Kang, 2003), although more so for everyday abilities than for laboratory tasks (Berry, West, & Dennehy, 1989; McDonald-Miszczak et al., 1999; West, Dennehy-Basile, & Norris, 1996).

In addition to using self-efficacy as a form of self-evaluation, confidence is also often assessed. Understanding the relationship between confidence and accuracy is an important issue in eyewitness scenarios. For instance, police and juries heavily weigh eyewitnesses' levels of confidence when deciding if they are accurate or not.

Confidence

Research has shown that OA tend to be less confident in their accurate memories and more confident in their inaccurate memories than YA (Cohen & Faulkner, 1989; Karpel et al., 2001; Mitchell et al., 2003). For instance, Karpel and colleagues (2001) found that levels of confidence and vividness ratings of falsely-recognized items were higher for OA than YA. Mitchell and colleagues (2003) also found that OA were more confident than YA committing source memory errors, and were less confident when their source memories were correct. Furthermore, Adams-Price (1992) found that OA showed fewer significant correlations between accuracy and confidence than YA.

The results from two experiments conducted by Dodson et al. (2007b) showed that OA were worse than YA in judging their responses on cued recall and source memory tests. Participants viewed and listened to a series of statements read by one of two speakers. Participants were told there would be a memory test following the reading (intentional condition). After a delay, participants were exposed to each statement again and were told to indicate whether the statements were old or new and to rate their confidence for each answer. When participants indicated that a statement had been heard during the test phase, they were to also determine which of the speakers read that statement (source memory). Using the same confidence scale, they indicated their confidence for their source memory judgment. It was found that there were no significant age-related differences in the confidence-accuracy relationship for *item memory*. However, for *source memory* responses, OA were worse than YA in their confidence-accuracy judgments (Dodson et al, 2007b).

Dodson, Bawa, and Krueger (2007b) wanted to explore further the misrecollection hypothesis in a second experiment which predicted that “OA should show an impaired ability to monitor the accuracy of all responses that demand memory for recently learned specific details” (p. 127). To study this prediction, a cued recall test of memory for recently learned specific details was used. They expected to find that OA would be worse in assessing the accuracy of their responses even when YA and OA remembered comparable numbers of items, and their prediction was confirmed. Finally, in an eyewitness memory situation, YA and OA were equally accurate in recognizing criminals and rejecting distracter faces from a photo line-up, but YA were more confident, suggesting that OA were more cautious in their confidence ratings (Yarmey & Kent, 1980). Overall, when compared to YA, OA show decreased confidence in their accurate eyewitness memories and increased confidence in their inaccurate memories.

CHAPTER 6
STUDY 2: METHOD

The purpose of Study 2 is to examine the misinformation effect in OA as compared to YA in incidental and intentional encoding conditions through the use of a more realistic stimulus (live event) than has been used in the past (slides, video).

Hypotheses

Hypothesis 1: YA will be more accurate than OA on all recall tests, but facial recognition will not vary significantly with age (Yarmey & Kent, 1980; Smith & Winograd, 1978).

Hypothesis 2: Intentional memory conditions will lead to more correct recall of details in directed and free recall (Block, 2009) and better recognition of faces than incidental memory conditions (Block, 2009; Davies & Hine, 2007). This effect is expected to occur for both OA and YA.

a) OA recall and recognition scores will be worse in intentional conditions than YA.

b) Age differences will be reduced in incidental conditions.

Hypothesis 3: Participants receiving misinformation will have lower recall scores and make more memory errors on free recall and on the second recall task than those not receiving misinformation (Sutherland & Hayne, 2001; Dodson et al., 2007a).

a) Participants receiving misinformation will have lower scores on the second directed recall than the first directed recall test, and participants not receiving misinformation will score the same on both directed recall tests.

b) Misinformation will result in lower scores in the incidental condition than the intentional condition on free recall and on the second directed recall test.

c) YA will be *less* affected by misinformation than OA: OA will make more memory errors after misinformation on free recall and on the second directed recall test. In the intentional condition specifically, YA will be less affected by misinformation than OA; misinformation effects may be more similar across age group in the incidental condition.

Hypothesis 4: Overall, memory self-efficacy will be higher in YA than OA.

Hypothesis 5: Based on our findings from Study 1, it is predicted that a positive confidence-accuracy relationship will be present in both encoding conditions.

Method

Participants

Data was collected from 77 older adults aged 59 to 82 years old (*M*=72.30, *SD*=5.17). The sample of OA participants was 95% White, 5% Other. Older adults were 63% female overall; with 58-68% female participants in each condition. In addition, 99 undergraduate college students aged 18 to 23 years old (*M*=18.78, *SD*=1.08) participated. The undergraduate sample was 42% White, 19% Black, 16% Hispanic, 19% Asian, and 3% Other. Younger participants were 56% female overall; with 48-70% female in each condition. OA had an average of 16.37 years of education (SD=2.80) and YA had an average of 13.00 years of education (SD=1.13), which was a significant difference, $F(1, 173) = 118.92$, $p<.001$, $\eta_p^2=.41$. On average, both age groups were quite healthy with ratings above eight on a Likert scale where ten was *Excellent Health* and zero was *Very Poor Health*, although YA had higher health ratings, $F(1, 173) = 4.68$, $p<.05$, $\eta_p^2=.03$.

All participants were cognitively healthy. Participants were excluded if they had difficulty understanding directions or had significant hearing or vision problems that impaired their ability to hear or see the interruption. One YA was not included because of a significant hearing deficit. No older adults were excluded. OA were recruited from the local community and retirement homes and were compensated with a $10 gift and memory handouts. YA were recruited from university courses and compensated for their participation with course credit.

Participants were tested in groups (1-6 participants per group for YA, $M = 4.10$ $SD = 1.40$; and 1-7 participants per group for OA $M = 4.77$ $SD = 1.36$), which were comprised entirely of members in the same age, encoding condition, and misinformation condition (with the exception of the last few groups tested, which were mixed by misinformation: some participants received misinformation on the printed DR1 recall test and some did not, in order to balance group sizes).

Materials

All materials were the same as study 1, with minor adjustments made after an examination of the study 1 results. For example, two questions were switched between DR1 and DR2 in an attempt to equalize the difficulty of the two directed recall questionnaires. Confidence was also assessed for the photo lineup and two manipulation check questions were added asking participants to report any difficulty hearing or seeing the interruption. In addition, a memory self-efficacy assessment was added to provide more information about participants' self-evaluation of their own ability.

The Memory Self-Efficacy Questionnaire with four scales (MSEQ-4; West, Bagwell, & Dark-Freudeman, 2008) is a valid and reliable assessment of memory self-efficacy (Berry, West, & Dennehy, 1989). One scale was added to the MSEQ-4, to assess efficacy for face recognition in an eyewitness context, leaving five scales in total–memory for names, text, shopping lists, stories, and faces (for this investigation, with the added scale, the overall measure maintained its reliability (alpha = .93). Each scale had five questions representing five levels of difficulty for one task. Each question required participants to indicate their confidence level (from 0%-100%) for being able to perform each of the five memory tasks, which were presented in order of descending difficulty. The dependent variable was self-efficacy strength (average confidence across all responses), ranging from 0 to 100. As described by West and colleagues (2001), when memory self-efficacy is assessed following a memory measure, as opposed to before, scores tend to be lower and depict a more accurate representation of actual performance. Accordingly, efficacy was assessed after all memory tests were completed.

Procedure

All testing took place on campus at the University of Florida in the same room, with the exception of one testing session which took place at a local retirement community (N=6). There were no significant differences between those tested at the retirement community and those tested on campus in the same condition for any of the measured variables. The procedures used in study 1 were replicated. All participants, regardless of encoding condition, were given a short story to read and told their memory would be tested on that story (no such memory test was ever given, as the story was used as a filler task only). Those in the intentional condition were warned about an upcoming interruption and were told to pay attention to it because their memory would later be tested on that interruption. No such warning was given to those in the incidental condition. Clear speech techniques were implemented during the scripted interruption for all testing sessions in order to ensure that the interruption was heard and understood clearly (Kricos, 2003). After the interruption, participants filled out a short demographics questionnaire, completed a directed recall memory test (indicating their confidence in each of the responses), a photo lineup facial recognition test (with corresponding confidence), and were told to give a recollection in writing about all the details they could remember about the interruption. Finally, participants completed the modified MSEQ-4 questionnaire and provided health information before they were debriefed. Groups were assigned to encoding and misinformation conditions by counterbalancing, forming a 2 (age group: young or old) X 2 (encoding condition: incidental or intentional) X 2 (misinformation condition: misleading or non-misleading recall questions) experimental design.

CHAPTER 8
STUDY 2: RESULTS

Preliminary Analyses

Analyses of variances (ANOVA) tested the effects of age group, encoding condition, and misinformation on each of the manipulation check questions. As expected, those in the intentional condition (*M* = 5.72, *SD* = 1.97) were significantly more likely to expect a memory test on the interruption than those in the incidental condition (*M* = 2.08, *SD* = 1.79), *F* (1, 168) = 164.80, $p<.001$, $\eta_p^2=.50$. In addition, those in the intentional condition (*M* = 6.00, *SD* = 1.53) also tried to remember the interruption significantly more often than those in the incidental condition (*M* = 2.31, *SD* = 1.85), *F* (1, 176) = 213.78, $p<.001$, $\eta_p^2=.56$. YA (*M* = 4.42, *SD* = 2.43) reported trying to remember the interruption more than OA (*M* = 3.71, *SD* = 2.56), *F* (1, 176) = 8.25, $p=<.001$, $\eta_p^2=.05$. Those who received misinformation reported noticing it (*M* = 4.14, *SD* = 2.30) more than those who did not receive misinformation (*M* = 2.98, *SD* = 2.11), *F* (1, 168) = 15.17, $p<.001$, $\eta_p^2=.08$. In addition, YA (*M* = 3.97, *SD* = 2.23) recognized the presence of misinformation more than OA (*M* = 2.96, *SD* = 2.20), *F (*1, 168) = 11.80, $p<.001$, $\eta_p^2=.07$, and those in the intentional condition (*M* = 3.94, *SD* = 2.29) noticed misinformation more than those in the incidental condition (*M* = 3.13, *SD* = 2.20), *F (*1, 168) = 6.40, $p<.01$, $\eta_p^2=.04$. Participants in the intentional condition spent significantly more time paying attention to the event (*M* = 44.30s, *SD* = 45.87s) than those in the incidental condition (*M* = 19.46s, *SD* = 25.40), *F* (1, 168) = 18.85, $p=<.001$, $\eta_p^2=.10$. Finally, there were no age differences in reported ability to see or hear the interruption. There was one encoding condition difference, indicating that those in the incidental condition (*M* = 6.38, *SD* = .97) reported a significantly lower ability to see than those in the intentional condition (*M* = 5.81, *SD* = 1.61), *F* (1, 168) = 8.07, *p*<.005, η_p^2=.05. This is likely due to the fact that they were not expecting a memory test and were not paying attention, rather than a vision problem.

On each of the manipulation check questions, we set a criteria of *5* or higher on the Likert-type scale (with 7 being *Yes, a lot*) to identify individuals who may have expected a memory test or noticed the presence of misinformation. About half of the participants (52%) who received misinformation reported noticing at least some incorrect information embedded in the questions, compared with 29% of participants who did not receive misinformation. In addition, 65% of YA compared with 37% of OA who received misinformation reported noticing at least some of it. Only 14% of the participants in the incidental condition indicated that they were expecting a memory test on the interruption, compared with 78% of participants in the intentional condition. Finally, 15% of participants in the incidental condition indicated that they were trying to remember the interruption, compared with 87% of participants in the intentional condition.

In order to determine if group size had an effect on memory performance, an Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) X Group Size one way ANOVA was examined for all directed recall questions with group size entered as a random effect. Results indicated that group size and group size by condition interactions were not significant; indicating that group size did not contribute to performance on the memory measures (free recall, recognition, directed recall).

Directed Recall

The same coding procedures from study 1 were used such that directed recall questions were coded into categories based on response type, and analyses focused separately on correct responses and errors specifically attributed to misinformation.

To test the effects on correct directed recall scores, an Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) X Age (young or old) X Time of test (DR1 or DR2) mixed ANOVA was examined. There was a significant main effect of encoding condition, F (1, 165) = 43.50, p<.001, η_p^2=.21, with participants in the intentional condition scoring significantly higher overall than those in the incidental condition. There was also a main effect of misinformation, F (1, 165) = 6.29, p=.01, η_p^2=.04, such that participants who received misinformation scored significantly lower overall than those who did not receive misinformation. In addition, there was a significant main effect of age such that OA scored lower overall than YA, F (1, 165) = 34.85, p<.001, η_p^2=.17. Finally, there was no main effect of time of test (see Table 8-1 for all directed recall data).

Planned Bonferonni comparisons were used to examine the predicted interactions. As expected, the time of test by misinformation interaction was significant, F (1, 165) = 4.99, p<.05, ηp2=.03. Those who received misinformation scored lower on DR2 than those who did not, F (1, 165) = 12.86, p<.001, η_p^2=.07, and there was no difference between the scores of the two groups (misinformed and not misinformed) on DR1, providing between subjects support for an effect of misinformation (see Table 8-1). Furthermore, as predicted there was no difference between scores on DR1 and DR2 for those who were not misinformed, but for those who were misinformed, scores on DR2 were lower than score on DR1, F (1, 165) = 4.61, p<.05, η_p^2=.03, providing within-subjects evidence for an effect of misinformation.

Continuing to report the planned Bonferroni comparisons, the predicted four-way interaction of time of test, encoding condition, age, and misinformation approached significance F (1, 165) = 2.13 p=.15. It was hypothesized that in the intentional condition specifically, YA would be less affected by misinformation than OA,whereas misinformation effects (lower scores on DR2 than DR1) would be more similar across age group in the incidental condition. This prediction was not supported because misinformed YA scored higher than misinformed OA in both encoding conditions: intentional condition, F (1, 165) = 16.10, p<.001, η_p^2=.09; incidental condition, F (1, 165) = 14.01, p<.001, η_p^2=.08. The two-way interaction of misinformation by encoding condition was not significant, providing no support for the prediction that misinformation would have a greater effect in the incidental condition.

To consider the misinformation effect in more detail we examined the number of errors specifically attributed to misinformation (six possible errors total) in an Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) X Age (young or old) ANOVA. There was a significant main effect of misinformation, F (1, 175) = 58.91, p<.001, η_p^2=.26, such that those who were misinformed responded to these questions more often with incorrect responses specifically based on the misinformation they had received. There was also a main effect of age, F (1, 175) = 12.70, p<.001, η_p^2=.07, such that YA made more misinformation errors than OA. The encoding condition by age interaction approached significance, F (1, 175) = 3.66, p=.06, η_p^2=.02.

Planned Bonferroni comparisons revealed that in the incidental condition, YA made more misinformation errors than OA, F (1, 168) = 15.40, p<.001, η_p^2=.08, and in the intentional condition, both age groups made an equal number of misinformation errors. Thus, when OA and YA weren't trying to remember the event, YA remembered more "clues" (although false clues) embedded in DR1 questions which they used to answer DR2 questions. See table 8-2. YA in the incidental condition made fewer misinformation errors than YA in the intentional condition, F (1, 168) = 6.62, p<.01, η_p^2=.04, suggesting that YA were more resistant to false information when they were expecting a memory test.

Further analyses examined differences between self-report measures on two of the manipulation check questions: 1) "Were you expecting a memory test on the interruption?" and 2) Did you notice any incorrect information within any of the questions that asked about your memory for the event?" On each of the manipulation check questions, the same criteria used in Study 1 was used, such that a score of *5* or higher on the Likert-type scale (with 7 being *Yes, a lot*) to identify individuals who may have expected a memory test or noticed the presence of misinformation. A two-way ANOVA using these two independent variables (1) expectation of a memory test and 2) detection of false information), run only on those participants who were misinformed, revealed that expectation of a memory test, and detection of false information were not significant factors in determining how much false information was reported. That is, those who noticed false information were just as likely to report it as those who did not notice it, and those who were expecting a memory test were also just as likely to report false information as those who were not expecting a memory test.

Confidence: All Answers

To examine confidence differences, an Age (YA or OA) X Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) MANOVA was conducted with two confidence variables (confidence for correctly answered questions, and confidence for incorrectly answered questions). Multivariate tests showed a significant main effect for encoding condition, F (2, 166) = 7.27, p=.001, η_p^2=.08, misinformation, F (2, 166) = 3.83, p<.05, η_p^2=.04, and age, F (2, 166) = 3.86, p<.05, η_p^2=.04. Follow up univariate ANOVAs showed the specific effects for each variable. There was a significant effect of encoding condition for confidence ratings on correctly answered questions, F (1, 167) = 12.35, p<.001, η_p^2=.07, and incorrectly answered questions, F (1, 167) = 7.14, p<.01, η_p^2=.04 (those in the intentional condition were more confident on correct and incorrect answers). There was a significant main effect of misinformation on confidence ratings for incorrectly answered questions, F (1, 167) = 7.09, p<.01, η_p^2=.04, but misinformation had only a marginal effect on confidence ratings for correctly answered questions, F (1, 167) = 2.86, p=.09, η_p^2=.02. No interactions were significant. Additional analysis revealed that confidence in correct answers was significantly higher than confidence in incorrect answers across all groups, F (1, 167) = 918.06, p<.001, η_p^2=.85. See Table 8-3.

Pearson bivariate correlations were used to examine the confidence-accuracy relationship for all responses. See table 8-4. For confidence in correct answers there was a weak positive correlation for all participants, r=.17, p<.05. For those who were not misinformed, there was a positive correlation between confidence and accuracy, r=.25, p<.05. This finding was qualified by the fact that the correlation was only significant for those who were not misinformed in the intentional condition, r=.30, p<.05, but not in the incidental condition. See table 8-4. For YA there was a significant correlation between confidence and accuracy, r=.24, p<.05, and for OA the relationship was somewhat weaker (r=.21, p=.07). This relationship for YA seemed to be driven mainly by those who were misinformed because they were the only group that displayed a positive correlation between confidence in correct answers and accuracy, r=.29, p=.05. For OA, the confidence-accuracy correlation was present in the opposite condition: those in the group that was not misinformed were the only participants to display a positive correlation between confidence in correct answers and accuracy, r=.34, p<.05. See table 8-4.

Confidence: Misinformation Answers Only

An Age (YA or OA) X Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) MANOVA was conducted with two confidence variables for only those questions that assessed misinformation (confidence for correctly answered misinformation questions, and confidence for incorrectly answered misinformation questions). This analysis was limited to incorrect responses attributed to misinformation details only). Multivariate tests showed a significant main effect for encoding condition, F (2, 115) = 9.62, p=.001, η_p^2=.14, and for misinformation, F (2, 166) = 3.85, p<.05, η_p^2=.06. Follow up univariate ANOVAs showed the specific effects for each condition. There was a significant effect of encoding condition for confidence ratings on correctly answered misinformation questions, F (1, 116) = 19.27, p<.001, η_p^2=.14, but not for incorrectly answered misinformation questions, such that those in the intentional condition had higher confidence ratings on correctly answered misinformation questions . In addition, there was a significant effect of misinformation for confidence ratings on incorrectly answered misinformation questions, F (1, 116) = 7.76, p<.01, η_p^2=.06, but not for correctly answered misinformation questions, such that those who were misinformed were more confident in false memories. See table 8-5.

A subsequent repeated measures analysis of the same variables revealed a significant main effect of response type (correct vs. incorrect), F (1, 116) = 6.82, p<.01, η_p^2=.06, which was qualified by two 2-way interactions: a significant response type by encoding condition interaction, F (1, 116) = 6.10, p<.05, η_p^2=.05, and a marginally significant response type by misinformation interaction, F (1, 116) = 3.04, p=.08, η_p^2=0.03. A priori Bonferonni comparisons revealed that those who were misinformed were just as confident in their incorrect responses as their correct responses, F (1, 116) = .39, p>.10. Also, those in the incidental condition were just as confident in their incorrect responses as their correct responses, F (1, 116) = .34, p>.10. By contrast, those in the intentional condition were more confident in their correct responses, F (1, 116) = 13.49, p<.001, η_p^2=0.10. Pearson bivariate correlations were used to examine the confidence-accuracy relationship for misinformation responses. There were no significant correlations between misinformation responses and accuracy. See table 8-6.

Face Recognition

The recognition task was initially scored to create a single dichotomous variable. As expected, significantly more participants in the intentional condition recognized the target face than in the incidental condition, χ^2 (1, N=174) = 5.08, p<.05. In the intentional condition, 56% of the participants recognized the target face, whereas 39% of the participants in the incidental condition recognized the target face. Age differences in recognition were also assessed. Significantly more YA recognized the target face than OA, χ^2 (1, N=174) = 8.06, p<.005. Results indicated that 57% of YA recognized the target face, whereas 35% of OA recognized the target face. In the intentional condition, YA recognized the target face 65% of the time compared with 42% of OA, χ^2 (1, *N*=86) = 4.32, *p*<.05. In the incidental condition, this age difference approached significance, χ^2 (1, *N*=90) = 3.31, *p*=.07 (47% for YA; 28% OA).

Additional tests that distinguished errors of omission (e.g., “Not present” or “I don’t know” responses) from errors of commission (i.e., choosing the wrong face) revealed that 44% of OA compared to 30% of YA chose the wrong face, a marginally significant difference, χ^2 (1, *N*=176) = 3.59, *p*=.06. Further analysis showed that this difference was only true for participants in the intentional encoding condition where 45% of OA and 17% of YA made errors of commission, χ^2 (1, *N*=86) = 8.11, *p*<.005, and not in the incidental condition where no age differences in false alarms were present (44% and 43% for OA and YA respectively), χ^2 (1, *N*=90) = .00, *p*>.10. There was also a significant main effect of encoding condition, such that 29% of participants in the intentional condition compared with 43% in the incidental condition made errors of commission, χ^2 (1, *N*=176) = 3.87, *p*<.05. The presence of misinformation, where the target was placed in the photo lineup, seat position for participants, and the specific person serving as the interrupter had no significant effect on face recognition.

Confidence: Face recognition. To examine confidence differences in face recognition decisions, two Age (YA or OA) X Encoding Condition (incidental or intentional memory) ANOVAs were conducted: one for confidence for correct identification, and the other for confidence for errors of commission (confidence levels for errors of omission were not included because these participants did not make a decision).

For confidence in correct identification, there was a significant main effect of age such that YA were more confident in correct identification than OA, F (1, 81) = 4.50, $p<.05$, $\eta_p^2=.06$. See Table 8-7. There was also a significant main effect of encoding condition such that participants in the intentional condition were more confident in their correct identification than those in the incidental condition, F (1, 81) = 5.15, $p<.05$, $\eta_p^2=.06$.

For confidence in errors of commission (i.e., choosing the wrong face) there were no age differences in confidence levels, and there was a marginal main effect of encoding condition such that those in the intentional condition were more confident in their wrong decision than those in the incidental condition, F (1, 60) = 3.23, $p=.08$, $\eta_p^2=.05$.

Free Recall

A three way analysis of variance (ANOVA) examined the effects of encoding condition, misinformation, and age on the number of details correctly provided in free recall. Encoding condition had a significant effect on free recall, F (1, 176) = 23.15, $p<.001$, $\eta_p^2=.12$ such that those in the intentional condition remembered significantly more details than those in the incidental condition. See Table 8-8. Age also had a significant effect on the number of details correctly provided, F (1, 176) = 32.71, $p<.001$, $\eta_p^2=.16$, such that YA provided more details than OA. The presence of misinformation had no significant effect on the total number of details recalled, F (1, 176) = 2.08, $p>.10$.

Planned Bonferroni comparisons examined the encoding condition by misinformation interaction. It was hypothesized that those who received misinformation would have lower recall scores in the incidental condition than the intentional condition. This hypothesis was not supported: Those in the incidental condition who were misinformed had significantly higher free recall scores than those who were not misinformed: *F* (1, 168) = 4.54, $p<.05$, $\eta_p^2=.03$, while those in the intentional condition who were misinformed scored just as high on free recall as those who were not.

Because the data for free recall intrusions were not normally distributed, with only a few intrusions made by each participant, three Kruskall-Wallis tests (misinformation vs. no misinformation, YA vs. OA, and intentional vs. incidental) were run to examine the effect of misinformation on the number of intrusions. Those who received misinformation made significantly more intrusions based on the misinformation (*M*=.70, *SD*=.92) than those who did not receive misinformation (M=.23, SD=.55), χ^2 (1, *N*=176) =16.68, $p<.001$. The presence of intrusions was not significantly different for age group or encoding conditions, such that OA and YA made the same number of misinformation intrusions, and those in the intentional and incidental conditions made the same number of intrusions. In addition, the predicted interactions were also examined, with additional Kruskall-Wallis tests run separately for those who were misinformed in each encoding condition and in each age group. No analyses were significant, indicating no difference between incidental and intentional encoding on the misinformation effect for free recall for either age group

Self-Efficacy

To examine self-efficacy differences between groups (using the original four subscales), an ANOVA was conducted using the confidence for all items in an Encoding Condition (incidental or intentional memory) X Misinformation (misleading or non-misleading recall questions) X Age (YA or OA). As expected, YA (*M* = 66.05, *SD* = 13.46) had higher self-efficacy than OA (*M* = 59.18, *SD* = 16.91), *F* (1, 176) = 10.514, $p=.001$, $\eta_p^2=.06$. This main effect, however, was modified by a significant three-way interaction of age, encoding condition, and misinformation, F (1, 176) = 5.09, p<.05, η_p^2=.03. Bonferroni comparisons indicated that YA had higher self-efficacy than OA only in the incidental condition when misinformed, F (1, 168) = 5.08, p<.05, η_p^2=.03, and in the intentional condition when not misinformed, F (1, 176) = 11.12, p<.001, η_p^2=.06. When not misinformed, encoding condition had no significant effect on self-efficacy for YA, but OA had significantly lower self-efficacy in the intentional condition, F (1, 168) = 4.70, p<.05, η_p^2=.03.

Table 8-1. Means and standard deviations on directed recall questionnaires as a function of experimental condition and Age

	DR1		DR2		Total	
Condition	M	SD	M	SD	M	SD
OA	5.03	2.08	4.62	1.97	9.65	3.56
Intentional	5.78	2.18	5.42	2.01	11.18	3.60
Not Misinformed	6.00	2.03	6.32	2.16	12.26	3.65
Misinformed	5.58	2.34	4.53	1.39	10.11	3.30
Incidental	4.31	1.73	3.85	1.62	8.15	2.84
Not Misinformed	4.60	1.60	4.15	1.69	8.75	2.77
Misinformed	4.00	1.86	3.53	1.62	7.53	2.86
Combined						
Not Misinformed	5.26	1.92	5.21	2.20	10.46	3.65
Misinformed	4.79	2.23	4.03	1.52	8.82	3.31
YA	6.03	1.80	6.20	1.65	12.23	2.94
Intentional	6.69	1.68	6.98	1.39	13.67	2.49
Not Misinformed	6.82	1.59	7.29	1.38	14.11	2.47
Misinformed	6.50	1.82	6.55	1.32	13.05	2.44
Incidental	5.41	1.70	5.47	1.54	10.88	2.70
Not Misinformed	5.23	1.63	5.62	1.70	10.85	2.75
Misinformed	5.60	1.78	5.32	1.38	10.92	2.69
Combined						
Not Misinformed	6.06	1.79	6.48	1.75	12.54	3.06
Misinformed	6.00	1.83	5.87	1.47	11.87	2.77
All Adults						
Intentional	6.28	1.95	6.29	1.85	12.57	3.26
Not Misinformed	6.47	1.80	6.89	1.78	13.36	3.10
Misinformed	6.05	2.11	5.56	1.68	11.62	3.22
Incidental	4.93	1.79	4.77	1.76	9.70	3.06
Not Misinformed	4.96	1.63	4.98	1.83	9.93	2.92
Misinformed	4.91	1.96	4.55	1.68	9.45	3.22
Combined						
Not Misinformed	5.72	1.87	5.95	2.04	11.67	3.46
Misinformed	5.45	2.10	5.02	1.75	10.47	3.38

Table 8-2. Means and standard deviations for misinformation errors as a function of experimental condition (six possible errors)

Condition	Misinformation Errors M	SD
OA	1.53	1.29
Intentional	1.58	1.13
Not Misinformed	0.79	0.79
Misinformed	2.37	0.83
Incidental	1.49	1.45
Not Misinformed	1.00	1.03
Misinformed	2.00	1.67
Combined		
Not Misinformed	0.90	0.91
Misinformed	2.18	1.31
YA	2.16	1.65
Intentional	1.75	1.52
Not Misinformed	1.00	1.22
Misinformed	2.80	1.28
Incidental	2.55	1.68
Not Misinformed	1.78	1.31
Misinformed	3.36	1.66
Combined		
Not Misinformed	1.37	1.31
Misinformed	3.11	1.51
All Adults		
Intentional	1.67	1.36
Not Misinformed	0.91	1.06
Misinformed	2.59	1.09
Incidental	2.09	1.66
Not Misinformed	1.43	1.24
Misinformed	2.77	1.78
Combined		
Not Misinformed	1.17	1.18
Misinformed	2.69	1.49

Table 8-3. Means and standard deviations for confidence ratings as a function of experimental condition and accuracy

Condition	Correct Answers M	SD	Incorrect Answers M	SD
OA	79.42	13.77	36.39	18.15
Intentional	82.08	11.41	40.60	17.57
Not Misinformed	79.74	13.02	34.01	13.40
Misinformed	84.42	9.29	47.20	19.06
Incidental	76.76	15.49	32.18	17.95
Not Misinformed	74.63	15.92	32.43	17.35
Misinformed	78.89	15.18	31.93	19.00
Combined				
Not Misinformed	77.18	14.58	33.22	15.31
Misinformed	81.65	12.72	39.57	20.31
YA	76.41	12.56	40.21	16.83
Intentional	80.76	9.72	42.75	18.51
Not Misinformed	81.63	10.11	40.15	19.00
Misinformed	79.55	9.25	46.39	15.97
Incidental	72.31	13.61	37.82	14.86
Not Misinformed	69.28	12.49	33.63	11.15
Misinformed	75.46	14.25	42.17	17.09
Combined				
Not Misinformed	75.69	12.83	37.01	16.53
Misinformed	77.28	12.33	44.05	16.55
All Adults				
Intentional	81.34	10.45	41.80	18.03
Not Misinformed	80.87	11.28	37.67	17.73
Misinformed	81.92	9.47	46.78	17.32
Incidental	74.21	14.53	35.41	16.40
Not Misinformed	71.54	14.12	33.12	13.93
Misinformed	76.94	14.58	37.75	18.45
Combined				
Not Misinformed	76.30	13.52	35.44	16.06
Misinformed	79.28	12.62	41.99	18.39

Table 8-4. Confidence and accuracy correlations for all answers as a function experimental condition and age

	Correct	
Condition	r	sig.
OA		
Intentional	.14	.42
Misinformed	-.07	.78
Not Misinformed	.40	.09
Incidental	.17	.30
Misinformed	.28	.24
Not Misinformed	.18	.45
Combined	.21	.07
Not Misinformed	.34*	.04
Misinformed	.20	.22
YA		
Intentional	.24	.11
Misinformed	.35	.14
Not Misinformed	.14	.48
Incidental	.01	.95
Misinformed	.21	.33
Not Misinformed	-.21	.32
Combined	.24*	.02
Not Misinformed	.22	.11
Misinformed	.29*	.05
All Adults		
Intentional	.14	.20
Misinformed	-.03	.88
Not Misinformed	.30*	.04
Incidental	.01	.95
Misinformed	.14	.37
Not Misinformed	-.11	.47
Combined	.17*	.03
Misinformed	.14	.22
Not Misinformed	.25*	.02

Note.

** Correlation is significant at the 0.01 level (2-tailed

* Correlation is significant at the .05 level (2-tailed)

Table 8-5. Means and standard deviations for confidence ratings on misinformation responses as a function of experimental condition and accuracy

	Correct MI Answers		Incorrect MI Answers	
Condition	M	SD	M	SD
OA	67.46	24.35	61.41	23.96
Intentional	76.04	18.54	65.12	23.96
Not Misinformed	73.11	21.44	56.94	25.40
Misinformed	78.23	18.38	71.25	21.60
Incidental	56.03	25.84	56.47	23.62
Not Misinformed	54.70	24.20	51.82	19.53
Misinformed	57.50	28.80	61.58	27.57
Combined				
Not Misinformed	64.30	24.17	54.49	22.43
Misinformed	70.26	24.64	67.53	24.01
YA	63.32	21.62	56.68	25.30
Intentional	71.91	17.82	59.39	25.10
Not Misinformed	70.67	16.46	56.11	29.49
Misinformed	72.89	18.12	61.98	21.51
Incidental	56.20	22.51	54.43	25.55
Not Misinformed	53.22	23.96	45.15	26.01
Misinformed	59.65	20.79	65.17	20.86
Combined				
Not Misinformed	60.29	22.71	49.59	27.62
Misinformed	66.27	20.37	63.57	20.96
All Adults				
Intentional	73.77	18.25	61.98	24.56
Not Misinformed	71.75	18.49	56.48	27.23
Misinformed	75.33	18.17	66.22	21.74
Incidental	56.14	23.48	55.12	24.74
Not Misinformed	53.71	23.67	47.37	23.94
Misinformed	58.91	23.36	63.93	22.96
Combined				
Not Misinformed	61.83	23.16	51.47	25.66
Misinformed	67.89	22.10	65.18	22.15

Table 8-6. Confidence and accuracy correlations for misinformation answers only as a function experimental condition (for misinformed participants only)

Condition	Correct r	sig.
OA	.29	.12
Intentional	.22	.42
Incidental	-.05	.87
YA	.26	.11
Intentional	.25	.31
Incidental	.09	.71
All Adults	.23	.06
Intentional	.14	.43
Incidental	.07	.69

Note.
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Table 8-7. Means and standard deviations for confidence ratings on recognition decisions as a function of encoding condition and age

	Correct Identification		Incorrect Identification	
Condition	M	SD	M	SD
OA	67.04	22.33	52.94	23.94
Intentional	73.75	17.46	59.41	25.36
Incidental	57.27	25.73	46.47	21.20
YA	77.96	24.83	55.33	19.78
Intentional	82.00	18.83	61.25	17.27
Incidental	72.92	30.43	53.18	20.56
All Adults				
Intentional	79.13	18.60	60.00	22.73
Incidental	68.00	29.59	50.26	20.84

Table 8-8. Means and standard deviations on free recall as a function of experimental condition and age

	Total Score on Free Recall	
Condition	Mean	SD
OA		
Intentional	7.05	3.57
Not Misinformed	7.26	3.48
Misinformed	6.84	3.75
Incidental	4.21	3.07
Not Misinformed	3.55	2.70
Misinformed	4.89	3.35
Combined		
Not Misinformed	5.36	3.59
Misinformed	5.87	3.64
YA		
Intentional	9.46	3.16
Not Misinformed	9.32	3.31
Misinformed	9.65	3.01
Incidental	7.49	3.34
Not Misinformed	6.69	3.06
Misinformed	8.32	3.49
Combined		
Not Misinformed	8.06	3.43
Misinformed	8.91	3.32
All Adults		
Intentional	8.40	3.54
Not Misinformed	8.49	3.50
Misinformed	8.28	3.63
Incidental	6.07	3.60
Not Misinformed	5.33	3.28
Misinformed	6.84	3.80
Combined		
Not Misinformed	6.92	3.73
Misinformed	7.52	3.77

CHAPTER 9
STUDY 2: DISCUSSION

In Study 1, the effects of misinformation on intentional and incidental encoding were directly compared in a live setting for YA. The second study was focused on examining how misinformation effects might change with aging. Memory abilities show significant age differences, and eyewitness memory findings from YA can not necessarily be applied to OA. Some research indicates that OA are more susceptible to misinformation than YA (Cohen & Faulkner, 1989), whereas other research indicates the reverse (Marche et al, 2002), or no age gap (Gabbert et al, 2003). It is therefore important to explore potential factors contributing to these discrepancies. The present study sought to examine the misinformation effect in a live context and under varying encoding conditions, in order to better understand how misinformation is processed by OA and YA in realistic settings.

Study 2 was enacted in order to replicate the main findings from study 1 and to examine age differences in memory performance of a live event and the effects of misinformation. The results of the two studies provide evidence pertinent to our main research questions: Is false information more salient in one encoding condition over another, and, are there age differences between young and old adults in the misinformation effect? Confidence in facial recognition decisions and memory self-efficacy were also examined.

Overview of Results in Relation to Study 1

As expected, the main results from Study 1 were replicated in Study 2. Participants in intentional encoding conditions had higher scores on directed recall and recognition than those in incidental conditions. In Study 2, but not Study 1, participants in the intentional condition outperformed those in the incidental condition on free recall, possibly due to the addition of OA in the second study (see discussion of this issue below). Additionally, as predicted, participants who were misinformed made more memory errors involving misinformation than those who were not misinformed. Again, it was not the case that this effect was stronger in the incidental condition, as the misinformation effect was comparable across the two encoding conditions. However, YA in the intentional condition did report less misinformation than YA in the incidental condition, providing some support for the hypothesis that misinformation would be more salient in incidental conditions. It was again found that misinformed participants in both encoding conditions were just as confident in their false memories as they were in their accurate memories.

In comparison to Study 1, more YA in study 2 who were misinformed reported noticing some of the false information, possibly because clear speech techniques (Kricos, 2003) were utilized in Study 2 to emphasize the dialogue in the interruption so that it could be encoded by OA who often exhibit hearing difficulties. This may also have led to greater opportunity for the YA to encode the details as well. This also might explain why there was a slight decrease in the misinformation effect between Study 1 and 2 for YA. In addition to replicating the main findings from Study 1, Study 2 revealed several new results in relation to aging.

Relative to the OA, YA were more accurate on the directed recall and free recall test as well as the recognition test in both encoding conditions. Overall, memory self-efficacy was higher in YA than OA. In regards to confidence in correct face recognition, YA were more confident than OA, and participants in the intentional condition were more confident than those in the incidental condition. There were no age differences in confidence levels for incorrect identification.

Aging and Memory

Consistent with previous research (e.g., Tubi & Calev, 1989; McDougal & Kang, 2003; Hultsch et al., 1998) OA scored lower than YA on all recall tasks. It was predicted that age differences would be reduced in incidental conditions, based on studies showing that YA use more memory strategies than OA when there is knowledge of a memory test, but when no knowledge of a test is present, YA do not use these strategies, causing age differences to be reduced (Smith & Winograd, 1978). This hypothesis was not supported for either recall task (YA scored higher in both encoding conditions), but was somewhat supported in the recognition task.

For the recognition task, age differences were reduced in the incidental condition for correct identification (but remained marginally significant), and false alarm rates were equal for both age groups (by contrast, in the intentional condition OA made significantly more false alarms) providing evidence that under incidental conditions age is less of a factor in determining recognition accuracy than when encoding conditions are intentional. One possible explanation for this finding is that recognition is less affected than recall by the aging process (Yarmey & Kent, 1980). Another possible explanation is that YA have stronger encoding processes than OA, and when these processes are handicapped during incidental encoding, YA lose this advantage (Smith & Winograd, 1978), causing memory performance between the two groups to be more similar (for the recognition task). This finding is supportive of other research that has also shown no reliable age differences in face recognition (Searcy, et al., 1999; Yarmey & Kent, 1980).

Some studies involving video depictions of events found no age differences in the misinformation effect (Coxon & Valentine, 1997; Gabbert, et al., 2003), but other similar studies have found that OA are more prone to misinformation than YA (Cohen & Faulkner, 1989; Karpel et al., 2001; Mitchell et al., 2003), and at least one study has shown that YA are more susceptible to misinformation than OA (Marche et al., 2002). Specifically, Marche and colleagues (2002) found that when participants viewed an event only once, memory of the event was weak and YA reported more false information than OA. They theorized that this was the case because YA encoded the false information in this condition better than OA. Similarly, in the present study, in the incidental condition (when memory was poor), YA made more misinformation errors than OA on directed recall.

It has been suggested that OA may not be as prone to report false information because they do not encode or retrieve the misinformation as well as YA, causing its impact to be lessened (Roediger & Geraci, 2007). This seemed to be the case in the present study, in the incidental condition. When both age groups were not expecting a memory test, YA encoded and retrieved more false details embedded in DR1 than did OA. On the other hand, when both age groups were expecting a memory test (intentional), the number of misinformation errors did not change for OA but decreased significantly for YA, resulting in no age difference in the misinformation effect (Coxon & Valentine, 1997; Gabbert, et al., 2003). This suggests that in both encoding conditions OA were unable to encode significant details from the DR1 test items. For YA, encoding conditions made a difference for misinformation errors. Perhaps YA showed enhanced vigilance to the test items in the incidental condition while reading DR1 questions, as they were trying to sort out their memories (Marche, et al., 2002). In contrast, YA in the intentional condition were paying attention to the event as it was unfolding, so they didn't feel the need to focus on memory clues embedded in DR1. This interpretation is speculative, but future studies could use a think-aloud protocol to determine whether or not some participants focus carefully on preliminary test questions and try to remember the details in order to bolster subsequent recall.

Aging and Confidence

Several studies have found that OA are less confident in their accurate memories and more confident in their inaccurate memories than YA (Cohen & Faulkner, 1989; Karpel et al., 2001; Mitchell et al., 2003). However, the present study found that OA and YA were just as confident in their accurate and inaccurate memories, with a slight trend for OA to be more confident when they were accurate. This finding is possibly due to the use of a live event, which could have enhanced a feeling of knowing for the older participants, leading to somewhat different confidence ratings than those traditionally assessed in laboratory list recall studies. Alternatively, this could be the case because half of the participants were not expecting to be accurate, due to incidental learning. These participants may have been quite comfortable in reporting low confidence.

Consistent with findings from past research (Yarmey & Kent, 1980), YA were more confident in correct identification during the facial recognition task, suggesting that OA were more cautious in their confidence ratings. However, OA and YA were equally confident when making false choices during this task. These findings should be considered when interpreting confidence in eyewitness identification. It is possible for OA to be much less confident than YA even when they're correct. As such, confidence in recognition should be weighed differently for OA than YA.

Aging and Self-Efficacy

As expected, YA had higher memory self-efficacy than OA. This finding is consistent with past research (McDougall & Kang, 2003). It is interesting to note, however, that this age difference was present only in two conditions: 1) in the intentional condition when not misinformed, and 2) in the incidental condition when misinformed. Because self-efficacy was assessed after the memory measures, it can be concluded that experimental conditions played a significant factor in influencing these age differences. When not misinformed, encoding condition did not affect self-efficacy levels for YA, but OA in the incidental condition had much higher self-efficacy than OA in the intentional condition.

It appears that an advantaged encoding condition served to reduce self-efficacy in OA to the point that there was an age difference between YA and OA. Even though OA in the incidental condition scored lower overall on the directed recall test, their self-efficacy was higher than OA in the intentional condition who performed better on the memory test. One explanation for this is that OA in the incidental condition did not know there would be a memory test and weren't paying close attention to the event. When they had difficulty recalling the necessary information, then, it did not reduce their memory self-efficacy because they did not expect to perform well with no warning about the memory test. In contrast, OA who were trying hard to remember may have been disappointed in their performance. They knew there would be a memory test and missed nearly half the questions, causing them to have a low view of their memory abilities. It is important to note that YA in this same condition (intentional, not misinformed) were only 60% accurate, yet their self-efficacy was not affected by this relatively poor performance, and was no different than their peers in the incidental condition. This suggests that OA are perhaps more vigilant in monitoring memory, causing them to have lower confidence in their memory abilities when scores are lower. YA may have attributed their poor performance instead to some external factor, such as difficulty of the test (see Miller & Lachman, 1999).

Interestingly, this encoding condition effect on age differences was reversed when participants were *misinformed*. YA who were misinformed had higher self-efficacy than OA who were also misinformed, but only in the incidental condition. A possible explanation is that self-efficacy levels for OA were lower in the incidental misinformed group because the combination of incidental learning and the presence of false information caused self-doubt. This self-doubt may have occurred for those older adults who noticed information that did not fit with what they remembered (i.e., the embedded false information). They had not tried to recall the details of the event, causing their original memories to be weak. This conflicting false information might have caused them to second-guess their memory, leading to a drop in self-efficacy. This effect did not occur for YA, who are more confident of their abilities, in general. To be sure of this interpretation, a more fine-grained analysis of confidence after each performance opportunity might be useful. Previous research has shown that self-efficacy is associated with performance (Berry et al, 1989; McDonald-Miszczak et al., 1999; West et al., 1996), and the current study suggests that encoding condition may play a significant role in this relationship, at least in remembering real events.

CHAPTER 10
GENERAL DISCUSSION

When studying event memory, it is necessary to address factors that occur in everyday settings in order to understand fully how human cognition operates when processing events. It is also important to understand how these processes change throughout adulthood. The two studies presented here sought to address gaps in the current literature by examining event memory and the effects of misinformation by directly comparing performance in incidental and intentional encoding conditions, using a live event. The use of a live event enhanced the legitimacy of the incidental condition, which was similar to a real-life circumstance. In this study, two types of encoding conditions, with misinformation, were investigated for one of the first times in a live event. Examining the misinformation effect in the two different age groups in two different encoding conditions provided some understanding of when age differences in memory and misinformation were strong, weak, or nonexistent.

The central findings of this research were consistent with the findings of past research. Misinformed participants reported more false information than those who were not misinformed, and YA performed better on memory tests than OA. The use of a live event, coupled with the use of two different encoding conditions, provided a unique perspective when examining age differences in the misinformation effect. The current study showed that YA were more susceptible to misinformation than OA, but only in incidental conditions. Because we did not compare the live setting with a video, it is impossible to determine whether these effects were weaker in the live context, as one study has shown (Thierry & Spence, 2004). However, even if the effects of misinformation were weakened in this study, as compared to studies using video, they remained significant, even under intentional encoding, providing evidence that false information is prevalent even under the most optimal encoding conditions for both YA and OA.

Limitations and Future Research

Although the use of a live event for these studies served to make its findings more externally valid than previous research in this area, the use of a live event always has the potential to reduce internal reliability. Although precautions were taken to ensure that participants in each experimental condition viewed the same exact event (e.g., extensive prior rehearsal of the interruption script, counterbalancing of condition assignments, interrupter blind to experimental condition) it is possible that an unconscious bias on the part of the experimenter (who was necessarily aware of the condition assignment) affected how the event was presented to each condition.

As previously indicated, manipulation check questions revealed that those in the incidental condition spent significantly less time paying attention to the event than those in the intentional condition. In an ideal situation, participants in both encoding conditions would spend an equal amount of time viewing and listening to the event. Perhaps the scores of those in the incidental condition would have been higher if they had spent the same amount of time viewing the event as those in the intentional condition. Although this is a possible limitation, it is also important to note that in many real-life scenarios, eyewitnesses are not necessarily paying attention to an event that they later need to remember. In a sense, then, this “limitation” may actually increase the ecological validity of the study. Furthermore, the self-reported differences in time spent viewing the event may not be accurate. Participants in the incidental condition may have reported their times in a self-serving way. The data show that their directed recall was poorer and that they were less confident in their responses than those in the intentional condition. This may have caused those in the incidental condition to underreport how much time they spent paying attention to the event in order to avoid blaming their errors on poor personal memory skill. To examine this issue in future research, investigators could ask the question about viewing time immediately after the event and compare that response with a response to a similar question that is asked later, after the memory test, to look for evidence of self-serving bias.

Prior research has shown evidence that age-related declines in facial recognition occur only for young faces (Lamont, Stewart-Williams, & Podd, 2005). In the present study, the interrupter was a younger adult. It is possible, then, that YA had an advantage during the recognition task because they were asked to recognize a face of a person from their own cohort. OA, on the other hand, were asked to recognize the face of someone who was, on average, 50 years younger. This may have put OA at a disadvantage during this task. However, one aim of this study was to maintain ecological validity in as many areas as possible. Considering that 47% of violent crimes by lone offenders, and 52% of violent crimes involving multiple offenders were committed by people under the age of 30 (Bureau of Justice Statistics, 2009), it is more common for eyewitnesses to have to recognize young faces, rather than old faces. So although a limitation may have been present for the OA and not the YA for the recognition task, this "experimental limitation" may represent real-life circumstances.

Future research should examine differences between emotionally salient and emotionally neutral events. Although we did not directly ask the participants, it is safe to conclude that the event in the current study was not highly emotional. Past research has shown that emotionality can affect memory (Butler & James, 2010). How does misinformation effect memory for a live event that is highly emotional to the viewer, compared to a live event that is not emotional to the viewer? Would incidental memory of an emotional real-world event be better or worse than incidental memory of a neutral event? How would these findings vary by age group?

Conclusions

Consistent with previous research (Loftus & Palmer, 1974; Zaragoza & Lane, 1994; Sutherland & Hayne, 2001), the current study has demonstrated how easily memory can be distorted. By simply suggesting a false detail was present, participants believed they heard and saw details that did not exist. That result is not new. However, this is one of the first studies to examine the impact of misinformation under both intentional and incidental learning conditions. Even when participants were paying attention to the event and trying to remember everything about it, they were still susceptible to believing false information. In addition, confidence in false memories was high in both encoding conditions. The implications of these findings are of particular concern for eyewitness testimony. For example, it doesn't matter if witnesses were paying close attention to a crime or not; they are equally prone to developing false memories and being confident in those memories when answering specific questions – a critical reminder of the fallibility of our memories in real-life situations. At the same time, free recall of details was not compromised by encoding condition, but was compromised by misinformation (more intrusions occurred). These data suggest that a free recall format, before detailed question-answering (hence, no opportunity for misinformation to be planted in people's minds), might yield valuable information from witnesses. Further research in this area will help psychologists learn more about the processing of real world events, with the long-term goal of identifying ways to improve the accuracy of everyday memory for younger and older adults alike.

APPENDIX A
DIRECTED RECALL 1

Directed Recall 1a (No Misinformation. Distributed to half of participants)

Instructions: Answer each of the following questions to the best of your ability in the space provided below each question. If you are unsure about the answer to any question, simply make your best guess. After answering each question, rate how confident you are with your answer's accuracy on a scale from 0 – 100 (with "100" being *extremely confident* and "0" being *no confidence* that your answer is correct).

*Content that is italicized and in parentheses *(example)* is the misinformation that was presented to half of the participants.

1. After the interrupter, *(Melissa),* knocked on the door *(three times)*, did the experimenter invite her in or did she open the door before getting any answer?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

2. When the interrupter paused/ *(glanced at her watch)* after opening the door, did she appear anxious?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

3. What color was the interrupter's hair?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence   Extremely confident

0   10   20   30   40   50   60   70   80   90   100

4. Was the interrupter wearing a necklace?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence   Extremely confident

0   10   20   30   40   50   60   70   80   90   100

5. After the experimenter greeted the interrupter, what problem did she report?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence   Extremely confident

0   10   20   30   40   50   60   70   80   90   100

6. Before being told what the problem was, the experimenter mentioned two other possible problems. What were they?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

7. Other than English, what was the probable native language of the person/ (*woman*) being interviewed?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

8. What color were the interrupter's pants/ (*jeans*)?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

9. The experimenter mentioned names of (*three*) people who can help with language barriers. What was one of those names?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

10. What type of shirt was the interrupter wearing?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

11. If the participant did not want to reschedule the interview what technique was the interrupter supposed to use to get through the current interview?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

APPENDIX B
DIRECTED RECALL 2

Directed Recall 2 (Distributed to all participants)

<u>Instructions:</u> Answer each of the following questions to the best of your ability in the space provided below each question. If you are unsure about the answer to any question, simply make your best guess. After answering each question, rate how confident you are with your answer's accuracy on a scale from 0 – 100 (with "100" being *extremely confident* and "0" being *no confidence* that your answer is correct).

1. How many times did the interrupter knock on the door?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

2. What was the name of the interrupter?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

3. The interrupter referred to a participant doing an interview. What was that participant's gender?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

4. Was the referenced interview being conducted in person or over the phone?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

5. What type of pants was the interrupter wearing?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

6. Was the interrupter wearing a watch?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

7. Was the interrupter's hair length past her shoulders?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

8. The experimenter mentioned names of people who can help with language barriers. How many names did he suggest?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

9. What color was the interrupter's shirt?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

10. What type of shoes was the interrupter wearing?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

11. Where did the experimenter tell the interrupter to make a note about the problem?

How confident are you about the accuracy of your response? Please circle only 1 number:

No confidence Extremely confident

0 10 20 30 40 50 60 70 80 90 100

APPENDIX C
FILLER TASK

Verbal instructions

For Intentional Encoding Condition:

"Shortly, someone will be interrupting this experiment. Pay close attention to every detail involved in the interruption, from beginning to end, including details about the event and the person interrupting. Your memory for these details will be assessed later. In the meantime, I am going to pass out a story for you to read. When you are finished reading the story you will be asked questions regarding various aspects of the story."

For Incidental Encoding Condition:

"I am going to pass out a story for you to read. When you are finished reading the story you will be asked questions regarding various details of the story."

-

Written Instructions: Read the following story carefully, paying attention to every detail. After reading the story you will be asked questions regarding the details of the events, people, and places in the story.

"William and Mildred are camping again this summer in the Upper Peninsula of Michigan. Each year they drive from their home near Pittsburgh, Pennsylvania, to their favorite Michigan resort. They have been spending their summers here for twenty-three years. They always rent the same cabin. It is sunny in the morning and shady in the afternoon. While William goes fishing in one of the nearby lakes or streams, Mildred reads magazines or novels, or works on her knitting…."

APPENDIX D
SCRIPT FOR INTERRUPTION

Interrupter knocks twice on door then opens the door.

Experimenter: to interrupter “Hey Marissa”

Interrupter stays in doorway, glances at left wrist as if a wristwatch was there

Interrupter: Hey, sorry to interrupt. I’m on the phone right now doing an interview, but he’s having a hard time answering the questions. What should I do?

Experimenter: Does he have a hearing problem? Is he distracted?

Interrupter: I don’t think so. He has a strong accent so I think it’s a language problem.

Experimenter: Can you tell what the accent is?

Interrupter: I don’t know…. Spanish maybe?

Experimenter: OK. Ask him if he’d like to have the interview conducted in Spanish. If he says yes, reschedule the interview for a time when Nicole or Talia is in the lab. If he says no, then just do your best to use your clear speech techniques and try to get through it the best you can. Then make a note about this problem on the interview sheet.

Interrupter: OK. Thanks, bye.

Interrupter leaves and closes door.

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BIOGRAPHICAL SKETCH

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