TOWSON UNIVERSITY
COLLEGE OF GRADUATE STUDIES AND RESEARCH

REDUCING MISINFORMATION EFFECTS WHILE MAINTAINING ACCURATE

RECALL IN EYEWITNESS MEMORY

by

Irina Matsiyevskaya

A Thesis

Presented to the faculty of

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in partial fulfillment

of the requirements for the degree

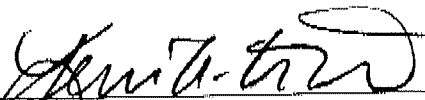Master of Arts in Experimental Psychology

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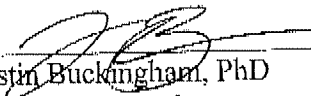
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This is to certify that the thesis prepared by Irina Matsiyevskaya, entitled Reducing
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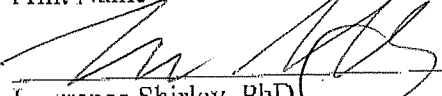Committee Member

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ABSTRACT

Reducing Misinformation Effects While Maintaining Accurate Recall in Eyewitness
Memory

Irina Matsiyevskaya

A witness to a crime may mistakenly recall the events and relay those misrepresentations
to their co-witnesses. This becomes problematic when witnesses provide testimonies to
police officers; witnesses are likely to include the misinformation obtained during the
discussion in their report. Previous studies attempted to reduce the misinformation effect
using warnings, however, this methodology also reduced the amount of accurate
information recalled, causing a *tainted truth* effect. In this study, participants witnessed a
simulated crime, received post-event information (PEI) in the form of a narrative, then
the warning, followed by a memory test. Optimum testimony was achieved by providing
non-discrediting warnings about possible inaccuracies in the co-witness's report. The
warning reduced the misinformation effect observed in participants who received
misleading information. Participants who received all accurate PEI had similar accuracy
rates in the warning and no warning conditions, displaying a reduced *tainted truth* effect.

Keywords: eyewitness memory, misinformation effect, tainted truth effect

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Significant historical events are experienced by many individuals and yet their accounts of the events vary. Recently, the reports of Osama bin Laden's death have struck the nation. Each day new eyewitness reports pour in, placing into question which of them was most accurate. The U.S. soldiers involved in the raid and Osama bin Laden's family members accounts were biased by their association to the victim, yet, these reports were still infinitely publicized (Mackey, 2011).

Witnessing a crime is not a simple process of giving a single eyewitness account of the event; the presence of other co-witnesses encourages discussion and often biases a witness' perception. Co-witnesses discuss the events and details of the witnessed crime, unknowingly combining their individual memories to form a collaborative report of the crime, also known as memory conformity (Gabbert, Memon, & Wright, 2006; Skagerberg & Wright, 2008a). Johnson, Hashtroudi, and Lindsay (1993) suggested that this occurs because individuals do not typically pay attention to the sources of their memory. The authors called this effect source monitoring. This is problematic when the police arrive to record testimonies, because they are unaware of the level and content of discussion that took place between the co-witnesses. Witnesses may mistakenly relay their misrepresentations to their co-witnesses (Wright, Memon, Skagerberg, & Gabbert, 2009). Wright, Self and Justice (2000) also found that the level of confidence with which a person provides incorrect information affects a co-witnesses' perception and their acceptance of the misleading information. A misinformation effect is observed when witnesses attribute the misleading information obtained from their co-witness to their own memory of the event. When providing testimonies to police officers, these witnesses are likely to include the misinformation obtained during the discussion in their report,

even though that information was not part of their original memory of the event (Gabbert, Memon, & Allan, 2003).

Most research on memory and eyewitness testimony has focused on cognitive processes, while neglecting the social aspects of the crime scene (Echterhoff & Hirst, 2009). Recently, researchers have been studying the interactions between multiple witnesses, (Gabbert et al., 2003; Gabbert, Memon, Allan, & Wright, 2004; Gabbert et al., 2006; Skagerberg & Wright, 2008a; Wright et al., 2000; Wright et al., 2009) friends and romantic partners, (Hope, Ost, Gabbert, Healy, & Lenton, 2007) and the influence of feedback from authorities (Bradfield, Wells, & Olson, 2002; Echterhoff, Groll & Hirst, 2007; Echterhoff, Hirst, & Hussy, 2005). The U.S. soldiers in the Osama bin Laden raid shared a common social experience which may have uniquely affected their recall of events. In order to truly explore the effects of such social influences on memories of eyewitnesses, research studies must be representative of real world crime scenes. Combining the influences of co-witnesses with the feedback from authorities in staged crimes would contribute to the external validity of such studies. Meissner, Hartwig, and Russano (2010) recognized the need for a holistic approach to improving our legal system, which combines psychological research with authority tactics. Authorities may influence the contents of witness reports by warning them about the possible negative effects of the discussion with co-witnesses. Echterhoff et al.(2005) investigated the beneficial effects of warnings that discredit the co-witness report, suggesting that labeling the co-witness as unreliable or incompetent leads to less acceptance of misleading information.

The current paper reviews the effects of co-witness discussion on memory conformity, how inducing source monitoring reduces the misinformation effect, and the effects of warnings about misinformation. Echterhoff et. al. (2007) recognized that the positive effects of discrediting co-witness warnings have so far been outweighed by the negative. Thus, the goal of my research was to reduce the negative effects of warnings on accuracy by examining the role of a credit-free warning on these three areas of social influence in eyewitness testimonies. A credit-free warning would not label the co-witness negatively, but rather suggest to the witness in laymen's terms that co-witnesses are likely to make mistakes. This allows for the witness to use their own judgment when considering the reports provided by their co-witnesses.

Co-Witness Discussion

Skagerberg and Wright (2008b) conducted a study in the UK using questionnaires to estimate the frequency of co-witness presence and discussion when witnessing a real crime. Witnesses to a crime reported being accompanied by one or more co-witness. 87% of the time, and 58% discussed the witnessed events with their co-witnesses. The majority of discussions, 52 %, included "general crime details" Other topics of conversation included "suspect details" and "emotional support," which was reported part of the discussion 39% and 6% of the time, respectively. This study implies that when crimes occur it is highly likely that they are witnessed by more than one individual. Co-witnesses talk to one another about crucial crime details before the police arrive, placing in question their individual memory recall. Discussion of the crime can lead to conformity with other witnesses; individual reports combine into a single report,

reflecting memory of the group rather than each separate witness account (Gabbert et al., 2006; Skagerberg & Wright, 2008b).

It is possible that co-witness discussion of crime details may lead to a better overall report of the crime, but it can also lead to a misinformation effect. This effect is achieved when an individual witnesses an event, then is provided with information about that event that is misleading, and then reports the misleading post-event information (PEI) as part of their memory for the original event (Wright et al., 2000). Skagerberg and Wright's (2008b) study suggests that a co-witness is a likely source of misleading PEI because they provide PEI about the crime to other witnesses. In social situations, such as the one encountered when co-witnessing a crime, the misinformation effect is explained by memory conformity. Memory conformity is described as using information received from co-witnesses or other sources rather than basing recall on actual memory for an event (Gabbert et al., 2004; Skagerberg & Wright, 2008a; Wright et al., 2000).

Skagerberg and Wright (2008a) conducted a study with college participants using different versions of short video clips. Participants were either in the paired condition (experimental) or tested individually (control); the paired individuals did not know each other before the experiment. The pairs watched six short video clips, three of them were critical, varying between the paired participants in certain details. After watching each clip, the paired participants were guided to discuss specific aspects of the clips, then each participant answered questions about the clip individually; this was done for all six clips. The three critical clips introduced different details to each paired participant; which simulated misleading PEI as coming from a co-witness. The participants in the control group completed filler tasks instead of the discussion before answering questions about

the clips. Results indicated a presence of memory conformity between the paired-participants which produced a misinformation effect; the authors explained that this effect did not occur because participants simply went along with the misleading information after discovering that most of the reported answers were a blend of the information from the clip and misleading PEI. This study showed that individuals were affected by the PEI, as reflected in their answers, but not entirely dependent on it.

Gabbert et al. (2003) conducted a similar study comparing college students, mean age 20, and older adults, mean age 69; participants were divided into a paired or individual condition. The paired participants watched a short video of a girl in a university office returning a book, each saw the same film but shot from different angles, allowing for some aspects to be seen in one version of the video but not the other (i.e. stealing money). After watching the video, participants either discussed their memory of the event or individually rehearsed their memory, with the instruction to act as if they were real witnesses. A questionnaire was used to guide this process by asking participants to provide a free recall of the video and answer seven specific questions; participants in the individual condition completed this on their own. A 45-minute filler task was followed by a final memory test in the form of a similar questionnaire; each participant individually provided a free recall of the crime they had seen. Participants also answered eight questions, four neutral and four critical; the critical questions included two details from each version of the video. A confidence rating of 1-7 was assigned for each answer (7 being more confident). Each participant was also asked whether, based on the video, they could assign guilt or innocence to the girl. Results indicated that 71% of the participants in the paired condition reported information encountered in their discussion

even though it was not part of the video they saw, and 60% attributed guilty verdicts to the girl in the video even though they did not see her commit a crime. Young and older adults showed comparable levels of memory conformity, even though older adults recalled fewer correct items than young adults. This study indicated that even when participants are motivated to act as real eyewitnesses, they are affected by the information provided by their co-witnesses; the interaction between co-witnesses is an important area of further investigation.

Wright et al. (2000) conducted a study that investigated the influence of confidence on memory conformity. In their second experiment, participants consisted of 40 college students, ages 19-28; pairs of participants looked through a storybook, not knowing there was a difference in one of the scenes. Then each participant answered a questionnaire about the story, providing a confidence rating of 1-10 for each answer. Following a five-minute filler task, each pair of participants was asked to recall the event together as they would describe it to a police officer; then each participant completed the same questionnaire. Results indicated that most pairs came to agreement on the critical item, which was the presence or absence of an accomplice, suggesting that conformity occurred for both scenarios of the event. Memory conformity was observed in pairs with a highly confident partner. Participants who conformed to the presence of an accomplice had higher confidence ratings, whereas those who conformed to no accomplice had lower confidence ratings, implying that when someone says they saw something it is more believable than if they report not seeing it. Wright et. al., illustrates how high levels of confidence facilitates misleading PEI effects on eyewitness memory reports, especially when those items are new or added rather than contradictory.

Gabbert et al. (2006) suspected that certain aspects of the discussion following the stimuli have an effect on memory conformity and induce a misinformation effect. In Experiment 1, 66 college students, mean age 19, participated in unacquainted pairs. Each pair looked at a picture for 30 seconds, not knowing the two versions differed in two details, and then they each completed a 10-minute filler task. Participants then recalled the details of the picture together and then individually completed a free recall test. This was followed by another 10-minute filler task and the same procedures continued for a total of four pictures. Each participant saw eight critical items in the pictures that differed from their paired participant. Results indicated that the person mentioning a critical item first was more likely to recall that item correctly (79% of the time), whereas their paired participant was more likely to recall an incorrect item (35% of the time). These results illustrated that speaking first made the participant more influential over their paired participant, possibly because speaking first indicated confidence in one's memory. In Experiment 2, Gabbert et al. (2006) explored the types of information that are likely to lead to memory conformity. In this experiment, college participants, mean age 19, watched differing versions of a crime in pairs. In the addition/omission condition, two critical items differed in the video, either appearing in the video or not; in the contradiction condition, four critical items differed, such as the color of the hat worn by the thief. In each pair, one participant watched the video while the other completed a filler task, both believing they watched the same video. Another ten minutes of filler talks was followed by the pair recalling the details of the event together, and ten more minutes of filler tasks. Each participant completed a final recall test, individually recalling as many details as they could remember from the video. Results replicated those found in

Experiment 1; participants who mentioned a critical item first recalled that item correctly, whereas their partner recalled the incorrect item 56% of the time. Types of information was also found to have an effect on memory conformity, added items were recalled most, followed by contradictory and omitted items, 45%, 29%, and 10%, respectively. These findings support the results found in Wright et al. (2000) Experiment 2, in which participants were likely to go along with added items that were not present in the original event.

The studies described so far have indicated that eyewitnesses are likely to be accompanied by co-witnesses who affect their recall of the witnessed crime; high confidence contributes to the misinformation effect and memory recall is affected by the witness speaking first and the type of PEI (especially added items). In the real world, witnesses are also likely to encounter non-social presentations of misinformation when reading police reports or newspaper articles about the crime they witnessed. Gabbert et al. (2004) investigated whether the social presentation of misleading PEI leads to a greater misinformation effect than a non-social, narrative form of presentation. In their experiment, young participants, mean age 20, and older participants, mean age 69, watched a video of a robbery. In the biased and control narrative conditions, participants watched the video individually, completed a ten minute filler task and answered a 20-item cued recall test, followed by a 20-minute filler task. Then they read a narrative description of the video, which did not include any details that would help participants answer questions on the recall test; the biased narrative included four items of misinformation. In the biased confederate condition, participants watched the video in pairs and then briefly discussed the video; the confederate acting as a participant did not

include any details that would aid the participant's recall on the cued recall but did mention the four misleading items. This was followed by another 20-minute filler task and the same 20-item cued recall test. Results indicated that participants were more likely to include misleading items when they came from a confederate than from a narrative, and all participants increased accuracy on the second attempt at the cued recall test. These results illustrated that memory conformity persists across correct and incorrect items and the misinformation effect is stronger when PEI is presented socially versus non-socially. Co-witness discussion has detrimental effects on the validity of eyewitness testimonies because individuals do not recognize that their memories end up reflecting the discussion rather than their actual memory of the crime.

Induced Source Monitoring and Warnings of Misinformation

Johnson et al. (1993) suggested that eyewitnesses are subject to the misinformation effect because individuals are not motivated to distinguish the sources of information. Misinformation is familiar because it has been recently presented and therefore it is attributed to the original event even though it was encountered after the witnessed event. If individuals are encouraged to pay attention to the source of information, it is implied that the misinformation effect will decrease. Echterhoff et al. (2005) investigated the effects of source warnings after the presentation of misleading PEI. Credibility warnings were implemented, encouraging participants to questions the reliability of PEI. In their first experiment, a total of 91 college participants, mean age 27, individually watched a video of an event, completed five minutes of filler tasks, and read a narrative describing the event; the narrative included four misleading items that were not in the video. Another 10-minute filler task was followed by a warning about the

narrative, described as an untrustworthy or incompetent source, or no warning. All participants completed a 16 item recall test: four items looking for misleading items, four for control items (not included in event or narrative), and eight questions about event items. Results indicated that both types of warnings significantly reduced the misinformation effect but did not eliminate it. Recall of items for the actual event was similar across the warning and no warning conditions, however, recall of control items was more frequent in both warning conditions. The authors failed to notice that these results suggested a reduction in overall accuracy of non-misled items. In Experiment 2, source monitoring effects were also explored in terms of credible sources with the use of a yes-no recognition test. Sixty college participants, mean age 28, followed similar procedures to those in Experiment 1. After viewing a video of a burglary, participants engaged in ten minutes of filler tasks before reading the narrative description; eight items in the narrative were misleading and the other eight were new. The social post-warning condition discredited the narrative source while the validation condition credited the narrative source as coming from a police officer. After a 3-minute filler task, participants answered a yes-no recognition test which included eight misleading items, eight control items, and 16 items from the event. Each yes answer was also accompanied by memory characteristic ratings, which were used to describe the visual recall of the item remembered. A manipulation check was used to assess whether participants accepted the source as credible or not. Again, the results indicated that the social post-warning discrediting the narrative reduced the misinformation effect to the point that participants were no more likely to recall misleading items than new items. Memory characteristics were also rated as more realistic in the post-warning condition, illustrating that the

participants were able to distinguish the misleading items from the correct items. Unfortunately, the warnings led to a more liberal response bias; participants were more likely to falsely recognize new items as pertaining to the actual event. Experiments 3 and 4 compared social warnings versus explicit monitoring using a cued recall test and yes-no recognition test, respectively. Participants in the explicit monitoring condition were told that the description of the video contained items not present in the video. Response times were measured for misleading items and actual event items. Both types of warning reduced the misinformation effect compared to no warning, however, overall recall of the event was reduced by the warnings. The warnings did show that participants took longer to respond to questions about misleading items when warned than not warned. The results from these experiments supported the source monitoring paradigm; motivating individuals to consider the source of information reduced the misinformation effect even if the source monitoring occurred after the misleading PEI was presented. Increased recall of new items indicated that further investigation was necessary to determine the detrimental effects of warnings.

Echterhoff et al. (2007) further explored the detrimental effects of warnings before and after the presentation of misleading PEI. Previous results indicated that the warnings led to more conscious source monitoring and encouraged participants to scrutinize all PEI, therefore, recall was reduced for misled and non-misled items. The authors suggested that non-misled items in the narrative containing PEI were *tainted* by the warning, so participants were more likely to consider them incorrect. In Experiment 2, typical misinformation effect procedures were used as described in the previous studies. A total of 89 college students, mean age 27, watched a video of a crime and read

a narrative containing misleading items. Misinformation effects were reduced for participants in the warned before and after conditions, indicating that individuals are motivated to pay attention to the source of information whether they are warned before or after the information is presented. A *tainted truth* effect was found in Echterhoff et al.'s experiments, implying that participants were less likely to report accurate information from the narrative because it was discredited by the warning. New items were more likely to be reported on the memory recall than actual items from the event because they were not *tainted* by the discrediting warning, suggesting that warnings have a negative effect of reducing accurate recall along with the positive effects of reducing the misinformation effect.

Minimizing misinformation effects has been the focus of recent research (e.g. Echterhoff et al., 2005), but few studies have measured the effects of warnings and source monitoring on the recall of accurate information (Echterhoff et al., 2007).

The Present Study

The present study focused on the effects of warnings about misinformation on subjects after they witnessed a simulated crime and received PEI from a narrative written by another witness. Participants were tested on their memory of the event, measuring the misinformation effect and overall accuracy. The experiment measured the effect of misinformation on overall memory accuracy. Attempts to avoid the *tainted truth* effect were addressed in the form of a credit-free warning, rather than the discrediting warnings used by Echterhoff et al. (2005, 2007). The warning came from a researcher in the form of a statement that summarized recent research findings about the possible inaccuracies

that may be present in a witness's report. The procedures were adapted from Echterhoff et al. (2005, 2007) studies on social warnings and tainted truth.

The present study employed a 3 (type of information in narrative: consistent, misleading, neutral) x 2 (warning: no warning, warning) between subjects design. Consistent narratives accurately described the details portrayed in the video, whereas misleading narratives inaccurately described the details. Neutral narratives were devoid of all details about the items in the video. Dependent measures were the number of misleading and accurate items recalled, confidence ratings for each item recalled, and response times for the entire cued recall test. The response time measure was based on the procedures from Echterhoff et al.'s (2005) Experiment 4; results indicated that participants in the warning conditions had longer recall response times than participants in the no-warning condition. The present study attempted to replicate these results, in order to demonstrate that a warning elicits participants to spend more time analyzing their memory for the event.

This study reduced the misinformation effect by warning participants about possible inaccuracies in the narrative without reducing the overall amount of accurate information recalled. I predicted that the completely accurate narrative condition would be able to detect a *tainted truth* effect if one exists. A tainted truth effect would be observed if participants that read the accurate narrative would recall fewer items accurately when warned versus not warned. The misleading narrative condition would detect whether the warning encouraged participants to distinguish between correct and incorrect items within one report. A reduction in the misinformation effect would be observed if participants that read the misleading narrative would recall fewer misleading

items when warned. The neutral narrative would serve as a control, displaying recall rats of accurate and misleading items when no additional information was provided to the participant. A main effect of narrative type was expected according to the misinformation effect paradigm; the misleading narrative was predicted to elicit significantly more misleading responses than the accurate and neutral narratives on the cued recall test (Wright et al., 2000).

According to the source monitoring paradigm, I predicted that warnings would motivate participants to analyze the source of PEI, so they would be less likely to include misleading information presented by the narrative in their memory report (Johnson et al., 1993). Because warnings would elicit source monitoring, I hypothesized that the warning condition would increase the time it would take participants to answer the cued recall test compared to the no-warning condition. A main effect of warning on the number of misled items recalled was expected; participants receiving the warning would report less misleading information than those receiving no warning. I predicted that the *tainted truth* effect observed by Echterhoff et al. (2007) would be reduced due to the credibility-free nature of the warning. Participants would be more likely to use their own judgment to distinguish which aspects of the report were inaccurate since the entire report was not discredited. Participants receiving the consistent narrative and neutral narrative would not be affected by the warning and therefore recall the same number of non-misled items accurately as participants in the no-warning condition. An interaction of warning and narrative type was expected; I predicted that participants in the warning/misleading narrative condition would recall fewer misleading items than participants in the no-warning/misleading condition, whereas participants in the consistent and neutral

conditions would recall the same number of misled items in the warning and no-warning conditions. I expected that participants would recall the same number of non-misled items accurately in the warning condition and no-warning condition across all narrative types.

Method

Design and Participants

A total of 235 (167 women, 68 men) college participants were recruited from the Towson University Psychology Research Pool to participate in a survey study on personality and intelligence, and compensated with class credit. All participants were Introductory Psychology students. The design conformed to a 3 x 2 factorial between-subjects structure. Each group consisted of 37- 43 participants in each of the six conditions, which was based on the Gabbert et al. (2004) study. The age range of participants was 18-32 ($M = 18.78$, $SD = 1.59$) and the majority (75%) of the sample were Caucasian.

Materials

Video and Corresponding Narratives. The 2-minute video was filmed under Dr. Kerri Goodwin's advisement at a college bookstore. The video was shot as a single view from a security camera in a corner of the bookstore. The video portrayed a young man stealing several items as he walked around a bookstore, as well as him robbing the cashier at supposed gunpoint.

The narratives were brief descriptions of the video according to condition. Consistent narratives described the video accurately and mentioned the details that would later be questioned on the cued recall test, providing the participant with a review of the

video. For example, the consistent narrative said, "…came back to the front with an Italian textbook …" Neutral narratives described the slideshow accurately without mention of details: a neutral narrative said "…came back to the front with a textbook …" A misleading narrative with misinformation described the slideshow accurately with the exception of six incorrect details. A misinformation narrative said, "…came back to the front with a French textbook …"

(Appendix D contains the three narratives in their entirety.)

Cued Recall Test. The cued recall test consisted of 18 open-ended questions based on the video. Participants had the option to answer "I don't know" or "I don't remember" for questions they could not answer. They also provided a confidence rating for all questions, except those answered "I don't know" or "I don't remember." Their confidence rating was be based on a 10-point scale (1= *slightly confident* and 10 = *highly confident*). Questions on the cued recall followed this pattern: "What color shirt was he wearing?" "What letter was on the man's hat? " Did he steal the shirt?"

(Appendix E contains the cued recall test.)

Filler Tasks. The M-C SDS (Crowne & Marlowe, 1960) is composed of 33 characteristic statements that participants may identify with. After reading each statement, participants marked it *true* or *false*. Statements included: "I like to gossip at times," "there have been occasions when I took advantage of someone," "I am always courteous, even to people who are disagreeable." The Mini Marker Set (Saucier, 1994) consisted of a list of personality traits and participants rated themselves on each trait on a scale from 1(*extremely inaccurate*) to 9 (*extremely accurate*).

The vocabulary task consisted of listing words that begin with the letter *q* or *j*, listing synonyms for happy and modest, listing antonyms for dark and intelligent, and separating lists of words into organized groups.   The math task consisted of 50 complex multiplication and division problems, so that participants could not complete them within the 5 minutes allotted for filler tasks.

Information Sheet and Manipulation Check. The Information sheet was used to gather information about each participant regarding their gender, year in school, race/ethnicity, academic major and age. The manipulation check was used to determine whether participants recalled the warning; participants were asked to recall what the experimenter said to them about the written description of the video. Participants also rated the extent to which they considered that information when answering questions about the video on a scale from 0(*did not consider at all)* to 4(*considered entirely).* Participants were asked if they recognized anyone in the video and if so, they listed who. (Appendix F contains the information sheet; Appendix G contains the manipulation check.)

Procedure

Participants were tested in groups of no more than 15; warning and no-warnings conditions were tested separately. Participants were told that before beginning the true experiment, they were going to watch a video for a pilot study and rate their comprehension of the events on a 7-point scale provided to each participant. Then they were told that the true experiment would begin, and handed two packets of questionnaires to complete. Each packet served as separate 5-minute distractor tasks. The first packet

consisted of a Marlowe-Crowne Social Desirability Scale (M-C SDS; Crowne &

Marlowe, 1960) and a vocabulary; participants were stopped after five minutes.

Then the experimenter, pretending that she forgot, distributed a narrative

describing the video for the participants to rate on comprehension, just as they rated the

video. This deception was necessary to keep participants from guessing the true purposes

of the study and inherently studying the narrative. The researcher informed the

participants that the description of the video was written by a previous participant who

watched the same video of the crime. Thus, the previous participant's report served as a

co-witness report. Three different narratives were randomly distributed to each group of

participants; narratives varied by type of information (consistent, neutral, misleading).

After reading the narrative, participants completed another 7-point comprehension scale.

Then participants were instructed to complete a second packet of questionnaires.

The second packet consisted of the Mini Marker Set personality scale (Saucier,

1994), and a long list of multiplication and division problems. The personality scale and

math problems served as filler tasks, preventing participants from thinking about the

contents of the narrative. Participants were stopped after five minutes and given a

surprise cued recall test about the video they watched at the beginning of the experiment.

They were instructed to answer each question and provide a rating of their confidence for

each answer on the cued recall test.

In the warning condition, the researcher asked the participants to answer some

questions about the witnessed event and warned them that witnesses are likely to include

inaccurate pieces of information in their reports. The warning was read aloud as follows,

"when answering the questions about the video please consider the following: previous

research has shown that witnesses to a crime may not have a completely accurate memory of the event. Please consider the possibility that the descriptions of the video you watched at the beginning of the experiment were written by other witnesses and may not be completely accurate. " In the no warning condition, participants simply completed the cued recall test. Participants had unlimited time to complete the cued recall test, but were timed in both the warning and no warning condition; the experimenter marked down the start time and each participant filled in their completion time.

Upon completion, participants were debriefed about the true purposes of the study and provided with more information upon request. A manipulation check was administered; participants were asked to recall what the experimenter said about the written description of the video and rate the extent to which they considered that information when answering questions about the video on a 5-point scale (0= *did not consider at all* and 4 = considered entirely).

Results

A 3(Narrative Type) x 2(Warning) between-subjects one-way MANOVA was used to analyze items recalled, confidence ratings, and the time to complete the cued recall test. This analysis indicated a significant multivariate main effect of narrative type, Wilks' λ = .355, $F(12,440)$ = 24.91, $p < .05$, η^2 = .41, power = 1.00; a significant multivariate main effect of warning, Wilks' λ = .928 $F(6,220)$ = 2.86, $p < .05$ η^2 = .07, power = .89; and a significant multivariate interaction of Narrative Type x Warning, Wilks' λ = .882 $F(12,440)$ = 2.84, $p < .05$, η^2 = .06, power = .97. Given the significance of the overall test, the univariate effects for each dependent measure were examined further and are described below.

Cued Recall - Misleading Items

Univariate analysis for the mean number of misleading items recalled (out of six), indicated a significant main effect for Narrative Type, $F(2,231) = 80.82$, $p < .05$, $\eta^2 = .42$. A post-hoc Bonferroni analysis indicated that participants recalled more misleading items after they read a misleading narrative ($M = 1.59$, $SD = 1.31$) than a neutral ($M = .26$, $SD = .44$) or a consistent narrative ($M = .15$, $SD = .36$). Thus, the misleading narrative induced a misinformation effect in participants. There was a significant main effect for Warning, in which participants recalled fewer misleading items when warned ($M = .55$, $SD = .837$) than not warned($M = .87$, $SD = 1.252$), $F(1,231) = 9.55$, $p < .05$, $\eta^2 = .04$. There was also a significant Narrative Type x Warning interaction, $F(2,231) = 7.25$, $p < .05$, $\eta^2 = .06$. The interaction indicating a reduced misinformation effect in the presence of a warning is presented in Figure 1.Follow-up tests for simple effects revealed that for the participants that read a misleading narrative, those who heard a warning ($M = 1.17$, $SD = 1.034$) recalled fewer misleading items than participants who did not hear a warning ($M = 2.05$, $SD = 1.432$), $F(1,225) = 24.50$, $p < .05$, $\eta^2 = .10$. For participants that read a neutral or accurate narrative, there was no difference in the number of misleading items recalled whether they heard a warning or not, $Fs < 1$.

Figure 1. *Misled Items Recalled by Narrative Type and Warning Presence*
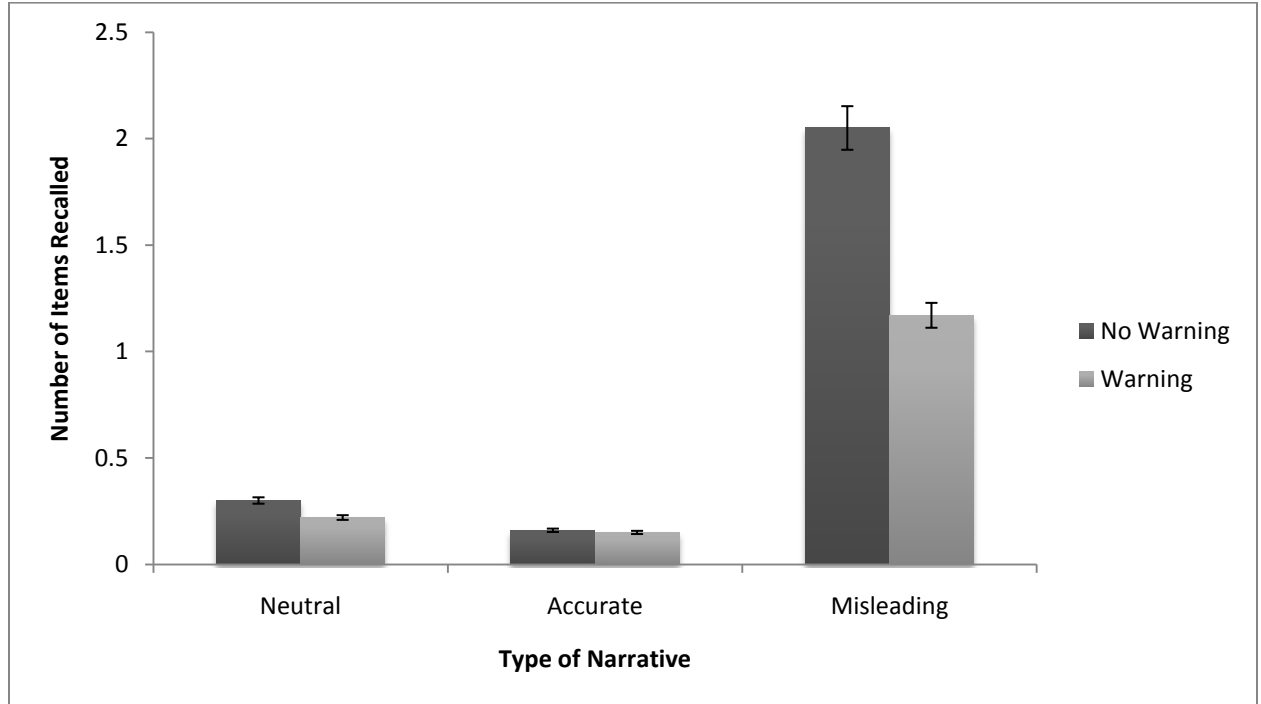
Cued Recall - Misled Items Correctly Recalled

Misleading items were only present in the misleading narrative, but because these items were scored separately for each narrative type, they served as another measure of accuracy on the neutral and accurate narratives. A univariate analysis for the mean number of misled items recalled correctly (out of six), indicated a significant main effect for Narrative Type, $F(2,231) = 61.39$, $p < .05$, $\eta^2 = .35$. A post-hoc Bonferroni analysis demonstrated that participants that read the accurate narrative ($M= 4.82$, $SD= 1.13$) recalled more misled items correctly than those that read the neutral ($M= 3.32$, $SD= 1.05$) or misleading narrative ($M= 2.96$, $SD= 1.20$); there was no difference between the neutral and misleading narratives. Accurate narratives did not contain any misleading items, which explains why participants recalled them more accurately than those that read the neutral or misleading narratives. Participants that read the narratives containing

misleading narratives were just as likely to answer questions about misleading items correctly as those that read the neutral narratives. There was no effect of Warning and no Narrative Type x Warning interaction, $F(1,231) = 1.93$ and $F(2,231) = 2.30$, respectively. Participants showed no difference in the number of misled items recalled correctly whether they heard a warning ($M=3.79$, $SD= 1.28$) or no warning ($M= 3.55$, $SD= 1.51$). This indicated that the warning did not reduce accurate recall of the misled items; individuals who read the misleading narrative were just as likely to recall misled items correctly as those who read the neutral narrative. Furthermore, accuracy for misled items was enhanced by the accurate narrative.

Cued Recall - Consistent (non-misled) Items

A univariate analysis for the mean number of consistent items recalled indicated a significant main effect for Narrative Type $F(2,231) = 28.12$, $p < .05$, $\eta^2 = .20$. A post-hoc Bonferroni analysis demonstrated that participants who read the neutral narrative ($M= 5.44$, $SD= 1.39$) recalled fewer consistent items than those that read the consistent ($M= 7.01$, $SD= 1.29$) or misleading narrative ($M= 6.54$, $SD= 1.32$). Furthermore, there was no difference in recall accuracy for consistent of misleading conditions. There was a significant main effect of Warning $F(1,231) = 4.20$, $p < .05$, $\eta^2 = .02$, in which participants that heard the warning ($M= 6.17$, $SD= 1.45$) recalled fewer consistent items than those that did not hear a warning ($M= 6.52$, $SD= 1.50$). There was no Narrative Type x Warning interaction, $F < 1$. These results presented in Figure 2, revealed that the tainted *truth effect* was avoided in that the warning did not differentially affect accuracy in the narrative conditions.

Figure 2. *Non-misled Items Recalled by Narrative Type and Warning Presence*
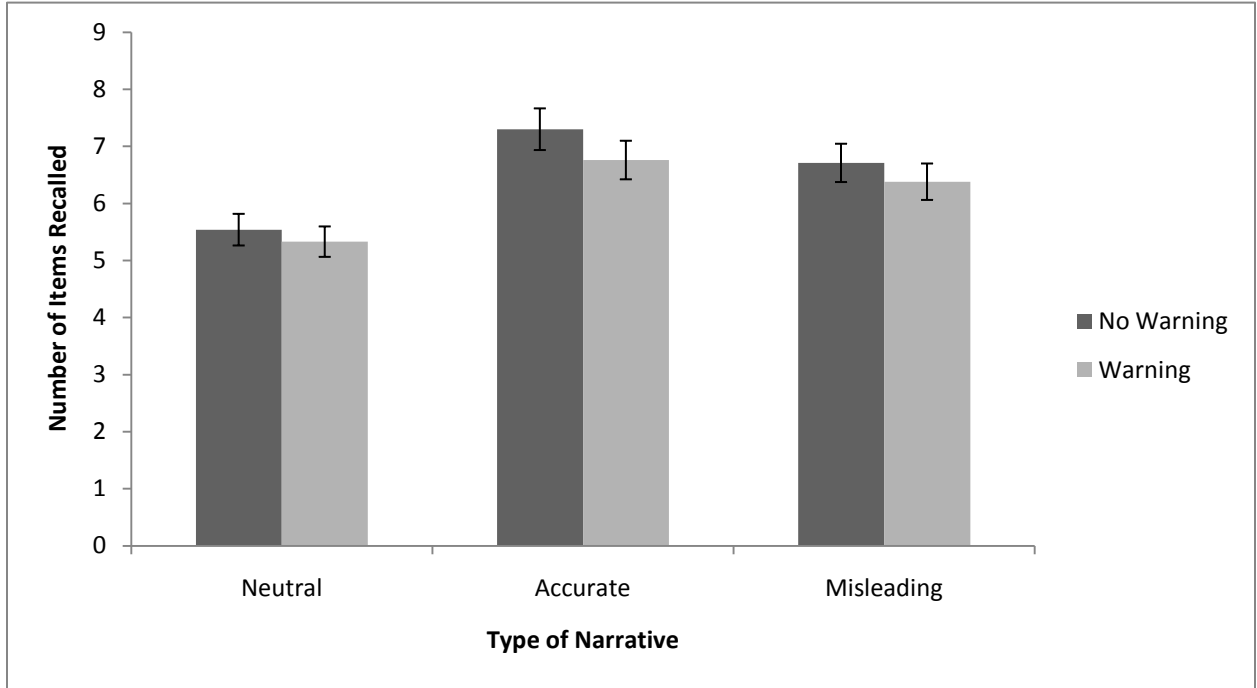
Confidence Ratings – Misleading Items

A univariate analysis for the mean confidence ratings of misleading items indicated a significant main effect of Narrative Type $F(2,231) = 15.78$, $p < .05$, $\eta^2 = .12$. A post-hoc Bonferroni analysis demonstrated that participants who read the neutral narrative ($M= 6.72$, $SD= 1.56$) reported lower confidence ratings than those that read the consistent ($M= 8.01$, $SD= 1.42$) or misleading narratives ($M= 7.62$, $SD= 1.32$); there was no difference between consistent and misleading narratives. There was no significant effect for Warning and no interaction of Narrative Type x Warning, Fs < 1. Participants' confidence ratings were not reduced by the warning across each narrative type.

Confidence Ratings – Consistent (non-misled) Items

Confidence ratings for consistent items revealed similar results to those reported for misleading items. Univariate analysis indicated a significant main effect of Narrative Type, $F(2,231) = 6.33$, $p < .05$, $\eta^2 = .05$. A post-hoc Bonferroni analysis demonstrated

that participants who read the neutral narrative narratives (*M*= 7.21, *SD*= 1.15).reported lower confidence ratings than those that read the consistent narratives (*M*= 7.81, *SD*= 1.07) or misleading narratives (*M*= 7.64, *SD*= 1.11); there was no difference between consistent and misleading narratives. There was no significant effect for Warning and no interaction of Narrative Type x Warning, $F(1,231) = 3.40$ and $F(2,231) = 1.36$, respectively. Participants remained confident whether a warning was present or not.

Cued Recall – Time

A univariate analysis for the mean time to complete the entire cued recall test indicated a significant main effect of Narrative Type, $F(2,231) = 6.90$, $p < .05$, $\eta^2 = .06$. A post-hoc Bonferroni analysis demonstrated that participants who read the consistent (*M*= 160.08, *SD*= 46.94) or misleading narrative (*M*= 165.88, *SD*= 47.53) completed the cued recall test quicker than those who read the neutral narrative(*M*= 187.55, *SD*= 51.44 ; there was no difference between consistent and misleading narratives. There was no significant effect for Warning and no interaction of Narrative Type x Warning, $F(1,231) = 3.38$ and $F < 1$, respectively. The warning did not make a difference on the time to complete the cued recall test.

Manipulation Check

For the 121 participants that heard a warning, a separate MANOVA was used to analyze the effect of narrative type on the manipulation check items: recall of warning and warning consideration. There was no significant effect of narrative type, $F < 1$. The warning was recalled by 68-70% of participants in each narrative type condition. Participants in all three narrative conditions considered the information about the other witness's report to a moderate degree.

Main analyses were run with just those individuals who recalled the warning, and the patterns of the results were the same as when ran with the entire sample. Therefore, all results reported included the entire sample.

Discussion

This study investigated the influence of credit-free warnings about misinformation on the recall of misleading and accurate information. The warning was used to obtain an optimum report from witnesses after they have witnessed a crime. The credit-free warning was implemented to increase recall of accurate information and reduce the misinformation effect. In contrast to the discrediting warnings Echterhoff et al. (2005, 2007) used in their research, a credit-free warning was used to alleviate the narratives of a negative bias. Therefore, participants could judge for themselves whether specific details presented to them in the narrative were accurate or inaccurate. It has been established that discrediting warnings reduce the misinformation effect, but in turn reduce overall accurate recall, known as the *tainted truth* effect. The results of this study supported the hypothesis that credit-free warnings would reduce the misinformation effect while avoiding the *tainted truth* effect in the misleading condition.

As expected according to Gabbert et al.'s (2004) research, memory conformity occurred when participants completed the cued recall test, which led to reporting misleading information from the narrative. A misinformation effect was induced by the misleading narrative, in which participants recalled more misleading items if they read a narrative containing misleading information than participants who read a neutral or accurate narrative. The warning reduced the misinformation effect, further solidifying Echterhoff el al.'s (2005,2007) findings. Warned participants that read the misleading

narrative recalled fewer misleading items on the cued recall test than non-warned participants. Arguably, the warning encouraged participants to use source monitoring when completing the cued recall test, which allowed them to recognize that certain items of information on the narrative did not match up with video of the crime. Contrary to my prediction, participants in the warning condition did not spend more time completing the cued recall test than those in the no-warning condition, which may indirectly indicate that they spent more time monitoring their memory. However, this result may have been due to the inconsistency of self-reported times provided by each participant; some participants estimated the amount of time it took them to complete the cued recall test rather than writing down the exact time on the clock when they completed the test. Interestingly, participants who read the consistent and misleading narratives reported quicker response times than participants who read the neutral narrative. Accurate and misleading narratives provided details that could help answer the questions on the cued recall test, whereas the neutral narrative did not provide any details. Future studies should implement better response time measures that allow for a more accurate estimate of time. The cued recall test could be completed on a computer that could track response times for each question. This would allow for an analysis of response times on misleading and non-misleading item questions separately. Participants may spend proportionately more time answering questions about misled items than non-misled items in order to consider the sources of conflicting information.

Contradictory to Echterhoff et al.'s (2007) findings, the warning did not reduce accuracy for non-misled items in the misleading and accurate narrative conditions. This suggests that accurate and misleading narratives did not seem to be tainted by the

warning because participants were able to recall more accurate items than those that read the neutral narrative. The neutral narratives served as a baseline of recall, similar to untainted items in the Echterhoff el.al study. Participants performed better on the cued recall test because they were able to use the information from the accurate and misleading narratives to answer the questions. Participants in the misleading narrative condition were able to discern between accurate and misleading items when warned. They correctly accepted accurate items whether they were warned or not. Although the warning significantly reduced recall of non-misled items overall, participants did not recall less accurate information than non-warned participant within each narrative condition; this was observed for both misled items recalled correctly and non-misled items. Results for confidence ratings provided further support regarding the hypothesis that a credit-free warning would reduce the *tainted truth* effect. Warned participants remained as confident as non-warned participants in their recall on misled and non-misled items. The reduced *tainted truth* effect was likely due to the credit-free nature of the warning, which allowed participants to distinguish accurate information from inaccurate information on the narrative.

The positive results achieved using credit-free warnings need to be replicated in more realistic settings. PEI information should be presented by an actual co-witness rather than a narrative written by a supposed witness. Confederates could be trained to act as co-witnesses in order to control for the type of information they discuss with the participants. Along with crime details, confederates would display either high or low levels of confidence in their recall of the event. This would allow us to investigate the role of credit-free warnings along with co-witness confidence. Wright et al., (2000)

demonstrated that witnesses are more likely to go along with misinformation provided by highly confident co-witnesses rather than co-witnesses exhibiting low confidence. It would be interesting to explore whether the credit-free warnings would reduce the misinformation effect in the presence of highly confident co-witnesses.

The social factors of eyewitness testimony and the misinformation effect have been modestly explored even though co-witness discussion has been recognized to be pervasive in real-world situations (Skagerberg & Wright, 2008b). It is important to investigate all possible areas of influence so that authorities are better equipped to analyze crime scenes and locate the culprit. Collaboration between psychological researchers and police investigators is necessary to perpetuate better understanding of the eyewitness situation (Meissner et al., 2010). Results from this study expanded our knowledge on the effects of warnings about possible inaccuracies on the witness. Police investigators may benefit from knowing what types of warnings yield the most accurate testimonies.

The events of the raid that led to Osama bin Laden's death may have been more accurately reported if a warning about discussion with co-witnesses was implemented. It is extremely important to gather optimum testimonies with the least amount of bias in order to compile a comprehensive report. An effort to reduce the recall of inaccurate information while maintaining maximum overall accuracy is pertinent to a successful investigation.

Appendices

Appendix A

Please Insert IRB Page next

Appendix B

Consent Form

Principal Investigator: Erin Matsiyevskaya, Experimental Psychology Masters
Program,   Towson University

This is a study in which I am investigating the relationship between personality and
intelligence. In this study, you will fill out personality questionnaires, complete a
vocabulary test, and compute math problems.

There are no known risks associated with participating in the study. Should you become
distressed or uncomfortable, you may leave the study immediately. Although there are no
direct benefits to you, I hope that the results of the study will reveal something about
human behavior. The study should take no longer than 50 minutes to complete.

Participants must be at least 18 years old.

Your participation is entirely voluntary. You do not have to participate in the study. If
you choose to participate, you may discontinue your participation at any time. Your
decision to participate or not to participate will not influence your grade or class standing.

All information about your responses will remain confidential. We will not show your
information to anyone outside of our research team unless you give us written
permission. Your responses will never be linked to your name. If you have any questions,
you may ask them now or at any time during the study. If you should have questions after
today, you can call (410) 627-1445 and ask for Erin M. or call (410) 704-2236 and ask
for Dr. Pat Alt, Chairperson of the Institutional Review Board for the Protection of
Human Participants at Towson University.

I, _____ affirm that I have read and understand
the above statements and have had all of my questions answered.

Date: _____
Signature: _____

THIS PROJECT HAS BEEN REVIEWED BY THE INSTITUTIONAL REVIEW
BOARD FOR THE PROTECTION OF HUMAN PARTICIPANTS AT TOWSON
UNIVERSITY.

Appendix C
Debriefing Form

I, _____ [print name], freely and voluntarily and without undue inducement of any element of force, fraud, deceit, duress, or other form of constraint or coercion, consent to be a participant in the research project entitled "Eliminating Misinformation Effects While Maintaining Accurate Recall in Eyewitness Testimonies" conducted at Towson University by Erin Matsiyevskaya as Principal Investigator. Furthermore, I consent to allow responses to various questionnaires and a memory test to be used for data analysis.

I understand that the data collected from the tasks I performed during the course of this experiment (i.e. viewing and event and answering questions about my memory for the event) will be used for data analysis. I understand that a personal computer will permanently record my responses in this experiment. All records will be anonymous, and identification of participants will be recorded by assigned numbers only. The records of this research which identify me will be kept in locked storage cabinets in the laboratory and be used for research purposes only. All records will be kept for a minimum of five years and will be accessible only to the primary researcher. Journal publishers require that data be kept for five years from the date of publication. However, data will probably be kept for five to ten years because of the time involved in data analysis, manuscript preparation, etc. Five years after journal publication, all data will be destroyed. At the latest, all data and recording will be destroyed by January 2020.

The attendant discomforts and risks reasonably to be expected by my participation in this project have been explained to me and I understand them to be minimal. I understand that my participation may help researchers learn about the mental processes involved in memory and attention.

I understand that my participation is voluntary. I understand that this consent may be withdrawn at any time and that I may discontinue participation in the study without prejudice, penalty or loss of benefits to which I am otherwise entitled. I have been given the right to ask and have answered any inquiry concerning the foregoing. Questions, if any, have been answered to my satisfaction. In the future, I understand that I may contact Erin Matsiyevskaya (t: 410-627-1445; email: imatsi1@students.towson.edu) for answers to pertinent questions about this research, my rights, or in case of a research-related injury. This research has been approved by the Towson University Institutional Review Boards for the Protection of Human Subjects in Research. Any concerns about these procedures may be directed to Dr. Patricia Alt, IRB (t: 410-704-2236).

I, _____, have read and understand the foregoing.
                [print name]

Participant Signature: _____   Date: _____

Witness Signature: _____   Date: _____

Appendix D
Consistent Narrative
(information matches the video participants watched; items on cued recall test are
underlined)

An average-looking male college student dressed in jeans, a <u>white and green
striped shirt</u>, and a white <u>hat with an L on it</u>, was in a campus bookstore. First he walked
over to a table with t-shirts, picked up a <u>red</u> one and looked at it, but did <u>not put it back.</u>
There were <u>two</u> other customers in the store. He walked toward the back of the store and
came back to the front with an <u>Italian </u>textbook. On his way back he spotted a display of
candy and picked up <u>M&M's</u>. Then he picked up a <u>blue </u>notebook and put all those
things in his <u>backpack</u>. When he was done looking around, he went to the cashier, who
was wearing a <u>pink scarf</u>. He asked the cashier for a gift card, but when she turned
around he <u>pulled out a gun</u>. He told the cashier to give him all the money. Then he
walked out of the store and the <u>cashier called the police</u>.

Neutral Narrative
(same as consistent narrative; lacks details questioned on cued recall test)

An average-looking male college student dressed in jeans, a shirt, and a hat, was
in a campus bookstore. First he walked over to a table with t-shirts and picked one up and
looked at it<u>.</u> There were others shopping in the store. He walked toward the back of the
store and came back to the front with a textbook. On his way back he spotted a display of
candy and picked some up, and then he picked up a notebook. When he was done looking
around, he went to the cashier, who was wearing a scarf. He asked the cashier for a gift
card, but when she turned around he told her to give him all the money. Then he walked
out of the store.

Misinformation Narrative
(all information is consistent except the details of target items;
items on cued recall test are underlined, target items are in bold)

An average-looking male college student dressed in jeans, a <u>white and green
striped shirt</u>, and a white <u>hat with an R on it</u>, was in a campus bookstore. First he walked
over to a table with t-shirts, picked up a <u>green</u> one and looked at it, then <u>put it back.</u> There
were <u>two other customers</u> in the store. He walked toward the back of the store and came
back to the front with a <u>French </u>textbook. On his way back he spotted a display of candy
and picked up <u>M&M's</u>. Then he picked up a <u>red </u>notebook and put all those things in his
<u>messenger bag</u>. When he was done looking around, he went to the cashier, who was
wearing a <u>pink scarf</u>. He asked the cashier for a gift card, but when she turned around he
<u>pulled out a gun</u>. He told the cashier to give him all the money. Then he walked out of
the store and the <u>cashier called the police</u>.

Appendix E
Cued Recall Memory Test
(with correct answers, target questions in bold and misleading answers in bold)

Please answer each question according to what you saw in the video shown at the beginning of the study. Provide a confidence rating for each answer using the following scale:
           1--------2--------3--------4--------5--------6--------7--------8--------9--------10
NOT AT ALL   NOT VERY   SOMEWHAT   VERY   ABSOLUTELY
CONFIDENT   CONFIDENT   CONFIDENT   CONFIDENT   CONFIDENT
   IN MY   IN MY   IN MY   IN MY   IN MY
 MEMORY   MEMORY   MEMORY   MEMORY   MEMORY

1. How tall was the man in the bookstore?
2. How much did the man weigh?
3. What color shirt was the man wearing?
           Correct: white and green striped shirt
4. What type of shoes was the man wearing?
           Correct: tennis shoes
5. What color were the man's pants?
           Correct: blue jeans
6. What color was his hair?
7. **What type of bag was he carrying?**   Correct: backpack
                                                   Misleading: messenger bag
8. **What letter was on the man's hat?**   Correct: L
                                                    Misleading: R
9. **What color shirt did he pick up?**   Correct: red
                                                    Misleading: green
10. **Did he steal the shirt?**   Correct: yes
                                                   Misleading :no
11. How many other customers were there in the store?
           Correct: two
12. **What type of textbook did he pick up?**   Correct: Italian
                                                   Misleading: French
13. What type of candy did he pick up?
           Correct: M&M's
14. **What color notebook did he pick up?**   Correct: blue
                                                   Misleading: red
15. What color scarf was the cashier wearing?
           Correct: pink
16. What did the man ask the cashier to get from behind the counter?
           Correct: gift card
17. What type of weapon did the man have?
           Correct: gun
18. Who called the police?
           Correct: cashier

Appendix F

Information Sheet

Circle the appropriate number for the items below:

1) Gender
    1: Female
    2: Male

2) Year in School
    1: Freshman
    2: Sophomore
    3: Junior
    4: Senior
    5: Other

3) Race/Ethnicity
    1: Asian, Pacific Islander
    2: American Indian, Native American, Native Alaskan
    3: Black, African-American
    4: Hispanic, Latino, Latina
    5: Middle Eastern
    6: White, Caucasian
    7: Other: _____

4) Academic Major
    1: Natural/Mathematical Sciences
    2: Social Sciences
    3: Humanities
    4: Business
    5: Undecided

5) Age: _____

Appendix G

Manipulation Check

Please recall what I said to you before the test about the written description of the video from another witness.

Please rate the extent to which you considered/used the information about what I said about the other witness report when answering questions about the video:

0 = did not consider warning at all

1 = considered warning very little

2 = considered warning to a moderate degree

3 = considered warned a lot

4 = considered warning entirely

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Goodwin, K. A., Kukucka, J., & Matsiyevskaya, I. *Co-witness confidence, conformity and eyewitness memory: An examination of normative and informational social influences.* Manuscript submitted to the Applied Cognitive Psychology journal April, 2011.

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Matsiyevskaya, I. *Co-witness Age Effects in Eyewitness Testimony.* Accepted to be presented at the 2011 APS Annual Convention in Washington D.C., May 27, 2011.

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