THE ROLE OF CAUSAL CONNECTIONS IN THE DEVELOPMENT OF FALSE MEMORIES FOR ENTIRE FABRICATED EVENTS

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CHAPTER I

Introduction

Eyewitness testimony obtained during post-event interviews is often used in legal cases as defining proof of a client’s innocence or guilt. However, eyewitness memory is far less reliable than once thought, as numerous instances of false convictions based on inaccurate testimony have been documented (e.g., Connors, Lundregan, Miller, & McEwan, 1996). This issue has received additional public attention in recent years as a result of the “Innocence Project” – a public policy organization with the stated goal of using DNA evidence to overturn wrongful convictions. Of the 254 DNA exonerations obtained since 1992, the leading cause of wrongful conviction has been inaccurate eyewitness testimony (Innocence Project, n.d.). Although the use of DNA evidence represents an important advance, it is still the case that biological evidence is absent from the vast majority of criminal cases (Justice Project, n.d.). As a result, eyewitness testimony remains a critical factor in most cases. To that end, understanding the factors that might influence the accuracy of such testimony represents an important area for research.

In general, eyewitness testimony is fallible to the extent that cognition and perception are imperfect processes. Numerous factors have been shown to influence the accuracy of eyewitness testimony, including: heightened emotional arousal experienced by the eyewitness during encoding of the event (e.g., Payne, Jackson, Ryan, Hoscheidt, Jacobs, & Nadal, 2006), the duration of the eyewitness event (e.g., Memon, Hope,
Bull, 2003), the quality of the initial viewing conditions (Wells & Olsen, 2003), and the presence or absence of a weapon in the hands of the perpetrator (e.g., Cutler, Penrod, & Martens; 1987). However, one other factor that has overwhelmingly been shown to influence the accuracy of eyewitness testimony, and the focus of this dissertation, is the way in which people are interviewed about the events they have witnessed (see Zaragoza, Belli, & Payment, 2006, for a review).

Interviews with police officers and legal officials are common for individuals that have witnessed a forensically relevant event. In fact, many eyewitnesses are interviewed a number of different times by a variety of different professionals before providing testimony in court. These interviews, however, represent an opportunity for witnesses to be exposed to information that does not match their recollection of the events that transpired or may be patently false. For example, interviewers will often provide additional details to eyewitnesses in order to help them develop a more complete account of events. These details can come from a variety of sources (e.g., accounts from other eyewitnesses, physical evidence from a crime scene) and may not be part of an individual’s recollection of the events that transpired. For example, an interviewer may ask a question such as, “Where was the suspect standing when he took the money from the cash register?” A question like this is suggestive in that it presupposes to the eyewitness that the suspect did in fact take money from the cash register. Although the suggestion may not be intentional, it may nonetheless influence an eyewitness’s memory.

Although concerns about eyewitness memory have existed for some time, it was not until the 1970s that researchers began to systematically study the deleterious impact
of misleading post-event information on the accuracy of eyewitness reports. Much of this early work was pioneered by Elizabeth Loftus and her colleagues (e.g., Loftus, 1975; Loftus, 1977; Loftus, Miller, & Burns, 1978; Loftus & Palmer, 1974) and focused on the effects of misinformation encountered in the context of a post-event interview. In the standard misinformation paradigm, participants view an eyewitness event, are interviewed at some later point, and then receive a final memory test about the events they witnessed. At the time of the interview, participants are exposed to information that was not depicted in the original event (e.g., they view a traffic accident at an intersection that involved a stop sign, but are later told it was a yield sign). Initial studies demonstrated that participants often incorporated these post-event suggestions into their eyewitness testimony (e.g., Loftus, 1975; Loftus, 1977; Loftus & Palmer, 1974) even when they directly contradicted information presented in the original eyewitness event (e.g., Loftus, Miller, & Burns, 1978).

These original studies generated a tremendous amount of interest in both the legal and psychological communities because they raised fundamental questions about the validity and reliability of human memory (e.g., Belli, Windschitl, McCarthy & Winfrey, 1992; Eakin, Schriber, & Sergent-Marshall, 2003; Lindsay, 1990; McCloskey & Zaragoza, 1985; Schreiber & Sergent, 1998). In particular, one important issue addressed by subsequent research was whether exposure to misleading post-event suggestions was leading participants to develop genuine false memories for the suggested information, or whether participants were simply conforming to the suggestions of the interviewer by reporting what they believed the experimenter wanted them to say. Indeed, many
researchers have noted that the demand characteristics of the typical eyewitness suggestibility experiment could lead participants to report the post-event suggestions, even if they know they do not remember witnessing it (Lindsay, 1990; McCloskey & Zaragoza, 1985). To assess whether misled participants develop genuine false memories for the suggested information, researchers began assessing eyewitness memory under circumstances that eliminated these demand characteristics (e.g., by warning them that they had been misinformed), as well as giving them memory tests that encouraged participants to discriminate between the witnessed event and post-event sources of information about the event (e.g., by giving participants source identification tests). The consistent finding is that even when such measures are taken, participants still claim to remember witnessing events that were only suggested to them, thus supporting the conclusion that exposure to misleading suggestion leads to genuine false memories (e.g., Belli, Lindsay, Gales, & McCarthy, 1994; Chambers & Zaragoza, 2001; Drivdahl & Zaragoza, 2001; Frost, Ingraham, & Wilson, 2002; Lindsay, 1990; Mitchell & Zaragoza, 1996; Zaragoza & Lane, 1994; Zaragoza & Mitchell, 1996).

Forced Fabrication

Although these findings are of considerable importance to real world forensic situations, they are limited in several ways. First, the majority of this research has focused on only one type of suggestive interviewing practice – where misinformation is provided by the interviewer to the eyewitness. However, this is not the only way in which post-event questioning can lead to inaccuracies in eyewitness testimony. In some
cases, eyewitnesses are pressed to describe information that they may not remember or did not actually see. This is particularly likely to occur in situations where the investigator is looking for information that corroborates their preconceived notions about how events transpired (cf. Bruck, Ceci, & Hembrooke, 1998). This situation is unique in that rather than having the misinformation provided by the interviewer, it is generated by the eyewitness. Consider for example, an eyewitness to a convenience store robbery. Although the eyewitness may have observed the end result (e.g., the cash register is missing and the clerk is dead on the floor), they may be forced to speculate about what happened that resulted in this outcome – even though they may not have witnessed or cannot remember those particular events.

What, then, is the fate of fictitious information that is generated by eyewitnesses only because they have been forced to do so? It is of particular relevance to forensic situations if indeed witnesses are susceptible to developing false memories for information they have been previously forced to speculate about. Zaragoza and colleagues have developed a modified version of the standard misinformation paradigm to investigate this possibility. In the forced fabrication paradigm, the crucial manipulation occurs during the post-event interview. In addition to being asked questions about witnessed events, participants are also required to answer questions about fictitious events that, although plausible, were not part of the originally witnessed event. Hence, in order to answer these false-event questions, participants must make-up, or fabricate a response. This is different from the standard misinformation paradigm in that the false information is being generated by participants – it is not provided to them by the
experimenter. The question of interest is whether or not participants will develop false memories for the information they have been pressed to fabricate.

In many ways, it is counterintuitive to think that witnesses could develop false memories for information they did not witness and did not willingly provide to an interviewer. In being asked such questions, the eyewitness would not only remember that the information did not occur, but also that their answers were produced under duress. These sources of information could potentially aid participants in later rejecting the forcibly fabricated information as false. Research with the forced fabrication paradigm has shown that, contrary to this intuition, participant-witnesses do sometimes develop genuine false memories for events they were earlier forced to fabricate (e.g., Ackil & Zaragoza, 1998; Zaragoza, Payment, Ackil, Drivdahl, & Beck, 2001).

Ackil and Zaragoza (1998), for example, showed participants a short video clip about two brothers at a summer camp and later interviewed them about the video. At the time of the video participants saw one of the main characters, Delaney, fall during a birthday celebration in a dining hall. When participants were interviewed about the video, they were required to answer the question, “When Delaney fell, where was he bleeding?” despite the fact that the character did not bleed at any point in the video. Although participants frequently resisted answering such questions (e.g., “I didn’t see that,” “That wasn’t in the video”), experimenters repeatedly prompted participants to “Give their best guess” until they acquiesced (e.g., “His knee was bleeding”). Participants returned one week later and were given a yes/no recognition test where their own fabrications from the post-event interview were fed back to them (e.g., “When you
watched the video, did you see Delaney’s knee bleeding?”). Both children and college aged adults demonstrated susceptibility to developing false memories for the details that they had fabricated earlier – though the tendency was more pronounced in the former. Subsequent research using both different materials and experimental procedures has provided additional evidence that college-aged adults are indeed susceptible to the developing false memories for forcibly fabricated details (Frost, Lacroix, & Sanborn, 2003; Hanba & Zaragoza, 2007; Pezdek, Sperry, & Owens, 2007; Zaragoza, et al., 2001).

Given these findings, researchers have since tried to further increase the similarity between the forced fabrication paradigm and actual forensic interviews. For example, in forensic situations, it is unlikely that an interrogator would sit idly by when information supporting their perspective was reported by an eyewitness. Rather, the interrogator would likely support the eyewitness’s recollection, by saying things such as, “That’s right. The suspect did have a gun.” Although the deleterious effects of such feedback had previously been demonstrated in research on eyewitness identification (e.g., Wells & Bradfield, 1998), the effects of confirmatory feedback on false memories for fabricated information are less well known.

Research has shown that confirmatory feedback provided after fabricated responses does indeed have negative consequences for accurate recollection. For example, Zaragoza, et al. (2001), using a procedure similar to the one used by Ackil and Zaragoza (1998), provided participants with either confirmatory (e.g., “That’s right. knee is the right answer”) or neutral (e.g., “O.K. ____”) feedback after their forcibly fabricated responses. The effects of confirmatory feedback were robust, as it increased false
memories for forcibly fabricated details, confidence in those false memories, and the likelihood that participants would freely report their forced fabrications 1 to 2 months later. Subsequent research on the impact of confirmatory feedback has shown that it also increases the likelihood that participants will repeat the same false information in situations in which they are interviewed a second time (as opposed to being “tested” after the initial interview). Similarly, forcibly fabricated responses that had previously been reinforced with confirmatory feedback are more likely to be judged as credible by a blind rater (Hanba & Zaragoza, 2007). Although the precise mechanisms for the effects of confirmatory feedback are still not completely understood (see Frost, Lacroix, & Sanborn, 2003, and Zaragoza et al., 2001, for differing perspectives), these studies further demonstrate the forensic relevance of studies involving forced fabrication.

Although representing an important advance in research on eyewitness suggestibility, the practical significance of these studies is tempered by the fact that participants were only required to fabricate isolated details about the witnessed event. In many forensic situations, eyewitnesses are required to provide testimony that is much broader in scope. It is of considerable practical significance to know if eyewitnesses may also be prone to developing false memories for entire fabricated events that are extended in time and involve people, locations and actions that were never actually witnessed.

Chrobak and Zaragoza (2008) required participants to do just that. Using the same basic paradigm as Ackil and Zaragoza (1998), participants viewed an 18 minute video clip about two brothers at a summer camp and then were later interviewed about the events they had witnessed. In addition to describing a number of true events that had
actually occurred, participants were also forced to describe two entire fictitious events that had not occurred in the movie. For example, one of the false event questions required participants to describe what the protagonist did when he and a fellow counselor snuck out at night on canoes – even though no such event was depicted in the movie. Participants were forced to describe where the characters went, what they did, and who they were with (e.g., they went to the girls’ camp and were drinking with the female counselors). It is worth noting that the majority of participants overtly resisted answering these false event questions with statements such as, “I don’t know” or “That part wasn’t in the movie.” Although evidence of false memory development on a short term recognition test administered 5 days after the interview was limited, participants demonstrated significant false memory development when tested again 7 weeks later. Specifically, participants in that study reported their forced fabrications almost 50% of the time on a final free recall test. Interestingly, a forced fabrication effect was found at free recall even for those items that participants had publicly rejected as false on the initial recognition test. This is particularly surprising given findings from the study of testing effects. Specifically, correct performance on initial recognition tests has been shown to increase accuracy and reduce distortions on subsequent free recall tests (e.g., Roediger & Karpicke, 2006). Making the free recall data from Chrobak and Zaragoza (2008) more intriguing is the fact that, at final test, participants had complete freedom to discuss as much or as little of the video as they wished. They were not prompted or pressured by the experimenter in any way. Moreover, they were told to be as accurate as possible, as if they were providing testimony in a court of law. Under these
circumstances, it seems likely that participants reported information that they held in high confidence. Indeed, an analysis of the free recall protocols shows that participants predominantly discussed the most central scenes of the movie. In other words, despite a conservative reporting bias, participants nonetheless reported their forced fabrications at a high rate.

Understanding why participants in Chrobak and Zaragoza (2008) may have been prone to developing false memories for entire fictitious events that they had earlier been forced to fabricate is the primary objective of the current study. However, before describing these experiments and the hypothesis they were designed to test, I first describe a theoretical framework, the source monitoring framework, that guides this research. According to the source monitoring framework, eyewitness suggestibility errors, like most memory distortion errors, reflect people’s tendency to confuse sources of information in memory (Johnson, Hashtroudi, & Lindsay, 1993). Overall, this framework helps to explain why, in general, people may be prone to developing false memories for information they have been earlier been forced to fabricate.

**Source Monitoring Framework**

Why might people be prone to confusing post-event false information (whether suggested by the experimenter or generated by the participant – as in the case of the forced fabrication paradigm) for actually perceived events? Research and theory on source monitoring have shown that source confusions arise when the information that is retrieved from memory about an item's source is ambiguous or incomplete, and/or when
less than optimal judgment processes are used to evaluate an item's source (see Johnson, Hashtroudi, & Lindsay, 1993; Lindsay, 2008, for reviews). According to the source monitoring framework (SMF), source monitoring is not a single ability, but involves a variety of interrelated cognitive processes including encoding, retrieval, and decision making/reasoning processes.

At the heart of this framework are assumptions about the nature of the memory representations that exist for both experienced and non-experienced events. Memory representations are not viewed as containing specific “tags” that indicate the true source of a given piece of information. Rather, memory for source is the result of an attribution process, a process whereby the individual makes an inference about the source of information. This inference is based on evaluating the quality and quantity of memory characteristics associated with the memory representation - with memories from different sources varying in specific, predictable ways. For example, perceived events tend to be rich in contextual, temporal, spatial, and sensory/perceptual detail (e.g., Johnson, Foley, Suengas, & Raye, 1988; Suengas & Johnson, 1988) whereas representations of internally generated events that have only been thought about or imagined tend to be associated with greater information about the cognitive operations required to generate them (e.g., Finke, Johnson, & Shyi, 1988; Johnson, Raye, Foley, & Foley, 1981). By the same token, mental representations for items that had been heard would have different sensory characteristics associated with them than representations for events that had been witnessed. In evaluating the source of a piece of information in memory, people use these characteristic properties, often unconsciously, to determine its source. However,
the distributions of features associated with different sources frequently overlap. As this overlap becomes greater, the likelihood of committing a source error increases. Research has shown, for example, that a number of factors that increase the overlap of features between perceived and imagined events can further increase source monitoring difficulty (e.g., Garry, Manning, Loftus, & Sherman, 1996; Henkel, Franklin, & Johnson, 2000; Thomas, Bulevich, & Loftus, 2003).

**Source Monitoring and Studies of Eyewitness Suggestibility**

In mimicking real world forensic situations, the general procedure used in misinformation studies creates a potentially difficult source monitoring task. Specifically, there are multiple sources of overlap between the witnessed event itself and the post-event interview about that event. In answering questions about the witnessed event, participants are required to describe the very same people and events that they have already viewed, resulting in a good deal of overlap in semantic content. In addition, answering these questions is likely accompanied by active rehearsal and mental reconstruction of the witnessed event. Reflecting on the events of the video while attempting to answer the questions serves to increase the overlap between the two sources even further.

In many respects then, it is not surprising that participants may thus confuse information that is suggested or presupposed to them for events that were actually witnessed. Research on eyewitness suggestibility has provided substantial evidence that increasing the similarity between the witnessed event and post-event sources of
misinformation serves to increase false memory rates even further. For example, repeated exposure to misinformation (e.g., Mitchell & Zaragoza, 1996; Zaragoza & Mitchell, 1996), imagining suggested events (Garry, Manning, Loftus, & Sherman, 1996; Hyman & Pentland, 1996; Paddock, Joseph, Chan, Terranova, Manning, & Loftus, 1998), and reflectively elaborating on the likely emotional consequences of suggested events (Drivdahl, Zaragoza, & Learned, 2009) have all been shown to increase the likelihood that participants will confuse misleading post-event suggestions for events they actually witnessed. This is because repeatedly imagining and reflectively elaborating on suggested events imbues the suggestions with memory characteristics (e.g., vivid perceptual and emotional details) that make them more similar, and hence more confusable, with memories of actually witnessed events.

There are several factors that differentiate the source monitoring task associated with the forced fabrication paradigm from traditional misinformation studies. Pressing participants to describe a poorly remembered or fictitious event in great detail forces them to create a concrete, perceptually detailed, and well-specified version of that fictitious event. In doing so, the participant is creating a fictitious event with characteristics typical of witnessed events, rendering the fabricated event highly confusable for a memory of something that actually took place.

In addition, in the forced fabrication paradigm participants’ fabrications are self-generated, and such information is more likely to be recalled than information that is passively presented to them (Hirshman & Bjork, 1988; Slamacka & Graf, 1978). This heightened memorability of the fabricated event may render it particularly confusable
with actually witnessed events, as participants likely recall their fabrications quickly and with little cognitive effort. Such processing fluency may contribute to a greater feeling of familiarity which, in turn, contributes to participants confusing their fabrications with events that had actually occurred in the video (e.g., Whittlsea, 1993). Moreover, there is evidence to suggest that the act of generating these fabrications will further help bind them to participants’ representation of the originally witnessed event (see Burns, 1990; Hirshman & Bjork, 1988; and McDaniel, Waddill, & Einstein, 1988, for evidence that generation improves encoding of the characteristics shared by the cue and the target word, as well as the relationships between the items on the list). In other words, the evidence suggests that in addition to being highly memorable, these self-generated fabrications will be strongly associated with memory for the witnessed events. Finally, the fabrications that are generated are likely to be constrained by participants’ own idiosyncratic knowledge, making them particularly plausible when they are encountered or retrieved at some later point.

However, there are factors associated with forced fabrication that should serve to reduce false memory relative to more passive exposure to misinformation. In particular, participants in forced fabrication experiments are likely to experience a great deal of discomfort and uncertainty at being forced to invent information that they are, at least initially, quite certain they did not witness. Indeed, the vast majority of participants in these studies vehemently resist answering the false event questions and only do so when repeatedly prompted by the experimenter. That such resistance can serve to inoculate participants against the development of false memories has been established (Zaragoza, et
al., 2001). Clearly then, one prerequisite for the development of false memories in the forced fabrication paradigm is that participants forget their resistance and uncertainty; in other words, they forget that they had been forced to make up the fabricated events. Consistent with this idea, participants in Chrobak and Zaragoza (2008) demonstrated much higher rates of false memory for their forced fabrications after an 8 week retention interval than a one week interval, presumably because memory for the source of the fabricated event decays more quickly than memory for its content (as in the “sleeper effect”, e.g., Eagly & Chaiken, 1993).

Overall, these factors at least partly explain why participants come to believe that information they were previously forced to fabricate truly happened. However, these factors may not fully account for the high rate of false memories reported in Chrobak and Zaragoza (2008). To reiterate, participants in that study freely reported their forced fabrications nearly 50% of the time on a free recall test administered 8 weeks after being interviewed. These were items that participants initially resisted providing, frequently (correctly) rejected at an initial recognition test, and yet, freely chose to report at a high rate. As a result, Chrobak and Zaragoza (2008) speculated that some other factor may have contributed to these results. To foreshadow, my dissertation will focus on how the nature of the relationship between witnessed and fabricated events may have contributed to the false memory development observed in that study. Specifically, I hypothesize that the high rate of false memories for forcibly fabricated entire events is due to the fact that participants’ fabrications helped to provide a causal explanation for events that were actually witnessed.
Causal Relations and Cognition

The need to seek explanations for events is a key factor influencing human cognition. People are highly motivated to achieve a coherent representation of the world around them (e.g., Schank & Abelson, 1977) and an inherent part of this process is understanding the reasons why events occur (e.g., Weiner, 1985). It is not surprising then that concepts of causality have assumed an important role in many areas of psychology, most notably in the text comprehension literature. In general, researchers in this area have sought to understand the mental representations individuals form when reading text, the factors that influence their construction, and how, in turn, that influences comprehension. Interestingly, comprehension has most often been tested by investigating the content and organization of participants’ memory for the events they have read.

The study of the mental representations that readers form can be marked by two distinct theoretical approaches. Each of these approaches and their treatment of causality will be described in turn, as each has resulted in important contributions to the domain of narrative comprehension. In the 1970s and early 1980s, the focus of researchers was on the mental representations individuals formed of the text itself. This perspective is most clearly articulated by Kintsch and van Dijk (1978). According to this viewpoint, two separate representations are created during reading. The first, a surface representation, is essentially a direct recreation of the text itself. The second, a semantic meaning representation, is conceived of as a network wherein different components of the text (“propositions”) are connected to varying degrees based on certain characteristics of the text (“argument overlap”). According to this conceptualization, readers do not go beyond
A consistent finding from this initial research approach is that identifying the causal relationships among events is fundamental to comprehension and the presence of these relationships strongly predicts subsequent recall. Although initial studies applied inconsistent definitions of what it meant for events to be causally related, subsequent research operationally defined this notion. One dominant conceptualization of causality focuses on four separate criteria (Trabasso & Sperry, 1985; Trabasso & Van den Broek, 1985; see also Mackie, 1980). The criteria of temporal priority and operativity are all-or-none factors that are required for a causal relationship to exist. Temporal priority simply refers to the fact that a cause cannot occur after the consequence. The criterion of operativity states that a cause must be active when the consequence occurs. Two other factors, necessity and sufficiency, are related to the strength of the causal relationship and can occur to different degrees. Necessity refers to the fact that if a given cause had not occurred, then the consequence would not have occurred. Sufficiency refers to the fact that if the cause does occur, then there is a high likelihood that the consequence will occur as well.

Research using such criteria has demonstrated at least several aspects of causality that predict subsequent memory performance. Consider first the distinction between a "causal chain" and "causal dead-end." Typically, the term causal chain has been used to refer to the sequence of events necessary to bring a story from its beginning to its end. However, at a minimum, a causal-chain requires an event be linked to both a prior
antecedent and a subsequent consequence (Trabasso & van den Broek, 1985). In contrast, a causal dead-end occurs when an event takes place that is not related to bringing a story to its resolution. There is considerable evidence suggesting that events that are part of a causal chain are better recalled than those that form a causal dead-end (e.g., Trabasso, Secco, & van den Broek, 1984; Trabasso & van den Broek, 1985; van den Broek, Lorch, & Thrulow, 1996). In addition to causal chain status, the number of causal connections between events has also been shown to predict recall (e.g., Fletcher & Bloom, 1988; Goldman & Varnhagen, 1986; Trabasso & Van den Broek, 1985). Along the same lines, the strength of the causal relation between events also influences memory. In general, as the strength of the relationship between events increases, so does recall. Interestingly, however, this relationship may be more complex than a simple linear function. Specifically, increasing the causal relatedness between events increases recall, but only up to a point, after which it may actually lower recall rates (e.g., Keenan, Baillet, & Brown, 1984; Myers, Shinjo, & Duffy, 1987).

However, much of the initial text comprehension research was limited in that it focused primarily on explaining how people represented simple texts (e.g., sentence pairs). In short, comprehension of more complex materials could not be explained by representations that were based solely on the text itself. As a result, more recent theories of text comprehension argue that readers also create representations of the situations described by the text. These representations are called mental models (Johnson-Laird, 1983) or situation models (van Dijk & Kintsch, 1983).
Researchers typically agree that there are at least five critical dimensions that comprise the situation models that readers construct. Of particular relevance to the current investigation, there is a substantial amount of evidence suggesting that readers routinely track and represent causal information as a part of their situation models (see Zwaan & Radvansky, 1998, for a complete review). To illustrate the importance of causal relations in situation models, consider, for example, the impact of the explicit provision of causally connective words such as *because* in the comprehension of text. The use of such causally informative words results in the creation of more coherent mental models, greater comprehension of the perceived events, and greater recall (e.g., Caron, Micko, & Thuring, 1988; Millis & Just, 1994; Traxler, Bybee, & Pickering, 1997). Overall, this research has overwhelmingly demonstrated that causal relations play a vital role in text comprehension and memory.

*Causal Relations and False Memories for Entire Fabricated Events*

To understand how causal relations may have influenced the results of Chrobak and Zaragoza (2008), it is necessary look at an example of the fabrications participants were required to provide and their relationship to events depicted in the movie¹. In that study, part of the movie clip that participants viewed contained a scene in which two camp counselors are depicted sneaking out at night and getting into a canoe. The movie then cut to the next day, and showed one of the counselors (Delaney) being severely reprimanded by the camp director and ultimately receiving a harsh punishment. Participants in the forced fabrication group were required to describe in detail where the
counselors went and what they did there after sneaking out on canoes (e.g., “They went to the girls’ camp and went drinking with the counselors there”). Consider then the nature of the relationship between fabricated and witnessed events in that study. According to the criteria establish by van den Broek (1990) (see also Mackie, 1980), the fabrications provided by participants were causally related to several parts of the originally witnessed event.

Participants’ fabrications were, at a minimum, linked to both an observed antecedent (getting on canoes) and an observed consequence (getting in trouble the next day), thus meeting the minimal criteria for the establishment of a “causal chain” (Trabasso & van den Broek, 1985). This would increase the likelihood that participants would later recall the content of the information they had been forced to fabricated (e.g., Trabasso, Secco, & van den Broek, 1984; Trabasso & van den Broek, 1985; van den Broek, Lorch, & Thrulow, 1996). A high rate of recall for the content of the fabrications may have also resulted from the degree to which they were causally related to witnessed events. Although fabrications such as “going to the girls’ camp” strongly predict the observed consequence of getting in trouble, they by no means mandate it. Presumably, participants created elaborations to help connect the fabricated and witnessed events (e.g., one of the girls from the girls’ camp must have reported them, which is why they got in trouble the next day). These types of elaborative inferences likely further increased subsequent recall of those fabrications (Myers, Shinjo, & Duffy, 1987).

Of course, simply remembering the fabricated information by no means guarantees that people will come to believe it actually occurred. The critical question is:
what is the specific mechanism associated with these causal chains that accounts for the tendency to confuse these forced fabrications for events that were actually witnessed? As Chrobak and Zaragoza (2008) suggested, the fabrications’ explanatory role may be the critical factor increasing the likelihood of source confusions. In other words, participants are likely to develop false memories for their forced fabrications because they help to explain some witnessed outcome. Indeed, the consequential outcomes depicted in the video (e.g., getting in trouble with the camp director) are precisely the kind of events which are likely to result in additional cognitive processing; in that they are negative and at least somewhat surprising (see Weiner, 1985, for a summary of evidence suggesting that unexpected and negative outcomes are particularly likely to illicit attributional thinking).

To clarify, it was not the case that witnessed events required additional explanation in order to make sense – the events depicted in the movie (sneaking out) provided a minimally sufficient causal explanation of the outcome (getting in trouble) insofar as “sneaking out at night” meets the conditions of temporal priority, operativity, necessity and sufficiency (van den Broek, 1990). It was possible for participants to provide a relatively coherent account of the witnessed event without mentioning the events they had been forced to fabricate, and, indeed, many participants did so (e.g., “they snuck out at night on canoes and got in big trouble”). If indeed a coherence break had occurred, participants may have been inclined to spontaneously infer the missing causal information (e.g., Hannigan & Reinitz, 2001; van den Broek, 1990) and consequently falsely recall those inferences. However, Chrobak and Zaragoza (2008)
were able to show that participants who viewed the same video clip but were not forced to fabricate what they did after sneaking out, very rarely spontaneously inferred that such fictitious events (e.g., going to the girls’ camp) actually occurred. In other words, only those participants who were forced to fabricate these events reported them at test.

In sum, it was not the case that participants’ fabrications were required to explain the events they had observed. Rather, participants’ fabrications provided a better, more complete, explanation of the observed outcomes. Specifically, the causal explanation provided by the fabricated event (e.g., going drinking with the female counselors at the girls’ camp) was more similar in magnitude to the actual outcome (a severe reprimand and harsh punishment) than the cause depicted in the movie (sneaking out at night) (see, for example, Einhorth & Hogarth, 1986 for evidence that people expect causes to be similar in magnitude to their outcomes). The fabricated account also offered further insight into the motivations and intentions of the characters– thus establishing these motivations as causes for events that were witnessed (see Zwaan & Radvansky, 1998, for the importance of intentional relations in event memory). In short, by incorporating their forcibly fabricated events into their mental representations participants created a more complete, well-specified account of the events that caused the witnessed outcomes.

Dissertation Hypothesis

The goal of my dissertation experiments was to test the hypothesis that participants are prone to developing false memories for forcibly fabricated events because they help to provide a causal explanation for events they witnessed (hereafter
referred to as the *explanatory role hypothesis*). To test the *explanatory role hypothesis*,
three experiments were conducted. Experiments 1 and 2 employed similar
methodologies, differing only in the memory measure administered at final test.
Participants viewed an eyewitness event, were forced to fabricate an entire fictitious
event during a subsequent interview, and then returned for a final memory test. The
primary manipulation involved the nature of the relationship between the forcibly
fabricated and witnessed events. In the Explanatory condition, participants’ fabrications
helped explain outcomes witnessed in the video. However, in Non-Explanatory
condition, participants’ fabrications no longer filled this same role – because the related
consequence scene in the witnessed event was replaced by an unrelated scene. It was
predicted that participants would be more likely to freely report (Experiment 1) and
falsely assent to (Experiment 2) their fabrications when they helped explain events
witnessed in the video.
CHAPTER II
Experiment 1

Method

A total of 179 undergraduates (Female = 118) completed the experiment in fulfillment of a course requirement.

Phase 1: Eyewitness Event

All participants first viewed one of two versions of an edited 18 minute clip from the movie “Looking for Miracles” (Grant & Sullivan, 1989), which portrayed the adventures of two brothers, Delaney and Sullivan, at summer camp. The clips were nearly identical to that used by Chrobak and Zaragoza (2008) with the exception of the modifications noted below.

Phase 2: Forced Fabrication Interview

All participants returned to the lab one week later and engaged in individual, face-to-face interviews with an experimenter about the film clip. All interviews were audio recorded. Participants were informed that they should answer questions in as much detail as possible, including information about where the events took place, who was present and what transpired. They were also instructed to provide an answer to every question, and if they did not know an answer, they were told to guess. As in Chrobak and Zaragoza (2008), all participants were queried about 5 true-events in chronological order,
all of which were salient and highly memorable scenes from the video (a complete list of the interview questions is provided in Appendix A).

To implement the forced fabrication manipulation, each participant was asked one false-event question (drawn from a set of two), at the relevant point in the interview. As in Chrobak and Zaragoza (2008), one false-event question asked participants to describe a fictitious prank they never saw (hereafter, “Prank”), including a detailed description of the prank and how they did it, and the second false event question asked participants to describe the exploits of the camp counselors after they snuck out on canoes (hereafter, “Exploit”), including where they went, who they were with, and what happened. In addition, for half the participants, their forced fabrication served in the *Explanatory Condition* and for the other half of participants their forced fabrication served in the *Non-Explanatory Condition*.

*Fabrication/Explanatory Condition.* In the Explanatory condition, participants’ fabrications were directly linked to both an observed antecedent and an observed consequence that it helped to explain, thus creating a “causal chain” (e.g., van den Broek, 1990) (see Figure 1). This condition is essentially a replication of the materials used in Chrobak and Zaragoza (2008). For the Exploit item, participants witnessed the counselors sneak out at night (antecedent) and then get in trouble with the camp director the next day (consequence). At the time of the post-event interview, participants were required to fabricate an intervening fictitious event: where they went and what they did when they snuck out on canoes. For the Prank item, participants witnessed a counselor (Delaney) go to stand up to make an announcement (antecedent) and then inexplicably
losing his balance and falling to the floor, knocking over several platters of food on a table as he did so (consequence). At the time of the interview, participants were required to fabricate an intervening fictitious event: what practical joke was pulled on him that caused him to fall.

![Figure 1](image-url)  

**Figure 1.** Relationship between witnessed events and later fabricated events in the Explanatory Condition of Experiments 1 & 2

**Fabrication/Non-Explanatory Condition.** In the Non-Explanatory condition, the events in the video were modified so that participants’ subsequent fabrications were linked to an observed antecedent, but they were not linked to an observed consequence that they helped to explain (see Figure 2). For the Exploit item, participants once again witnessed the counselors sneak out at night on canoes (antecedent). However, in the immediately succeeding scene, they did not see the counselors get in trouble with the camp director; rather, participants saw a scene that was causally unrelated to their
fabrication - a counselor horseback riding through the camp. Hence, in the Non-Explanatory condition, the fabricated event led to a “causal dead-end” (e.g., van den Broek, 1990).

The same general relationship is true for the Prank item. However, in contrast to the Exploit item, the observed antecedent was not the same in the Non-Explanatory condition as in the Explanatory condition. In the Non-Explanatory condition, participants witnessed the cook deliberately give Delaney a chair with a broken leg, so that when Delaney stood on the chair to make an announcement in the dining hall, the chair fell apart causing him to fall on the floor. Hence, the antecedent was that the cook had made a laughing stock of Delaney in front of all the campers and staff, who were depicted laughing and pointing at him. At the time of the interview, participants were required to fabricate what practical joke Delaney pulled on the cook in order to get back at him, that caused the cook to fall. This was a forced fabrication, because the video did not depict Delaney pulling a prank on the cook to get back at him. For this item, the fact that the cook had humiliated Delaney served as the antecedent to the fabricated event – the prank Delaney pulled on the cook to get back at him. However, no consequence was witnessed, as participants did not see the cook fall at any point in the video. Rather, the subsequent scene depicted the campers at the waterfront, and hence was unrelated to the prank incident they fabricated (see Figure 2).
As mentioned previously, each participant was asked to fabricate only one of the two false event items (exploit or prank). As a result, the alternative false event item they were not asked to fabricate served as a control. This control item was either Control/Explanatory or Control/Non-Explanatory depending on whether or not participants had viewed the outcome in the video relevant to that question (see Figure 3). Because each version of the video (A or B) was constructed such that it depicted an outcome for only 1 of the two critical scenes (either character falling on face, version A; or characters getting in trouble the next day, version B) the fabricated and control events served in different conditions for each participant. In other words, if the fabricated event was Explanatory, the control event was Non-Explanatory and vice versa. Across

<table>
<thead>
<tr>
<th>Viewed Antecedent</th>
<th>Post-event Question/Fabrication</th>
<th>Viewed Consequence</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPLOIT ITEM</strong></td>
<td>Counselors sneaking out on a canoe → Where did they go and what did they do?</td>
<td>Not Witnessed</td>
<td>Fabrication/Non-Explanatory</td>
</tr>
<tr>
<td></td>
<td><em>Drinking at girls’ camp</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PRANK ITEM</strong></td>
<td>Counselor wants to get revenge on cook → What practical joke was played?</td>
<td>Not Witnessed</td>
<td>Fabrication/Non-Explanatory</td>
</tr>
<tr>
<td></td>
<td><em>Put oil on the floor</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 2.* Relationship between witnessed events and later fabricated events in the Non-Explanatory condition of Experiments 1 & 2
participants, fabricated and control events served equally often in the Explanatory role and Non-Explanatory role conditions.

<table>
<thead>
<tr>
<th>Video Version Day 1</th>
<th>Events Depicted</th>
<th>Post-Event Interview Question About Scene (1 week later)</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>See character fall flat on face in dining hall</td>
<td>What practical joke was pulled?</td>
<td>Fabrication / Explanatory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>Control / Explanatory</td>
</tr>
<tr>
<td>B</td>
<td>Don’t see characters get in trouble following day</td>
<td>Where they went / what they did?</td>
<td>Fabrication / Non-Explanatory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>Control / Non-Explanatory</td>
</tr>
</tbody>
</table>

**Figure 3.** Experimental Design, Experiments 1 & 2

For both true and false event questions, participants were required to provide a complete description of the event in question before being allowed to move on to the next item. Experimenters followed up participants’ initial responses, which tended to be vague, with more specific questions regarding where the events took place, who was there, and what transpired. As expected from previous studies (e.g., Chrobak & Zaragoza, 2008), participants frequently resisted answering the false-event questions and they did so in one of several ways. For example, participants frequently bluntly refused to answer the questions by making statements such as “I didn’t see that” or “That wasn’t in the video” or evaded the question by talking about true, but irrelevant, information that actually occurred in the video. In other cases, participants evidenced more passive forms
of resistance, such as sitting there in silence and refusing to respond. In response to all these forms of resistance, experimenters prompted participants to “Give me your best guess” (sometimes repeatedly) until they complied.

*Experimenter Training*

In order to ensure consistency across interviews, all interviewers underwent rigorous training prior to testing participants. Of particular importance, all interviewers were instructed that for each true-event and false-event question, they were to elicit from participants an “entire” event that met certain pre-specified criteria with regard to what aspects of the event were to be described and the level of specificity at which these aspects were to be described. In general, interviewers were instructed to obtain information about what specific events transpired, how they transpired, and who was present. To assist experimenters with this task, they were given lists of potential “follow-up” questions that could be asked depending on any given participant’s initial response.

Experimenters were also provided with transcripts and item summaries from previous experiments that had used similar interviewing procedures. This helped to guarantee that all experimenters were aware of the “scope” of the information they were required to obtain. Included in these transcripts were comments that addressed either good approaches or mistakes that were made during the course of the interview. Familiarity with these interviews helped interviewers anticipate problematic responses from participants and gave them examples of proper ways to deal with them. This was particularly important with regard to the false event questions – where two types of
problematic responses could arise (other than claims of “I don’t know”). In some cases, participants openly questioned the veridicality of the false-event questions (“That wasn’t in the video, was it?”). In response to such questions, experimenters were instructed to simply reply, “I just need your best guess”. The other general type occurred when participants described “false” information that was too similar to events that were actually witnessed in the video. For example, in response to the Exploit item, a participant might describe the fact that some of the older counselors spied on the nurse with a pair of binoculars. However, this was an actual event that occurred earlier in the movie and was unrelated to Delaney and Moe sneaking off on canoes. In response to such answers, experimenters were instructed to respond, “That’s actually a different scene. I need you to tell me __________.” Finally, all experimenters underwent several practice interviews before conducting interviews with participants. Feedback about the specific performance of each interviewer was provided throughout the semester.

Despite these steps, a number of data points (N = 13) were removed from subsequent analyses because of experimenter error. These errors occurred for one of several reasons. In some cases the experimenter failed to elicit a sufficiently detailed false event (N = 2) or failed to elicit an event that was distinct from events that were actually witnessed (N = 4). In addition, several interviews were removed because the answer accepted by the interviewer was unrelated to the initial question (N = 4). Three interviews were removed because the experimenter inadvertently suggested a piece of false information to the participant during the course of trying to elicit a response. Finally, several interviews were removed because of equipment failure. Specifically,
they were conducted on damaged audio tapes and thus not usable for analysis purposes (N = 2).

**Phase 3: 6-Week Free Recall of the Witnessed Event**

Approximately 6 weeks later, participants returned for a final memory test. Participants were instructed to report the details of the video exactly as they remembered them and to provide as much detail as possible. To further encourage accurate recollection, they were told to assume that they were eyewitnesses whose testimony could be used in a court of law. Importantly, participants were not given any additional cues or prompts. Rather, they were free to report as much or as little of the original video as they wished.

The dependent variable of primary interest was the extent to which participants freely recalled the events they had been forced to fabricate earlier. Because each participant was asked only one false-event question, the rate at which they provided information relevant to the alternate (not presented) false-event question served as a measure of the base rate of reporting the fabricated events. In other words, it provided the rate at which participants spontaneously inferred events similar to the forced fabrications (hereafter referred to as the Control condition).

**Results and Discussion**

*Manipulation Check: Were Participants Truly Forced to Fabricate?*
All post-event interviews were transcribed and coded by two independent raters, with discrepancies resolved by discussion. As expected, participants strongly resisted answering the false event questions. In 67% of cases, participants provided no relevant information when initially asked the false event question. Instead, participants either bluntly refused to respond (47% of the time), with statements such as “I didn’t see that” or by evading the question (53% of the time) by talking about other events in the video or remaining quiet. When participants resisted, the interviewer prompted them to provide their best guess, often times repeatedly, until a relevant response was provided. On average, it took 2.42 conversational turns before participants provided the first part of a fabricated answer and 6.14 turns to provide a complete answer. This was in contrast to 1.04 and 2.36 conversational turns, respectively, for true-event items.

Preliminary analyses revealed that there were no differences between the Explanatory and Non-Explanatory conditions on any measure of resistance (all $p > .10$). These data are presented in Table 1. *Initial Conversational turns* refers to how many exchanges took place between the experimenter and the participant before the participant provided the first part of a fabricated response. *Overall Conversational turns* refers to how many exchanges took place before the participant provided a complete fabricated response. *Initial Overt resistance* refers to how many times a participant made a statement such as “I don’t know” prior to providing the first part of a fabricated answer. Finally, *Overall Overt resistance* refers to how many times participants overtly resisted before providing a complete fabricated response. Given that overt resistance has been shown to buffer against false memory development (Zaragoza, et al., 2001), it was
important to rule out the possibility that differences in false memory development could be attributed to differential levels of resistance.

Table 1. Summary of Resistance by Condition, Experiment 1

<table>
<thead>
<tr>
<th>Resistance Type</th>
<th>Explanatory</th>
<th>Non-Explanatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Conversational Turns</td>
<td>2.44</td>
<td>2.40</td>
</tr>
<tr>
<td>Initial Overt Resistance</td>
<td>6.39</td>
<td>5.88</td>
</tr>
<tr>
<td>Initial Overt Resistance</td>
<td>.76</td>
<td>.69</td>
</tr>
<tr>
<td>Overall Overt Resistance</td>
<td>1.24</td>
<td>.97</td>
</tr>
</tbody>
</table>

Were Participants More Likely to Develop False Memories When Their Fabrications Helped Explain Witnessed Events?

The dependent measure of primary interest was the proportion of forcibly fabricated events falsely recalled 6 weeks later. Two blind raters coded free recall transcripts for reporting of forcibly fabricated events. For each of the two fabricated events, the coder assessed whether participants reported information that they had earlier been forced to fabricate (either yes or no). Overall, the inter-rater reliability for the coding of recall for both Fabricated and Control data was 91% (discrepancies were resolved by discussion).

Raters used a set of predetermined guidelines to assess whether or not a participant’s response constituted mentioning their prior fabrication. Mentioning of false presuppositions that had been provided by the experimenter (e.g., someone pulled a prank, they did something when they snuck out on canoes) were not counted in the
analysis, only reports of fictitious information that the participants had earlier generated themselves were counted. To be counted as evidence of a false memory, participants had to mention some specific aspect of their original fabrication. Consider, for example, a participant that provided the following fabrication at the time of the interview: “Delaney and Moe went drinking at the girls’ camp.” The following types of responses would have been considered as evidence of false memory development, “They went over to the girls’ camp,” “Delaney and Moe went drinking,” or “They met up with some girls.” However, more general responses such as “They took the canoes out” or “They went out on the lake” that could not be linked to their fabrication were not considered evidence of false memory for their fabrications. For the Control condition, participants had to mention a fictitious detail that was typical of the type of details provided for fabricated items. To that end, the same basic set of guidelines was applied to control data.

Because performance for the two false event items (i.e., prank and exploit) did not differ on any dependent measure (all \( p > .10 \)), results were collapsed across item.

Of primary relevance to the goals of this study, the results supported the prediction that the explanatory role of participants’ fabrications plays an important role in false memory development. As illustrated in Figure 4, participants were almost three times more likely to report their fabrications in the Explanatory condition (\( M = .27 \)) than in the Non-Explanatory condition (\( M = .10 \)), \( \chi^2(1, N = 179) = 8.155, p = .004 \), Cramer’s \( V = .213 \). However, the results also showed that participants developed false memories for their forced fabrications even when they did not serve this explanatory function. Free recall of forced fabrications in the Non-Explanatory condition significantly exceeded the
base rate, $\chi^2(1, N = 178) = 6.78, p = .009$, Cramer’s $V = .195$). Not surprisingly, the magnitude of the false memory effect in the Explanatory condition was robust, $\chi^2(1, N = 179) = 21.49, p = .000$, Cramer’s $V = .347$. Finally, the base rate of spontaneously reporting the fabricated events in the Control condition was low, and did not vary for the Explanatory ($M = .02$) and Non-Explanatory ($M = .01$) conditions. These findings show that when participants were not forced to fabricate these events, they almost never inferred them spontaneously.

![Free Recall of Fabricated Events - 6 weeks](image)

*Figure 4.* Proportion of forcibly fabricated events freely reported on the 6-week recall test by participants in the Explanatory and Non-Explanatory conditions. The control condition represents the base rate of spontaneously reporting events similar to the fabrications. Error bars represent standard errors of the mean.

The results of Experiment 1 support the *explanatory role hypothesis*. Although a forced fabrication effect was found in both the Explanatory and Non-Explanatory conditions, the magnitude of this effect was much greater in the former - where participants’ fabrications explained outcomes that they had actually witnessed.
Importantly, these differences do not appear to be due to differential levels of resistance to answering the false event questions at the time of the initial interview.
CHAPTER III

Experiment 2

Experiment 2 assessed whether the results of Experiment 1 would generalize to situations where the final memory test involved recognition (rather than recall). Assessing false memory development with a recognition test was informative for several reasons. First, it is possible that participants in the Explanatory and Non-Explanatory conditions of Experiment 1 developed false memories for their forced fabrications to the same extent, but participants in the Non-Explanatory condition were simply less likely to retrieve and/or report them on the free recall test. Many studies have shown that recall of narrative events is organized around the causal and logical sequence of events, such that events that are less well-integrated into the causal chain of events are less likely to be reported. As depicted in Figures 1 and 2, the fabricated events were part of a “causal chain” in the Explanatory condition (i.e., they were linked to an observed antecedent and observed consequence), but were part of a “causal dead end” in the Non-Explanatory condition (i.e., they were linked to an antecedent only) (Trabasso, Secco, & van den Broek, 1984). Hence, the finding that participants were less likely to report their fabrications in the Non-Explanatory condition of Experiment 1 may reflect retrieval and reporting strategies, rather than a lack of false memory, per se.

To address this possibility, Experiment 2 was a replication of Experiment 1, with the exception that the measure of false memory was a recognition test (rather than recall). A recognition test minimized the impact of retrieval structures and the demands of “good
storytelling” on memory performance, as all participants were provided with the fabricated event as a cue at the time of test (cf., Marsh, Tversky, & Hutson, 2005).

A second change introduced in Experiment 2 was the provision of a warning prior to the final memory test explicitly informing participants that the person who had earlier interviewed them had asked about events that never actually happened. The purpose of the warning was to provide a more stringent test of false memory development (see Chrobak & Zaragoza, 2008, for evidence that warnings reduce false memory). It also reduces demand characteristics that may lead participants to assent to their fabrications in order to appear consistent or please the experimenter (see Lindsay, 1990). Note, however, that demand characteristics cannot explain why false recall differed in the Explanatory and Non-Explanatory conditions of Experiment 1.

Method

A total of 133 undergraduates (Female = 90) completed the experiment in fulfillment of a course requirement. Materials and procedures were identical to Experiment 1, with the exception of the Phase 3 memory test. Rather than a final free recall test, participants in Experiment 2 were read an 11 item yes/no recognition test.

In addition, all participants were read a pretest warning. Specifically, participants were told that the original interviewer had asked them about some things that had not actually occurred in the video, and that their task in the current phase of the experiment was to indicate which things occurred in the video and which things did not.
All participants were asked questions in the form of, “When you watched the video, did you see _______?”. The test queried participants about the events of the video in chronological order and included questions about the fictitious events that they had been forced to fabricate during the Phase 2 interview. For purposes of the test, each participant’s fabricated answer was condensed into a single sentence that highlighted the key elements of their earlier forced fabrication (e.g., “When you watched video, did you see Delaney and Moe go to the girls’ camp and drink with the girls there?”). Since participants were only questioned about 1 of the 2 false event items during the Phase 2 interview, the fabricated answer for the other false event question on the recognition test was provided by a yoked participant. Thus, participants’ false assents to the items they had earlier been forced to fabricate provided the measure of false memory development. In contrast, false assents to the yoked (other-fabricated) items provided the base rate of false assents to fabrications when participants had never been asked the corresponding false-event question (this was the Control condition). The remaining 9 items consisted of: 4 true events which participants had also been interviewed about, 3 true events that participants were not interviewed about, and 2 false events that participants had not been interviewed about (see Appendix B).

As the main focus of this study is false memory for fabricated events, I will only report: 1) false assents to self-generated fabrications and 2) false assents to yoked (other-generated) fabrications (which were new at the time of test).

Results
**Manipulation Check: Were Participants Truly Forced to Fabricate?**

As in Experiment 1, participants strongly resisted answering the false event questions – in 77% of cases they provided no relevant information when initially asked the false event questions (bluntly refusing to respond 55% of the time, evading the question 45% of the time). On average, it took participants 2.56 conversational turns before providing the first part of the fabricated answer and 6.94 conversational turns to elicit a fully detailed account. In contrast, participants almost always provided relevant information about true event questions immediately after the initial prompt ($M = 1.06$ conversational turns) and took only 3.44 conversational turns to generate an entire true event comparable in length to those generated for the false questions. Once again, there were no differences between the Explanatory and Non-Explanatory conditions on any measure of resistance (all $p > .05$). Results are presented in Table 2.

Table 2: Summary of Resistance by Condition, Experiment 2

<table>
<thead>
<tr>
<th>Resistance Type</th>
<th>Explanatory</th>
<th>Non-Explanatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Conversational Turns</td>
<td>2.60</td>
<td>2.53</td>
</tr>
<tr>
<td>Initial Overt Resistance</td>
<td>7.57</td>
<td>6.34</td>
</tr>
<tr>
<td>Initial Overt Resistance</td>
<td>1.00</td>
<td>.91</td>
</tr>
<tr>
<td>Overall Overt Resistance</td>
<td>1.52</td>
<td>1.27</td>
</tr>
</tbody>
</table>

**Were Participants More Likely to Develop False Memories When Their Fabrications Helped Explain Witnessed Events?**
The dependent measure of interest was the proportion of fabricated events falsely assented to 6 weeks later. Because performance for the two false event items did not differ (all $p$s > .10), results were collapsed across item.

As illustrated in Figure 5, the provision of a warning and the change to a recognition test did not alter the main findings of Experiment 1: participants were more likely to falsely assent to having witnessed their fabrications in the Explanatory condition ($M = .28$) than in the Non-Explanatory condition ($M = .12$), $\chi^2 (1, N = 126) = 4.791, p = .029$, Cramer’s $V = .195$. Once again, the base rate of false assents to the fabricated events was low. However, unlike Experiment 1, the base rate of errors in the Explanatory condition ($M = .13$) exceeded the base rate in the Non-Explanatory condition ($M = .02$), $\chi^2 (1, N = 133) = 6.056, p = .013$, Cramer’s $V = .213$. Nevertheless, forcing participants to fabricate resulted in false memories in both conditions, as false assents to forced fabrications exceeded the base rate in both the Explanatory condition $\chi^2 (1, N = 131) = 4.617, p = .032$, Cramer’s $V = .188$, and the Non-Explanatory condition, $\chi^2 (1, N = 128) = 5.625, p = .018$, Cramer’s $V = .210$. 
Discussion

In contrast to Experiment 1, the dependent measure in Experiment 2 was a yes/no recognition test that directly presented participants with their previous fabrications. Despite this change, participants were more likely to endorse their prior forced fabrications when they helped to explain events that were actually witnessed in the video. The fact that these findings were replicated using a recognition test suggests that the difference between the Explanatory and Non-Explanatory conditions found in Experiment 1 was not simply a function of factors related to retrieval strategy or the demands of a recall test. In addition, participants endorsed their fabrications at a high rate – despite a pretest warning – suggesting that participants did in fact develop genuine false memories for their forced fabrications.
One difference between Experiments 1 and 2 was the finding that, in the current experiment, participants were more likely to assent to control items in the Explanatory condition than in the Non-explanatory condition. In other words, participants were more likely to falsely assent to novel test items such as “Delaney and Moe went drinking at the girls’ camp” when they had viewed the relevant outcome (Delaney getting in trouble) at the time of the video than when they had not. However, such a finding is still in line with the explanatory role hypothesis. Presumably, participants assented to these control items precisely because they helped provide a more complete explanation of the events they witnessed.

The fact that this control effect occurred in Experiment 2, but not Experiment 1, suggests that participants did not spontaneously infer the fabricated events “online” as they encoded the witnessed events. If indeed that had occurred, participants would have demonstrated some tendency to incorporate these fabrications into their free recall. However, this was not the case in Experiment 1, as participants rarely provided missing, non-fabricated explanatory information at the time of test ($M = .02$). The primary change from Experiment 1 to Experiment 2 was the switch to a recognition test (as opposed to free recall) in which the cognitive demands placed on participants were greatly reduced (ie., they did not have to generate the information). As a result, participants were likely influenced by both the plausibility of the fabrications and the fact that they explained events witnessed in the video – thus explaining the increased rate of false assents. However, the lack of such inferences in the recall data from Experiment 1 suggests that such inferential errors may not be firmly held.
Overall, the finding of inferential errors for novel control items found in Experiment 2 is in line with results reported in a study by Hannigan and Reinitz (2001). In that study, participants viewed a slide sequence depicting a typical event (e.g., shopping at a grocery store). In some situations, participants viewed an outcome (e.g., a bunch of oranges on the floor) that could not be explained by another of the other slides. At the time of a subsequent recognition test, participants had higher confidence that non-presented causal slides (e.g., a woman taking an orange from the bottom of a pile) were studied at test than unrelated control slides. Presumably, this occurred because the novel causal slides offered an explanation for events that had been previously viewed.
CHAPTER IV

Experiment 3

Although the use of a recognition test in Experiment 2 eliminated potential differences in reporting strategy associated with free recall (Experiment 1), it is still the case that in Experiments 1 and 2, the explanatory role of participants’ fabrications was always confounded with whether or not the fabrication was part of a causal chain (see Figures 1 and 2). Given evidence that events that are part of a causal chain are better remembered than are events that are part of a causal “dead end”, it is possible that the fabrications in the Explanatory conditions of Experiments 1 and 2 were simply more memorable than fabrications in the Non-Explanatory conditions. In other words, the results of Experiments 1 and 2 cannot rule out the possibility that differences in the memorability of the fabricated events may have contributed to the differences in false memory for the Explanatory and Non-Explanatory conditions. In Experiment 3 this confound was eliminated, as the explanatory role hypothesis was tested in situations where participants’ fabrications were always part of a causal chain and the explanatory strength of the fabrications was manipulated by the presentation of alternative explanations that could also explain the relevant outcomes witnessed in the video.

Research has indicated that the strength of a perceived causal relationship is highly influenced by the presence of alternative explanations. Specifically, multiple possible explanations for a particular consequence reduces the extent to which people view any one event as causally related to that outcome (Einhorn & Hogarth, 1986;
By the same token, having only one causal explanation for an event increases the perceived strength of a causal relationship. These principles were nicely illustrated in a study by Johnson and Seifert (1994). In one experiment, participants read a story in which an initial causal explanation was provided for a critical event (e.g., volatile materials started a warehouse fire). However, later in the story, participants were provided with information indicating that the initial explanation was not accurate (e.g., volatile materials could not have started the fire). Results showed that participants only abandoned this discredited explanation when they were provided with an alternative explanation for events that they had read (e.g., arson started the fire). This study not only demonstrates people’s need to have an explanation for events (they persisted in believing explanations that had been discredited when no alternative explanation existed), but also illustrates how the provision of alternative explanations can weaken the strength of preexisting causal explanations.

In Experiment 3, the explanatory strength of participants’ forced fabrications was manipulated by varying whether or not participants received an alternative explanation for the events their fabrication helped to explain. All participants were treated identically to those in the Explanatory conditions of Experiments 1 and 2, up through the forced fabrication interview. Immediately following the forced fabrication interview, participants were read narratives that provided additional information about several of the characters in the video. Of particular importance was the narrative relating to Delaney. In the Alternative Explanation (AE) condition, some of the information in the narrative could be used to provide an alternative explanation for the viewed critical outcomes that
participants’ fabrications helped to explain. For example, some participants learned that Delaney suffered from a balance disorder that could cause him to fall unexpectedly. This information could serve as the basis for explaining why Delaney fell in the dining hall (the viewed outcome related to the Prank fabrication). In the No Alternative Explanation (NE) condition, participants read about similar information (e.g., that Delaney had a skin disorder), but this new information could not be used to explain the viewed outcome relevant to their fabrication (i.e., Delaney falling in the dining hall).

As in Experiments 1 and 2, participants returned to the lab 6 weeks later and were asked to recall the events in the video. The measure of false memory was the extent to which participants recalled their forced fabrications as part of the witnessed event. It was predicted that participants would be less likely to develop false memories for their fabrications when the information contained in the narrative provided an alternative explanation for the witnessed outcome (fabrication has lower explanatory strength) than when the narrative did not provide a plausible alternative explanation (fabrication has high explanatory strength). Such results would provide strong evidence in favor of the explanatory role hypothesis.

**Method**

A total of 175 participants (Female = 132) completed the experiment in fulfillment of a course requirement.

**Phase 1: Eyewitness Event**
In contrast to Experiments 1 and 2, all participants viewed the same edited, 18
minute clip from the movie, “Looking for Miracles” that was used in Chrobak and
Zaragoza (2008). The primary difference between this clip and the ones used in
Experiments 1 and 2 was that the two critical scenes (dining hall, sneaking out) both
portrayed the consequences relevant to the fabrications participants were later asked to
fabricate. In the dining hall scene, participants saw Delaney inexplicably fall and knock
over several food trays on his way to the ground. In the sneaking out scene, participants
witnessed Delaney get in big trouble with the camp director the next day. The final scene
of the movie also differed somewhat in Experiment 3. In Experiments 1 and 2, the movie
ended with a relatively innocuous scene depicting the camp owner teaching Delaney’s
younger brother, Sullivan, how to swim. In contrast, the final scene of the clip used in
Experiment 3 depicted Delaney crying by the water because he had lost an unspecified
scholarship.

**Phase 2a: Forced Fabrication Interview**

The forced fabrication interview took place 1 week after the video. For
participants in the Fabrication group, the procedure and materials for the interview were
identical to those used in the Explanatory condition of Experiment 1, with the exception
that they were required to fabricate both the prank and exploit items. Participants in the
Control group were not asked the two critical false-event questions. The purpose of this
group was to determine a base rate of spontaneously inferring the fabricated events in the
absence of having fabricated the two critical false event items. Based on the findings
reported in Chrobak and Zaragoza (2008) and those of Experiment 1, I expected that participants who had not been asked to fabricate the fictitious events would spontaneously report similar information at an extremely low rate. As such, a smaller number of control participants were tested (N = 41), as large numbers participants were not needed to demonstrate that this was the case.

Provided below is a description of the actual scenes from the video and the corresponding false-event questions that were asked of participants in the Fabrication group during the forced fabrication interview:

1. Actual Scene: Sneaking out at Night

Delaney and Moe sneak into a canoe at night and head off for an unknown destination. The next clip in the movie shows Delaney getting yelled at by the camp director, who is extremely shocked and disappointed by his behavior.

False Event Interview Question: Exploit

“To the end of the movie, Delaney and Moe use a canoe and sneak off at night. After sneaking out, where did they go and what did they do that caused them to get in big trouble the next day?”

2. Actual Scene: Dining Hall

During the course of a birthday celebration, Delaney is asked to stand up and make an announcement. As he goes to stand up, he inexplicably loses
his balance and falls to the floor, knocking over several food platters on his way down.

False Event Interview Question: Prank

“The next scene takes place in the dining hall. Delaney is asked to stand up and make an announcement. A practical joke is pulled on him that causes him to fall and end up on the floor. What was it?”

Phase 2b: Post-Event Narratives

Immediately after the forced fabrication interview, participants were instructed that they would hear some narratives that provided additional information about Sullivan (Delaney’s younger brother), Delaney, and the Chief (the director of the camp). In general, these narratives provided insight into additional facets of the characters’ backgrounds and experiences. For example, part of the narrative about Delaney informed participants that Delaney was a very talented student that had an interest in going into the medical field. Participants were given typed copies of the narratives and instructed to read along as prerecorded versions of the narratives played. The narratives were all of approximately the same length and were always presented in the same order (Sullivan, Delaney, the Chief). The full text of these narratives is included in Appendix C.

The Alternative Explanation and No Alternative Explanation conditions were created by manipulating information in the narratives about Delaney. The conditions differed critically in two paragraphs embedded in the overall narrative that described: 1) a medical condition that Delaney had and 2) a problem Delaney had with pornography.
In the Alternative Explanation condition, the critical paragraph was designed to provide an alternative explanation for the outcome that participants’ fabrications (Exploit or Prank) helped to explain. In the No Alternative Explanation condition, participants learned about similar information that could not be used to explain the relevant outcomes. Consider first the paragraphs that dealt with Delaney’s medical condition:

Alternative Explanation (for the Outcome that the Prank Fabrication Helped to Explain)

“Making matters worse, Delaney suffers from a rare inner ear disorder known as Ménière's disease. Resulting from an imbalance of fluid in the inner ear, Delaney experiences unexpected periods of vertigo or dizziness, where he has difficulty maintaining his balance. In the past, occurrences have frequently caused Delaney a significant amount of social embarrassment. The condition was so bad, that Delaney had to lie about it in order to receive his job at the camp. As a result, Delaney is very concerned about the possibility of an unexpected occurrence while working at the camp.”

No Alternative Explanation

“Making matters worse, Delaney suffers from a rare skin disorder known as Phemphigus. Resulting from an autoimmune deficiency, Delaney occasionally experiences unexpected blisters over his face, neck and back. In the past, occurrences have frequently caused Delaney a significant amount of social embarrassment. The condition was so bad, that Delaney had to lie about it in
order to receive his job at the camp. As a result, Delaney is very concerned about the possibility of an unexpected occurrence while working at the camp.”

The AE narrative was intended to provide participants with an alternative explanation (other than their forced fabrications) as to why Delaney falls in the dining hall. Specifically, the vertigo associated with Ménière's disease could cause Delaney to fall in an unexpected and unpredictable manner. The presence of this alternative explanation should thus reduce the strength of the causal relationship between participants’ fabrications and the witnessed events (e.g., Einhorn & Hogarth, 1986). Specifically, it should reduce the degree of the necessity of the fabrication (e.g., Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985); as the information about Ménière's disease provides a viable causal explanation as to why Delaney fell.

The narrative was constructed in such a way that while participants were not specifically told his disease could have been responsible for the incident in the dining hall, they were likely to make that association. The information presented in the NE condition was similar in nature. However, the primary difference was that the disease described in that narrative, Phemphigus, could not be used to explain why Delaney fell in the dining hall. The relationship between witnessed, fabricated, and narrative events for the Prank item is depicted in Figure 6.
The two versions of Delaney’s narrative also differed in terms of how they described a specific issue related to a problem that Delaney has with pornography:

Alternative Explanation (for the Outcome that the Exploit Fabrication Helped to Explain)

“For all of his strengths, Delaney frequently managed to get in a fair amount of trouble at the camp. In part, it seems to stem from the fact that Delaney is somewhat bored with his job a counselor. Delaney’s relationship with the camp director has deteriorated in recent weeks. The Chief recently discovered numerous pornographic magazines in Delaney’s cabin. He was concerned by the pornography for several reasons. First of all, it was highly illegal in this state at the time and the Chief feared that if the ladies who donated to the camp found out about it, it would endanger the funding for the camp. He also worried that the younger campers might be exposed to Delaney’s dirty magazines. As a result, he
warned Delaney about what would happen if the magazines were found again. Despite the warning, Delaney refused to get rid of the magazines, and keeps them hidden beneath his mattress.”

No Alternative Explanation

“For all of his strengths, Delaney frequently managed to get in a fair amount of trouble at home. In part, it seems to stem from the fact that Delaney is somewhat bored with school. In fact, money was not the only reason Delaney took the job as a counselor at the camp. His relationship with his mother has deteriorated in recent months, in part due to Delaney’s trouble making. Delaney’s mother had recently discovered numerous pornographic magazines in his room. She was concerned by the pornography for several reasons. First of all, it was highly illegal in this state at the time and she feared that if anyone found out about it, Delaney would get in serious trouble. She was also embarrassed by her son’s behavior and worried that Sullivan might be exposed to the dirty magazines. As a result, she encouraged Delaney to work at the camp Sullivan is attending, as she believes it will help Delaney mature. In fact, because of his new found sense of responsibility at the camp, Delaney has thrown out all of his magazines and has not been tempted since.”

In this case, the AE narrative provided participants with an alternative explanation (other than their forced fabrications) as to why Delaney got in so much trouble with the camp director. In particular, if Delaney was found to have pornography in his cabin, it
could explain why Delaney got in so much trouble with the Chief, thus reducing the necessity of participants’ fabrications. As a result, the information in the AE narrative should reduce the strength of the causal connection between those fabrications and the events witnessed in the video (e.g., Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985). In contrast, the NE narrative described the same problem with pornography, only this time in the context of Delaney’s home life. In other words, participants should not have viewed Delaney’s problem with pornography as being responsible for the outcome depicted in the movie. The relationship between witnessed, fabricated, and narrative events for the Exploit item is depicted in Figure 7.

![Figure 7](image_url)

*Figure 7. Relationship between witnessed, fabricated, and narrative events, Experiment 3, Exploit Item*

Each version of the narrative was constructed such that it contained an alternative explanation for only 1 of the 2 critical scenes depicted in the video (either: character falling on face OR characters sneaking out on canoes at night). Thus, for each participant
the fabricated items served in different conditions (i.e., if the Exploit item was in the Alternative Explanation condition, then the Prank item was in the No Alternative Explanation condition and vice versa). This is depicted in Figure 8. Across participants, each item (Exploit or Prank) served equally often in the Alternative Explanation and No Alternative Explanation conditions. Control participants were treated in a similar manner, receiving explanatory information about 1 of the 2 critical scenes. Given that control participants had not been forced to fabricate answers to the critical false event questions, the explanations provided in the narratives did not necessarily constitute “alternatives” in the same sense that they did for participants in the Fabrication condition. However, it is still the case that such explanations may have reduced the extent to which control participants spontaneously inferred intruding events to explain the witnessed outcomes.

<table>
<thead>
<tr>
<th>Events Depicted</th>
<th>Post-Event Interview Question About Scene (1 week later)</th>
<th>Narrative Version</th>
<th>Information Presented</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td></td>
<td></td>
<td></td>
<td>No Alternative Explanation</td>
</tr>
<tr>
<td>Prank</td>
<td>See character fall flat on face in dining hall</td>
<td>What practical joke was pulled?</td>
<td>Balance Disorder</td>
<td>Alternative Explanation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pornography problem at home</td>
<td>No Alternative Explanation</td>
</tr>
<tr>
<td>Exploit</td>
<td>See characters get in trouble following day</td>
<td>Where they went / what they did?</td>
<td>Skin Disorder</td>
<td>No Alternative Explanation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pornography problem at camp</td>
<td>Alternative Explanation</td>
</tr>
</tbody>
</table>

*Figure 8. Experimental Design, Experiment 3 (Fabrication group only)*
Phase 3a: 6-Week Memory Test of the Witnessed Event

Participants returned 6 weeks after the interview and were given the same free recall test described in Experiment 1. Immediately after free recall, participants completed a cued-recall test in which they were given general prompts (these prompts are provided in Appendix D) to describe the 9 major scenes from the video (e.g., a counselor getting bitten by a poisonous snake, a birthday celebration in the dining hall).

Importantly, participants were only given general prompts; they were not prompted to report their fabricated events or specific events from the scene. This cued-recall test was included in order to minimize the variability between participants in terms of the amount of information they reported at free recall. Specifically, participants in Experiments 1 sometimes failed to report major scenes from the video for reasons that were presumably unrelated to their memory for those omitted scenes (e.g., a desire to complete the experiment quickly). Cuing participants to talk about each of these scenes helped to provide a more complete measure of participants’ memory for the witnessed events. The primary dependent measure was the extent to which participants reported the events that they had earlier been forced to fabricate (a) on the free recall test and (b) on the cued recall test. Overall, it was predicted that participants would be less likely to report their fabrications when the information contained in the narrative could also be used to explain the relevant witnessed outcomes. The purpose of the Control group was to assess the extent to which participants would infer and report the fabricated events when they had not been asked the false-event questions at interview.
Phase 3b: 6-Week Test of Accurate Memory for Fabrications and Narrative Information

In contrast to Experiments 1 and 2, in Experiment 3 I also assessed participants memory for (a) the fabricated answers they had generated in response to the false event questions (Fabrication group only) and (b) the relevant information about Delaney provided in the post-interview narratives (e.g., Ménière's disease, Phemphigus). This is distinct in that rather than testing participants’ memory for the eyewitness events, it assessed memory for the post-event information (e.g., what they fabricated, information in the narrative).

Immediately after free recall and cued-recall of the witnessed event, participants were reminded of the two critical false-event questions they were asked during the earlier post-event interview (e.g., the prank and exploit questions) and were asked to recall the answers they had given to these questions (e.g., “We asked you to describe the practical joke that caused Delaney to fall and end up on the floor. Please describe to me the answer you provided”). Given that participants’ fabrications were part of a causal chain in both the Alternative Explanation and No Alternative Explanation conditions, it was expected that participants’ ability to remember their forced fabrications would be comparable in both conditions. If, as expected, participants remembered their fabrications equally well in the two conditions, a finding of reduced false memory in the Alternative Explanation condition relative to the No Alternative Explanation condition would provide clear evidence that the likelihood of false memory development is dependent on the explanatory strength of participants’ fabrications.
Next, participants were asked to recall the critical information contained in the narratives about Delaney (e.g., Ménière's disease or Phemphigus, pornography at home or pornography at camp). Participants were provided with prompts that were similar in nature to those used to assess memory of participants fabricated responses (“Please tell me everything you can remember in the narrative about: Delaney’s medical condition or Delaney’s propensity to get in trouble with his mom / the Chief”). This was done in order to assess whether participants could remember the alternative explanations at the time of the final test. Assessing participants’ memory for the relevant information from the narrative would prove informative if results from free recall and cued-recall indicated no differences in false memory development between the Alternative Explanation and No Alternative Explanation conditions. Specifically, they would help rule out the possibility that participants simply did not encode or have access to the information presented in the narrative.

Pilot Testing of Materials

Before conducting the study proper, the narratives were pilot tested to verify that participants who had never been asked the false event questions would view the information in the post-event AE narratives (i.e., the narratives describing Delaney’s Ménière's disease and Delaney having pornography at the camp) as providing plausible explanations for the outcomes they had earlier observed in the video (falling down, getting in trouble).
A total of 74 participants (Female = 56) completed the pilot testing in fulfillment of a course requirement. In contrast to both Experiment 1 and Experiment 2, participants were tested in groups of approximately 15. All participants viewed the same edited, 18-minute video clip of “Looking for Miracles” used in Experiment 3, but were never interviewed about the events they had seen. Rather, immediately after the video, participants listened to audio recordings of the 3 narratives that contained additional information about Delaney, Sullivan, and the Chief. To ensure that participants attended to the information in the narratives, they were also provided with text copies of the narratives and instructed to read along. Participants were randomly assigned to receive one of the two narrative sets used in Experiment 3. As in Experiment 3, each narrative contained an explanation for only 1 of the 2 critical scenes depicted in the video (either the counselor falling in the dining hall OR the counselors sneaking out on canoes at night).

After presentation of the narratives, participants were given a 15 minute filler task. The filler task was a 48-item personality inventory where participants rated themselves and the 3 characters depicted in the narratives on a number of different personality dimensions. Once the questionnaires were complete, participants were then given a surprise test designed to assess whether or not they viewed the information in the Explanatory narratives as providing plausible explanations for the critical events they had seen in the video. To this end, the majority of participants (N= 54) were asked to explain the causes of 5 different events depicted in the video. Among these were the two events related to the Explanatory Narratives: what caused Delaney to fall in the dining hall and
why did Delaney get in trouble with the camp director. The other three questions asked about causes that were actually witnessed.

In addition, a small subset of participants (N = 18) were given a free recall test in which they were simply asked to report the events of the video as they remembered them (as in Experiment 1). This was done in order to determine if participants would spontaneously incorporate information from the narratives into their overall representations for what occurred in the video. Finally, after the initial task (either explain the causes of events or free recall), all participants were given a final 2-item task in which they were asked to rate how likely they thought it was that the information from the Explanatory Narratives could explain the critical outcomes in the video. For each of the two questions, participants indicated their responses on a scale of 1 – 6, with 1 meaning that it was impossible that this was the cause, and a 6 indicating that it was certainly the cause.

As expected, participants connected the critical information from the narratives to events witnessed in the video. When cued to describe the cause of the critical consequences, 77% percent of participants reported information about Ménière's disease and 86% reported information about Delaney having a problem with pornography at the camp. For those participants that were given free recall, 4 out of 10 participants spontaneously included information about Delaney’s Ménière's disease. However, none of the 8 participants that had heard information about Delaney’s problem with pornography at the camp spontaneously provided this information, possibly owing to the fact that “sneaking out on canoes” provides a minimal causal explanation for why the
counselors got in so much trouble. Finally, participants rated the explanations offered by the narratives as particularly likely to have caused the outcomes presented in the video. Specifically, for participants that heard the relevant information at the time of the narrative, the average “likelihood” scores were 4.92 and 5.08 for “Ménière's disease” and “pornography at camp, respectively. Overall, results from the pilot study suggest that participants did in fact view these accounts as plausible explanations for the events they witnessed.

Results

Manipulation Check: Were Participants Truly Forced to Fabricate?\textsuperscript{3}

As in Experiments 1 and 2, participants strongly resisted answering the false event questions – in 58% of cases they provided no relevant information when initially asked the false event questions (bluntly refusing to respond 54% of the time, evading the question 46% of the time). On average, it took participants 2.43 conversational turns before providing the first part of the fabricated answer and 6.71 conversational turns to elicit a fully detailed account. In contrast, participants almost always provided relevant information about true event questions immediately after the initial prompt ($M = 1.10$ conversational turns) and took only 3.11 conversational turns to generate an entire true event comparable in length to those generated for the false questions. There were no differences between the Alternative Explanation and No Alternative Explanation conditions on any measure of resistance (all $p$s > .10). These data are presented in Table 3.
Table 3: Summary of Resistance by Condition, Experiment 3

<table>
<thead>
<tr>
<th>Resistance Type</th>
<th>Explanatory</th>
<th>Non-Explanatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Conversational Turns</td>
<td>2.39</td>
<td>2.47</td>
</tr>
<tr>
<td>Initial Overt Resistance</td>
<td>6.85</td>
<td>6.56</td>
</tr>
<tr>
<td>Initial Overt Resistance</td>
<td>.71</td>
<td>.71</td>
</tr>
<tr>
<td>Overall Overt Resistance</td>
<td>1.23</td>
<td>1.04</td>
</tr>
</tbody>
</table>

Were Participants Less Likely to Develop False Memories for Their Forced Fabrications when Provided with Alternative Explanations?

The dependent measure of interest was the proportion of fabricated events falsely recalled 6 weeks later on a test of memory for the witnessed event. Because performance for the two false event items did not differ (all ps > .10), results are collapsed across item. Data was coded in the same fashion and using the same criteria as in Experiment 1. The inter-rater reliability for the coding of recall for both Fabricated and Control data was 95% (discrepancies were resolved by discussion).

Figure 9 illustrates the combined free and cued recall of fabricated events. As expected, participants were less likely to report their forced fabrications in the Alternative Explanation condition ($M = .20$) than in the No Alternative Explanation condition ($M = .31$), $\chi^2 (1, N = 262) = 4.24, p = .040$, Cramer’s $V = .127$. The base rate of spontaneously reporting the fabricated events was low and did not differ as a function of condition (Alternative Explanation $M = .00$, No Alternative Explanation $M = .05$), $p > .10$. Overall, forcing participants to fabricate resulted in false memories in both conditions, as recall of
the forced fabrications exceeded the base rate in both the Alternative Explanation Condition, $\chi^2(1, N = 175) = 9.768, p = .002$, Cramer’s $V = .236$, and the No Alternative Explanation Condition, $\chi^2(1, N = 169) = 11.564, p = .001$, Cramer’s $V = .262$.

Figure 9. Proportion of fabricated events reported on the 6-week test of witnessed events by participants in the Alternative and No Alternative Explanation conditions (free recall and cued recall combined). The base rate of false reporting for the corresponding controls is provided for comparison. Error bars represent standard errors of the mean.

Did Participants Develop False Memories for the Alternative Explanations Contained in the Narratives?

Pilot data suggested that participants viewed information in the Alternative Explanation narratives as providing a possible explanation for the critical eyewitness events. Given these findings, it seems reasonable to suspect that participants in Experiment 3 may have offered the relevant narrative information (e.g., Ménière’s disease, pornography at the camp) at test. Overall, participants were more likely to
mention the explanatory narrative information (e.g., Ménière's disease) than the non-explanatory narrative information (e.g., Phemphigus), as not one participant mentioned the non-explanatory information during either free or cued recall. These data are presented in Figure 10. Although not explicitly predicted, these data also fit with the predictions made by the explanatory role hypothesis. Participants were more likely to mention the relevant narrative information in the Alternative Explanation condition precisely because it could be used to explain events in the video. Interestingly, participants in the Fabrication condition reported this explanatory narrative information at a level ($M = .22$) comparable to reporting of the fabricated responses ($M = .20$).

![Figure 10](image)

**Figure 10.** Proportion of narrative explanations reported on the 6-week test of witnessed events by participants in the Fabrication and Control groups (free recall and cued recall combined). The base rate of false reporting the non-explanatory narrative information (e.g., Phemphigus, pornography at home) is provided for comparison. Error bars represent standard errors of the mean.
It is worth noting that participants in the Control group (who were not asked to fabricate answers to the false event questions but were nonetheless exposed to the “alternatives” provided in the narratives) were somewhat less likely to spontaneously include the explanatory narrative information in their recall of the eyewitness event ($M = .10$) than participants in the Fabrication group ($M = .22$), $\chi^2 (1, N = 174) = 3.007, p = .083$, Cramer’s $V = .131$. This finding is somewhat counterintuitive as, for Control participants, the narrative offered the only explanation comparable in magnitude to the witnessed outcomes. Thus, one might expect them to report this information at a higher rate. One possible explanation for this finding is that forcing participants to answer the false event question at interview (Fabrication group) likely made them more cognizant of the fact that the relevant viewed outcomes lacked sufficient explanation. And, as a result, this encouraged them to search for an explanation (which the narratives provided).
Control participants, in contrast, had never been asked to explain the outcomes, and may have been less aware that the events they had witnessed lacked sufficient explanation. As a consequence, Control participants may have been less likely to attend to the relevant information in the narrative. Overall, greater attention to the information provided in the narrative (as well as greater integration with the witnessed events) may have made the narrative information (e.g., Ménière's disease) more memorable for participants in the Fabrication group, a hypothesis that is verified by results reported below.

Did Participants Have Accurate Memory for the Post-Event Information?
In contrast to Experiments 1 and 2, I also assessed the extent to which participants were able to remember the information they were exposed to after the video. First, they were explicitly asked to describe what they told the experimenter when initially asked the false event questions at interview. Overall, participants were quite good at recalling the events they had fabricated in response to the false-event questions ($M = .89$). More importantly, however, there were no differences in recall of the fabricated answers between the Alternative Explanation condition ($M = .87$) and the No Alternative Explanation ($M = .90$) conditions, $p > .10$. In other words, there was no evidence that the alternative explanations interfered with participants’ memory for their fabrications. These results provide strong evidence that the differences in false memory between the Alternative and No Alternative Explanation conditions reported above cannot be attributed to differences in memory for the fabricated events.

Participants were also explicitly asked to describe the relevant information provided in the narratives. That is, they were asked to describe (a) the disease that Delaney had or (b) Delaney’s specific behavioral problem. Overall, participants were relatively poor at remembering the information provided in the narratives. In fact, regardless of the specific experimental manipulation, most participants were comparable in terms of their recall of the relevant narrative information (Fabrication, No Alternative Explanation, $M = .23$; Control, No Alternative Explanation, $M = .26$, Control, Alternative Explanation, $M = .29$). The only exception appears to be Fabrication participants’ recall of the information that provided an alternative explanation for the witnessed outcomes, which was higher ($M = .43$) than Control participants’ recall of the same information ($M = .29$).
\( \chi^2 (1, N = 175) = 2.569, p = .076, \) Cramer’s V = .109. These results support the explanation posited in the preceding section for the counterintuitive finding that Fabrication participants had higher false memories of the explanation provided in the narrative than did Control participants (see Figure 10).

In summary, the foregoing results show that after 6 weeks, participants in both the Alternative and No Alternative Explanation conditions could recall their fabricated responses equally well and at extremely high rates (\( M = .89 \)). In contrast, Fabrication participants could recall the alternative explanations provided in the narratives much less well (\( M = .43 \)). The finding that the presence of this Alternative Explanation reduced false memory rates for participants’ forced fabrications (the main finding of Experiment 3) is especially impressive given that memory for the narrative information was so much weaker than memory for the fabrications themselves.

**Discussion**

Experiment 3 provided a strong test of whether or not false memory development for entire fabricated events is a function of the explanatory role that the fabrication serves. In contrast to Experiments 1 and 2, participants’ fabrications were always part of a causal chain, and explanatory strength was manipulated by the presence or absence of alternative explanations for events the fabrications served to explain. Results indicated that participants were less likely to report their fabrications when they had been provided with additional explanatory information in the context of the post-interview narratives. Presumably, this additional explanatory information reduced the extent which participants viewed their fabrications as a viable explanation for the unexplained
outcomes witnessed in the video. Critically, there was no evidence that participants were simply less likely to remember their fabrications in the Alternative Explanation condition than in the No Alternative Explanation condition. Overall, these results provide additional evidence that the causal explanatory function of participants’ fabrications is a critical factor influencing false memory development.

The Memorial Fate of Multiple Explanations

The results of Experiment 3 raise interesting questions about the nature of the representations that participants formed and maintained for both their fabrications and the relevant alternatives provided by the narratives. In general, the presentation of the alternative explanation in the narrative likely reduced the explanatory strength of participants’ forced fabrications. However, the specific way in which this influences the causal representation of events that participants formed (e.g., the causal chain) is yet to be resolved.

At the very least, it does appear to be the case that participants are capable of representing “multiple” causal chains for the same sequence of events. Direct evidence for this is provided by the handful of participants that reported both their fabrication and the alternative provided in the narrative, but indicated their uncertainty as to which was the true cause of the witnessed outcome (N = 2). For example, one participant provided the following explanation as to why Delaney fell in the dining hall:
I think either Ratface or somebody else um did something goofy with the food stand and I think, yeah Delaney slipped on something and fell, but I’m not really sure how. Um I think I remember he had some kind of balance disorder, so maybe it wasn’t even rigged, but I don’t remember…

Along the same lines, several participants (N = 4) entertained both explanations, but did not view them as mutually exclusive from one another. Consider one participant’s description of the events that led to Delaney getting in trouble with the camp director, “Later on Delaney goes out fishing, sneaks out with another of his bunk mates, he had some dirty magazines, too.” Another participant offered the following explanation for Delaney falling in the dining hall, “Delaney didn’t like have good balance and, uh, a couple of the other counselors play a trick on him.” Clearly, such cases provide strong evidence that participants were in fact capable of representing multiple possible causal representations at the same time. However, future research will be needed to explore the specific nature of these representations and the processes participants use to integrate these sources of information into a causal explanation for the events they have witnessed.
CHAPTER V

General Discussion

Summary

The current set of experiments was designed to explore an important unanswered question posed by Chrobak and Zaragoza (2008): Why might participant-witnesses be prone to developing false memories for entire fictitious events that they had earlier been forced to fabricate? The central hypothesis was that the causal explanatory role that participants’ forced fabrications played was a crucial factor influencing false memory development (the explanatory role hypothesis). Overall, participants were more likely to freely report (Experiment 1) and falsely assent to (Experiment 2) their forced fabrications when they helped to explain some outcome that had been witnessed. Furthermore, in Experiment 3, participants were less likely to report their fabrications when their explanatory power had been reduced by the presence of an alternative explanation that could also explain the same outcome as their fabrication. Overall, the collective results of these experiments provide strong evidence for the explanatory role hypothesis.

Of course, the explanatory role hypothesis cannot alone explain the entire pattern of results demonstrated in this series of experiments. A consistent finding across all three experiments was that participants demonstrated evidence of false memory development for their fabrications even when they did not explain an outcome witnessed in the video (Experiments 1 and 2) and when the explanatory strength of their fabrications had been weakened (Experiment 3). Ultimately then, the explanatory role that participants’
fabrications provided can be viewed as one factor that further complicates the source monitoring task facing participants.

With that in mind, what other factors may have contributed to the false memory development demonstrated by participants – particularly in cases where the explanatory role of their fabrications was minimal or nonexistent? Clearly, many of the basic mechanisms that have been shown to increase source monitoring difficulty are relevant (e.g., Johnson, Hastroudi, & Lindsay, 1993). Pressing participants to describe fictitious events in a great amount of detail forced them to create concrete, perceptually detailed, and well-specified memory representations that had characteristics typical of events that had actually been witnessed.

In addition, the responses that participants fabricated were quite plausible given the constraints of the movie. For example, there were no cases in which participants generated responses that were logically impossible given the events witnessed in the video (e.g., “Delaney and Moe got on a spaceship and went to the moon”). Rather, participants’ responses to the false event questions described common events that could be grouped into a number of similar categories. Along the same lines, the events that participants fabricated were highly consistent with the overall themes depicted in the movie. For example, one of the younger campers (“Ratface”) is frequently depicted causing trouble for the camp counselors. As a result, a fabricated response to the Prank false event question that described Ratface as the perpetrator is consistent with that character’s portrayal as a trouble maker. The overall plausibility of participants’ fabrications is particularly important given research suggesting that people are more
susceptible to developing false memories for plausible events as opposed to implausible events (e.g., Pezdek, Finger & Hodge, 1997). It is highly unlikely that participants would have developed false memories for implausible fabrications (e.g., “Delaney and Moe got on a spaceship and went to the moon”) even if they could be used to explain an outcome witnessed in the video (e.g., Delaney and Moe getting in trouble).

The fact that participants’ fabrications were self-generated also likely contributed to false memory rates in several ways. At a very basic level, the fact that the fabrications were self-generated made them highly memorable (Hirshman & Bjork, 1988; Slamacka & Graf, 1978). This notion was supported by results from Experiment 3, which indicated that when explicitly asked what answer they provided during the initial interview, participants were quite good at recalling the information they had previously fabricated. In fact, the accounts participants provided when asked to explicitly recall their fabrications were highly descriptive (e.g., “I said that Ratface loosened the leg of Delaney’s chair while his back was turned”), and tended to be slightly more detailed than what was reported when recalling the eyewitness events in Experiments 1 and 3 (e.g., “Ratface did something to his chair”). In addition, the self-generated nature of the responses likely increased the perceived plausibility of those fabrications, as they were likely constrained by the participant’s own idiosyncratic knowledge base.

*What is the Nature of the Explanatory Function that the Fabrication Serves?*

The results from the current series of investigations demonstrate that the relationship between witnessed and fictitious information influences false memory
development for forcibly fabricated entire events. Specifically, false memories are more likely to occur in situations where participants’ fabrications help explain events that were actually witnessed. However, this finding raises interesting questions about the precise nature of the mechanism underlying these effects. In other words, what are the specific properties associated with an event that increases its explanatory power?

Overall, the role that participants’ fabrications played is likely more nuanced than simply “providing an explanation”. Indeed, previous research has highlighted the complexity that underlies the existence of causal relationships between events (e.g., van den Broek, 1990). In order to understand the nature of causal explanatory role of participants’ fabrications, it is important to note that the fabrications were not essential for participants to form a coherent representation of the witnessed events. In the Explanatory conditions of Experiments 1 and 2, the events depicted in the movie (e.g., sneaking out) provided a minimally sufficient causal explanation of the outcome (getting in trouble) to the extent that “sneaking out at night” meets the all-or-none conditions of temporal priority (it occurred before the outcome) and operativity (it was active at the time of the outcome). However, the strength of that relationship, which can be measured as a matter of degree, is relatively weak. Sneaking out does not mandate that Delaney and Moe get in such big trouble (sufficiency), nor does the fact that they got in trouble have to result from them taking the canoes (necessity). Participants’ fabrications became incorporated into their representation of the witnessed events because they provided a stronger explanation for the witnessed outcomes than the events that were witnessed in the video. That is to say, participants fabrications (e.g., going to the girls’ camp) resulted
in a higher degree of necessity and sufficiency than the explanatory events witnessed in the video.

If this is the case, what factors resulted in participants’ fabrication offering a more necessary and sufficient causal explanation of the outcomes that were witnessed? One crucial factor appears to be the relationship between the magnitude of the viewed outcome and the magnitude of the fabricated cause. The increased similarity in magnitude between the fabricated cause (e.g., “Delaney and Moe went to the girls’ camp”) and the viewed outcome (e.g., Delaney getting in trouble) resulted in the formation of a strong causal relationship between the two and thus increased participants’ willingness to accept their fabrication as part of the initially viewed events.

However, the results from Experiment 3 demonstrate that similarity in magnitude is not the only factor influencing the explanatory strength of participants’ fabrications. In that experiment, participants were provided with additional explanations (Ménière's disease, a problem with pornography at the camp) that could also explain the same witnessed outcomes as participants’ fabrications. Importantly, the explanations provided by the narratives were also comparable in magnitude to the observed outcome. For example, Delaney getting in serious trouble with the camp director seems like a justifiable outcome for being caught with pornography. In situations where two causes of comparable magnitude are present, the necessity of any one cause is likely to be reduced. In the context of the current experiment, the necessity of participants’ fabrications was reduced by the explanations provided by the narratives.
Unanswered Questions and Directions for Future Research

Research has shown that people are especially likely to seek out causal explanations for negative and unexpected outcomes (e.g., Weiner, 1985). However, it is not clear to what extent these factors influenced the findings reported in the current sets of studies. Across all three experiments, the outcomes that participants’ fabrications helped to explain remained constant. That is to say, they were always negative and surprising. It is unknown to what extent participants would develop false memories for their fabrications if the outcomes were positive, expected or some combination of the various characteristics. For example, would participants be as inclined to develop false memories for their forced fabrications (e.g., “Delaney and Moe went to the girls’ camp”) if they explained some unexpected, positive outcome (e.g., the Chief praising Delaney for his adventurous spirit)?

In the current studies, it seems likely that the negative and unexpected nature of the viewed outcomes had at least an indirect influence on participants’ willingness to accept their fabrications. Specifically, as a result of the nature of the outcome, participants may have been more inclined to focus on the cause offered by the video (e.g., the counselors sneaking out at night) and thus recognize the disparity in magnitude between the viewed cause and the viewed outcome. However, future research will be needed to determine how specific characteristics of observed outcomes relate to false memory development.

Indeed, a primary limitation of the current studies is the fact that only two false event items were used (exploit / prank). To that end, future research will be needed to
determine if these results generalize to situations involving different kinds of fabrications (that describe a physical cause as opposed to a person generated cause, e.g., Hilton, McClure, & Sutton, 2010) and different kinds of outcomes (e.g., self relevant, emotional, positive). It is worth noting, however, that false memory rates for the two forcibly fabricated events did not differ across experiments, despite the fact that the items were in some ways different from another. For example, the exploit false event question required participants to fabricate an event that was much more extended in time (e.g., going to the girls’ camp) than the fabrication required for the prank item (e.g., someone tripping Delaney). Along the same lines, participants had greater access to information that could help them generate the prank fabrication (e.g., they witnessed Delaney surrounded by a group of campers and counselors, he was standing by a chair) than the exploit fabrication – which essentially required them to generate an entire scene. Overall, the similarity in the results for these two items suggests that the explanatory role hypothesis may be able to predict false memory development over a range of explanatory situations – though future research will be required to validate this conclusion.

Additional research will also be needed to understand the time course of false memory development. After 6 weeks, participants demonstrated false memory development for entire fictitious events that they had been forced to fabricate – particularly in situations where their fabrications explained some outcome that was actually witnessed. An examination of the resistance data collected across all three experiments indicates that participants were quite certain at interview that the fictitious events that they were required to describe did not in fact take place in the video. This
transformation between participants’ performance at interview and test raises important questions about the time course of false memory development for these forcibly fabricated events.

A number of factors specifically associated with the delay likely contributed to false memory development. Specifically, the delay made it more likely that participants forgot the resistance and uncertainty that accompanied the fictitious responses they generated at the time of interview. This is supported by an analysis of the impact that resistance had on false memory development (see Tables E1, E2, and E3, Appendix E). Only in Experiment 3 were participants that resisted answering the false event questions inoculated to some extent against false memory development. In Experiments 1 and 2, participants that resisted answering the false event questions were just as likely to freely report and falsely assent to their fabrications as “non-resistors.” This forgetting of prior resistance is perhaps most telling in Experiment 2, where participants were also provided with a warning prior to test. Presumably, if participants still had access to their resistance, the warning should have allowed them use that information to successfully reject their fabrications. In general, such findings are not surprising, as research suggests that with time, source specifying information becomes less accessible than the content information it is associated with (e.g., Eagly & Chaiken, 1993). The forgetting of source specifying information, combined with representations of the fabricated events that were rich in perceptual and contextual details, likely facilitated the source monitoring errors demonstrated by participants.
However, the specific time course of false memory development for entire fabricated events remains unknown. In the current series of studies, the fact that the same delay was used in all three experiments precludes any discussion about the impact of retention interval. Although Chrobak and Zaragoza (2008) tested memory at different time points (1 week and 8 weeks), the effects of delay were confounded with test type (recognition vs. recall). As a result, future research studies will need to use multiple retention intervals to determine the nature of the relationship between delay and false memory development.

A final question raised by these results concerns whether or not explanatory relations have a special status with regard to false memory development relative to other kinds of causal relations. At its simplest, a causal sequence includes an antecedent, eventcause, and a consequence (Trabasso & van den Broek, 1985). In other words, these events are all in some way causally connected to one another. In the current set of experiments, participants’ fabrications were always the intermediate event – the causal agent. As a result, they always provided a causal explanation in relation to the witnessed events. However, future research could be used to explore the likelihood of false memory development for fabrications that comprise the other components of the causal chain – the antecedent or the consequence. According to the explanatory role hypothesis, people should be less likely to develop false memories for these events because, despite the fact that they are highly integrated into a causal chain, they lack explanatory power.

Several lines of research seem to support this contention. For example, when comprehending text, readers frequently make backward inferences about the cause of
given outcome, but only rarely make forward inferences about the outcome of a given cause (van den Broek, 1990). Hannigan and Reinitz (2001) found that participants were particularly susceptible to developing confidently held false memories for non-presented slides that depicted the cause of a known outcome. However, that same study showed that participants did not confidently endorse non-presented outcomes of viewed causes. In other words, when participants were presented with a causal slide at study (e.g., a woman picking an orange from the bottom of a pile) they were unlikely to falsely endorse the non-presented outcome (e.g., bananas on the floor) at test. This reluctance to make forward inferences can be explained by the fact that the novel outcome slides that were presented at test lacked explanatory power – they could not explain slides that had been previously witnessed.

Such issues could be explored using the same basic materials and design used in the current experiments. For example, participants could be shown the counselors sneaking out at night (antecedent) and going to the girls’ camp (event/cause) and then later be required to fabricate the specific punishment that they received (consequence). Ideally, materials would be constructed such that participants always fabricated the same event (e.g., the punishment they received), but the specific role that the fabrication served (e.g., the cause or the outcome) varied based on the nature of events witnessed in the video. According to the explanatory role hypothesis, participants should be less likely to develop false memories for fabricated outcomes because they do not serve to explain events that were witnessed.
Theoretical Implications

The current findings converge with a large body of empirical evidence showing that when perceiving, comprehending and remembering events, people seek to understand the underlying causes of the events they experience (Weiner, 1985). For example, numerous studies have shown that when reading a story, people seek to identify the causal and motivational forces that drive the interactions of characters and that link events (e.g., Zwaan, Langston, & Graesser, 1995). The present findings show that this “effort after meaning” (e.g., Auble & Franks, 1978; Bartlett, 1932) continues well after the witnessed event is initially perceived and encoded. New information encountered or generated in the context of subsequent forensic interviews, even if false, can serve as a source of potential explanations for events that had been witnessed earlier.

The present results also add to an already impressive body of literature that seeks to describe the origins of false memories and beliefs. Specifically, these results can be readily incorporated into the source monitoring framework (Johnson, Hashtroudi, & Lindsay, 1993). According to this framework, memory is an attribution process. When people recall pieces of information, they are forced to make an attribution as to the source of that information. The tendency for people to seek out causal explanations for the events they have experienced further increases the difficulty of this source monitoring task. That is, events that have been experienced do not happen in isolation, but rather occur as part of a series of related events. To that end, people are especially likely to accept non-viewed explanatory events as having actually occurred. In the context of the current experiments, participants were faced with the task of determining whether or not
the events they described in the Phase II interview actually took place at the time of the video. Ultimately, participants were more likely to confuse their fabricated answers from interview as witnessed events when they provide a causal explanation for events that were witnessed.

In addition, the present findings fit with a broader literature documenting that people’s goals and desires can contribute to source monitoring errors. For example, studies of the “wishful thinking” bias (Gordon, Franklin & Beck, 2005) have shown that people are prone to misattributing desired predictions (e.g., an improved economy) to sources that are more reliable (e.g., the *New York Times*) than the actual source of the wished for outcome (e.g., *The National Enquirer*). As another example, our motivation to believe that we have made the right choice (e.g., the decision to buy a Hyundai rather than a Volkswagen) can lead to choice-supportive misattributions, such that we falsely attribute more positive features to the chosen option than its competitor, and vice versa (e.g., Henkel & Mather, 2007). The present results are related, insofar as people’s motivation to fully understand the causes of the events they have experienced predisposed them to confuse a fabricated event for a real one.

*Forensic Implications*

The findings of the current investigation are of particular relevance to real-world forensic situations. In most cases, the purpose of eyewitness testimony is to provide an explanation for an outcome (e.g., an accident, robbery, or murder) that does not have a well-determined cause. In such situations, the stakes associated with “solving” a crime
can be very high, as a conviction of the offender eliminates the likelihood of additional crimes being committed. As a result, forensic interviewers may push witnesses beyond their actual memories, encouraging them or even coercing them to describe events they do not remember or never witnessed. The results reported here suggest that, because of the explanatory function eyewitness testimony serves, witnesses may be especially predisposed to developing false memories for events that were at one time mere speculation or even forced fabrications.

Indeed, the results reported here may underestimate the extent to which eyewitness are prone to false memory development in real forensic situations. Research has shown that people are especially likely to seek causal explanations for negative, unexpected and consequential outcomes (e.g., Weiner 1985) – characteristics typical of forensically relevant outcomes. In addition, it is reasonable to suspect that in many cases, eyewitnesses have poorer memory representations for the witnessed events than in the current study. In the current experiments, the videotaped event was encoded under near perfect viewing conditions – a situation unlikely to occur during a witnessed crime. As a result, eyewitnesses are likely to be less certain about their memories for the witnessed events than participants in the current studies. This is confounded by the fact that the interviewers in forensic situations command greater perceived and actual authority than the undergraduate research assistants that interviewed participants in the current studies. These factors may ultimately result in eyewitness being less resistant to guessing or speculating about poorly remembered events – thus further increasing the likelihood of false memory development (e.g., Zaragoza et al., 2001).
There are additional factors associated with forensic interviews that have been shown to result in distortions and inaccuracies in memory. One such factor is the presentation of a confirmatory feedback (e.g., “That’s right”) after an eyewitness provides a piece of inaccurate information. Confirmatory feedback has been shown to increase both the rate of false memory development and the confidence in which those memories are held (Zaragoza et al., 2001). Along the same lines, research has also shown that the presence of feedback makes participants more likely to fabricate the same information when interviewed a second time (Hanba & Zaragoza, 2007). However, in these studies participants were only forced to fabricate specific details. It is possible that the effects of confirmatory feedback would be amplified for explanatory false events. That is to say, confirmatory feedback may augment the natural tendency to seek out causal explanations for experienced events. Given the fact that eyewitness are frequently interviewed on numerous occasions about the events they have witnessed, this further increases the likelihood that they will repeatedly be exposed to the same inaccurate information (see Mitchell & Zaragoza, 1996; Zaragoza & Mitchell, 1996, for evidence that repeated exposure to misinformation increases false memory development).

The results obtained in Experiment 3 are of particular relevance to another aspect of the criminal justice system: the type of arguments made by defense lawyers. Ultimately, one goal of defense lawyers is to cast doubt on the accuracy of testimony provided by eyewitnesses – the nature of which is often to provide a causal explanation for some outcome. How then is a lawyer to introduce doubt into both the mind of the eyewitness and of the jury? One possibility is to offer additional explanations that could
reasonably explain the same outcomes as an eyewitness’s testimony. The results from Experiment 3 suggest that introducing such explanations may reduce the extent to which eyewitnesses accept their account as the sole explanation for a witnessed outcome.

The presentation of alternative explanations in Experiment 3 affected participants in several ways. A number of participants adopted this information (e.g., Delaney had Ménière's disease) as the sole explanation as to the outcomes they witnessed (e.g., Delaney falling). Clearly, an eyewitness abandoning their previous statements in favor of a new explanation would have a powerful impact on a jury. However, as mentioned previously, a few participants demonstrated a slightly different pattern that is perhaps more representative of what would occur in real forensic situations. These participants entertained both their fabrication and the relevant narrative information as explanations for the witnessed outcome. In forensic situations, an eyewitness that openly entertained multiple possible explanations would likely appear less credible to jurors. Given the impact of eyewitness confidence on jurors (Leippe, Manion, & Romanczyk, 1992; Lindsay, Wells, & O’Connor, 1989; Whitley & Greenberg, 1986), the introduction of even a small amount of doubt on the part of an eyewitness may have a profound impact on the overall outcome of a criminal trial. Indeed, the impact of such alternatives would likely be more powerful in forensic situations where the connection between an alternative explanation and an outcome would be explicitly made for eyewitnesses by the defense lawyer. This is in sharp contrast to the alternative explanations encountered by participants in Experiment 3, which were subtly embedded in the context of other character-relevant information.
Another extension of these findings concerns the debate over recovered memories of childhood sexual abuse. In the 1980s, numerous court cases emerged in which adult plaintiffs alleged prior sexual and physical misconduct had occurred when they were children. The critical factor in these cases was that the memories had been “repressed” for numerous years and had recently been “recovered.” In general, the cognitive reality of “repression” and “memory recovery” is still the subject of empirical debate (see Conway, 1997; Pezdek & Banks, 1996, for reviews). With regard to the current discussion, however, two issues are of critical importance. The first is that while cases of the “recovered” memories of abuse have been verified (see Schooler, Bendiksen, & Ambadar, 1997), several documented cases have been proven false (see Loftus & Polage, 1999; Nelson & Simpson, 1994). In other words, in the absence of some ulterior motive, it appears that some people developed genuine false memories of childhood abuse. This leads to the second issue: How might such false memories develop? A crucial factor in the majority of false recovered memory cases is that the recovered memories developed in the context of therapy. Specifically, in these cases, therapists suggested to patients that some type of prior trauma could explain their current problems, and that they should focus on trying to remember that trauma (Loftus, 1993). Of course, it is not the case that simply suggesting prior sexual abuse guarantees the development of false memories. Rather, there are a host of cognitive factors associated with memory recovery therapy that increases the likelihood of false memory development in those cases where no such memories exist.
In a seminal paper on the topic, Lindsay and Read (1994) highlighted a number of these factors (e.g., repetition across therapy sessions, the perceived plausibility of the childhood event, mentally rehearsing the event, hypnosis). However, one factor that was conspicuously absent from that review was the explanatory function that these suggested repressed memories served. In general, a patient in therapy has an inherent desire to find causal explanations for some current, negative life situation (e.g., they are depressed, not able to maintain close relationships). Loftus and Ketcham (1994) describe numerous cases of recovered memories in women that initially sought out counseling in order to alleviate the symptoms of depression, anxiety and suicidal ideation. Consider the account of one such woman:

“In the beginning of my therapy, I brought with me some very real hurts and disappointments. I had lost one of the most important relationships of my entire life. My life seemed out of control. I had external problems that caused me great distress, but my therapist didn’t seem too concerned with those. The pain had to be deeper, had to be buried, “repressed.” For me to have a ‘death wish’ of the magnitude I had and to be so self-destructive, I had to have repressed something so horrible and so traumatic that only a lengthy therapy and hard work were going to get me there (p. 23).”
After counseling had been initiated, this same woman began group therapy with other women with similar backgrounds. Her description of the nature of those group therapy sessions illustrates the commonality underlying these cases:

“The main denominator in the group was loneliness. We were all lonely, and confused, and afraid, and we were all desperately searching for memories. I figured this search for long-lost memories must be real if all these women were looking for the same thing (p. 23).”

Essentially, these women were seeking explanations for some current negative life situation. The goal of therapy was to uncover those explanations. The results from Experiments 1 and 2 suggest that to the extent that a “memory” of childhood sexual abuse provides that explanation, people may be particularly predisposed to developing false memories for those events in cases where no such abuse actually occurred.

In addition, several factors may further increase the likelihood of false memories for such explanatory childhood events. Of primary importance is the fact that the recovered memories are for events that would have occurred in the distant past. This is in sharp contrast to the conditions in the current set of studies – where false memory development occurred for events that were relatively recent. Several studies have demonstrated that the likelihood of false memory development increases with the delay between the alleged event and the subsequent effort to recall that event (e.g., Belli, Windschitl, McCarthy & Winfrey, 1992). Not surprisingly then, numerous studies have
shown false memory development for childhood events that have been suggested to participants (e.g., Hyman & Pentland, 1996; Loftus & Pickerell, 1995). Importantly, these studies demonstrated false memory development for relatively inconsequential events (e.g., spilling a punchbowl at a wedding; getting lost in a shopping mall). Given the circumstances surrounding a patient’s entry into therapy, it is likely that they will be motivated to a greater extent to engage in the type of cognitive operations (e.g., elaborative rehearsal) that support false memory development. Further complicating matters is the fact the recovered explanatory memories are endorsed by a highly credible source – the therapist. Overall, factors that led to memory distortion, such as mental imagery and repetition, may be further augmented by the causal importance of recovering such memories.

Future research is needed to further understand the impact of causality on false recovered memories for the distant past. Although ethical considerations limit the possibility of implanting false memories of childhood sexual abuse in the lab, such issues could be explored by examining false memory development for autobiographical events. The methodology developed by Hyman and Pentland (1995) may provide a useful avenue for exploring such issues. It is worth mentioning that the goal of such research is not to discredit the possibility of such recovered memories – as genuine cases have been reported. Rather, the purpose of such research should be to further inform clinicians and patients about factors that may delay or even prevent successful treatment. Patients that accept false explanations for their psychological difficulties are likely to suffer in several ways. Indeed, falsely accusing a family member of prior sexual misconduct will likely
result in devastating social and personal consequences. Further compounding the problem is the fact that the true explanation for the patient’s dysfunction will likely go undiscovered.

Conclusion

Although substantial progress has been made in understanding the mechanisms underlying eyewitness suggestibility errors, much of this research has focused on identifying the characteristics of a mental experience that lead people to confuse a fabricated or suggested memory for a “real” memory. For example, it is well established that memories of fabricated/suggested events that are highly familiar, clear, vivid, and rich in sensory and emotional detail are particularly likely to become false memories (Johnson, 2006). The research reported here adds to this body of research by showing that the relationship between the fabricated/suggested event and other information in memory also plays an important role in false memory development. In particular, the present studies are the first to show that the causal explanatory relationship between fabricated events and observed events is a powerful predictor of false memory development.
REFERENCES


FOOTNOTES

1For purposes of brevity, the current discussion will focus on only one of the false-event items from Chrobak and Zaragoza (2008). However, as discussed later, the same general relationship between fabricated and witnessed events was also present for the other false-event item.

2Seven data points were removed from analyses for Experiment 2 because of experimenter error during the Phase 2 interview - for reasons similar to those reported in Experiment 1.

3Two data points were removed from Experiment 3 because of experimenter error.
APPENDIX A

Questions from Forced Fabrication Interviews

True Event Questions: Experiments: 1, 2, 3

The opening scene of the movie takes place outside. The woman who founded the camp talks a little about its history. A boy nicknamed ‘rat face’ causes some trouble. What did he do?

In the next scene, one of the counselors is giving a lesson about poisonous snakes and is bitten by the snake. What happens in the rest of the scene?

Later, all of the ladies and boys walk down to the water to take a tour on the canoes. While on the boats, what happened that caused a huge commotion?

The next scene takes place on the dock. Delaney is forced to run down and pull his little brother Sullivan out of the water, and the two have a talk. What happened that caused Sullivan to end up in the water?

In the final scene, Sullivan interrupts the owner of the camp, Mrs. Gibson, by the water, as she is swimming. What happens in this scene? (Experiments 1 & 2 only)

In the final scene, Delaney was sitting by the water and was very upset. What happened in this scene? (Experiment 3 only)

False Event Questions: Experiments 1, 2 (Explanatory Condition) and 3

The next scene takes place in the dining hall. Delaney is asked to stand up to give an announcement. A practical joke is pulled on him that caused him to fall and end up on the floor. What was it?

Towards the end of the movie, Delaney and Moe use a canoe and sneak off at night. After sneaking out, where did they go and what did they do that caused them to get in big trouble?
False Event Questions: Experiment 1 and 2 (Non-Explanatory condition)

The next scene takes place in the dining hall. Delaney is asked to stand up to give an announcement. The cook deliberately gave him a broken chair to stand on. The chair broke and Delaney fell on the floor. Then Delaney decided to get back at the cook. What practical joke did Delaney pull on the cook later, causing the cook to fall and end up on the floor?

Towards the end of the movie, Delaney and Moe use a canoe and sneak off at night. After sneaking out, where did they go and what did they do that caused them to get in big trouble?
APPENDIX B

Experiment 2 Recognition Test Filler Items

Old-True
1. In the opening scene of the movie, a woman is giving a speech to a group of campers and counselors. When you watched the video, did you see a boy named ‘rat face’ cause a commotion during this scene when he ______?

2. The next scene involves a counselor getting bitten by a poisonous snake. When you watched the video, did you see ______?

3. After the incident in the dining hall, everyone goes down to the lake for a boat tour. When you watched the video, did you see ______?

4. In the next scene, Sullivan and some other boys were by the water fighting on the dock. When you watched the video, did you see ______?

New-True
1. When you watched the video, did you see a group of older ladies arrive at the camp for a visit?

2. When you watched the video did you see Sullivan get upset because he didn’t have any friends and run off when he was talking to Delaney by the water?

3. Towards the end of the movie Delaney and the other counselors are in their cabin. When you watched the video, did you see one of the counselors look at the Nurse’s laundry with a pair of binoculars?

New-False
1. When you watched the video, did you see a man on the shore patching a hole in the roof of one of the cabins?

2. When you watched the video, did you see Sullivan get pneumonia from being in the water and receive treatment at the Nurse’s station.
APPENDIX C

Experiment 3 Narratives

Delaney Narrative – PRANK ALTERNATIVE

Delaney and his brother Sullivan come from a poor family and live in a large city. Their father died in combat during World War I. As a result of financial hardship, Delaney has frequently been forced to take on several jobs to support his mother and younger brother Sullivan. In the past, Delaney has worked as a waiter, a newspaper delivery boy, and a tutor.

Making matters worse, Delaney suffers from a rare inner ear disorder known as Ménière's disease. Resulting from an imbalance of fluid in the inner ear, Delaney experiences unexpected periods of vertigo or dizziness, where he has difficulty maintaining his balance. In the past, occurrences have frequently caused Delaney a significant amount of social embarrassment. The condition was so bad, that Delaney had to lie about it in order to receive his job at the camp. As a result, Delaney is very concerned about the possibility of an unexpected occurrence while working at the camp.

Despite all of these obstacles, Delaney has always been a naturally talented student. He has been able to excel in school without having to do much studying. His favorite subjects are math and science, and he frequently expresses interest in going into the medical field. Delaney is at the end of his senior year in high school and was able to get a scholarship to attend college for free.

For all of his strengths, Delaney frequently managed to get in a fair amount of trouble at home. In part, it seems to stem from the fact that Delaney is somewhat bored with school. In fact, money was not the only reason Delaney took the job as a counselor at the camp. His relationship with his mother has deteriorated in recent months, in part due to Delaney’s trouble making. Delaney’s mother recently discovered numerous pornographic magazines in his room and was quite alarmed by their presence. First of all, it was highly illegal in this state at the time and she feared that if anyone found out about it, Delaney would get in serious trouble. She was also embarrassed by her son’s behavior and worried that Sullivan might be exposed to the dirty magazines. As a result, she encouraged Delaney to work at the camp Sullivan is attending, as she believes it will help Delaney mature. In fact, because of his new found sense of responsibility at the camp, Delaney has thrown out all of his magazines and has not been tempted since.
Delaney Narrative – EXPLOIT ALTERNATIVE

Delaney and his brother Sullivan come from a poor family and live in a large city. Their father died in combat during World War I. As a result of financial hardship, Delaney has frequently been forced to take on several jobs to support his mother and younger brother Sullivan. In the past, Delaney has worked as a waiter, a newspaper delivery boy, and a tutor.

Making matters worse, Delaney suffers from a rare skin disorder known as Phemphigus. Resulting from an autoimmune deficiency, Delaney occasionally experiences unexpected blisters over his face, neck and back. In the past, occurrences have frequently caused Delaney a significant amount of social embarrassment. The condition was so bad, that Delaney had to lie about it in order to receive his job at the camp. As a result, Delaney is very concerned about the possibility of an unexpected occurrence while working at the camp.

Despite all of these obstacles, Delaney has always been a naturally talented student. He has been able to excel in school without having to do much studying. His favorite subjects are math and science, and he frequently expresses interest in going into the medical field. Delaney is at the end of his senior year in high school and was able to get a scholarship to attend college for free.

For all of his strengths, Delaney frequently managed to get in a fair amount of trouble at the camp. In part, it seems to stem from the fact that Delaney is somewhat bored with his job as a counselor. Delaney’s relationship with the camp director has deteriorated in recent weeks. The Chief recently discovered numerous pornographic magazines in Delaney’s cabin and was quite alarmed by their presence. Amongst other reasons, the Chief was concerned about its impact on the camp. It was highly illegal in this state at the time and the Chief feared that if the ladies who donated to the camp found out about it, it would endanger the funding for the camp. He also worried that the younger campers might be corrupted by Delaney’s dirty magazines. As a result, he warned Delaney about what would happen if the magazines were found again. Despite the warning, Delaney refused to get rid of the magazines, and keeps them hidden beneath his mattress.
The Chief Narrative

The Chief has been running the camp for over a decade. During that time, he has been quite successful in helping to raise money for the camp. In fact, his fundraising activities are the primary reason why the camp has been able to provide free room and board for financially disadvantaged children – such as Sullivan.

In addition to running the camp during the summers, the Chief volunteers year round at a nearby children’s hospital. He gets the most enjoyment out of providing laughter to the children. He will frequently dress in a clown costume and entertain them for hours at a time. He is also one of the most well liked and respected people at the hospital.

The Chief’s interest in helping children was sparked by his late wife, who was an elementary school teacher in a poor urban area. She dedicated her life to helping those who were less fortunate than herself. Unfortunately, she died prematurely as the result of a brain tumor. In an attempt to carry out her wife’s work, he dedicated the rest of his life to helping children. His wife was also an activist for women’s rights and he has since adopted that cause as well. He demands that women be respected for their intellect and is an outspoken critic of the exploitation and degradation of women. Since his wife’s untimely death more than a decade ago, the Chief has not remarried or made any attempts at dating. The experience of his wife’s death has also served to strengthen his faith and his religious convictions.

In his spare time, the Chief has several hobbies. He is a tremendous baseball fan. He spends many evenings listening to baseball games on the radio and tries to attend as many games as his schedule will allow. He is also a collector of baseball memorabilia, with the top item in his collection being an autographed glove that had been signed by Babe Ruth. In addition to baseball, he also had an affinity for all things “outdoors.” He is an avid fisherman and loves bird watching, and the campgrounds provide him with an excellent location for partaking in these activities. He will often get up in the early morning before the camp activities start and go fishing down by the water.
The lack of money in the family also had a great effect on Sullivan. Because money was so tight, he frequently had to go stay with his Aunt, who was better off than Delaney and Sullivan’s mother. Unfortunately, this had a profound effect on his social skills. In particular, he was quite shy and found it to be extremely difficult to make friends. Most of his time was spent alone or trying to tag along with Delaney.

When he was younger, Sullivan had an imaginary friend named “Sebastian” who lived in his closet. Delaney repeatedly teased his brother about “Sebastian.” As a result, Sullivan eventually stopped talking to him.

School did not come as easily to Sullivan as it did to Delaney. Although still young, Sullivan had a difficult time focusing during school. His instructors often complained to his mother that he spent most of his time in class daydreaming. Although Sullivan looked up to Delaney and admired his abilities in school, he also felt like he was growing up in Delaney’s shadow. Delaney had a reputation as an excellent student, something that was frequently pointed out to him by his teachers. In many ways, Sullivan felt that he would never be as good as his brother.

Although Sullivan did not appear interested in school, he was incredibly talented at playing the flute. Despite not having money for lessons, Sullivan learned to play the flute from his mother and dedicated most of his free time to practicing. The flute often became an impediment to Sullivan’s schooling, as he would often skip studying to practice on the flute. It was Sullivan’s mother that pushed him to attend the summer camp where Delaney was a counselor, as she thought this would be the best way for him to interact with children his own age and learn how to make friends. She even forbade him from bringing his flute to the summer camp, as she was afraid it would prevent him from reaching out to the other children.
APPENDIX D

Cued-Recall Prompts, Experiment 3

1. In the opening scene, the campers and staff are gathered outside. Tell me anything you remember about that part of the movie.

2. In the next scene, a one of Delaney’s counselor friends is making a demonstration about snakes. Tell me anything you remember about that part of the movie.

3. The next scene takes place in the dining hall. Tell me anything you remember about that part of the movie.

4. In the next scene the old ladies, counselors, and campers walk down to the waterfront and go out on canoes. Tell me anything you remember about that part of the movie.

5. The next scene shows Sullivan and some of the other young campers fighting at the dock. Tell me anything you remember about that part of the movie.

6. The next scene shows the camp counselors in their cabin at the end of the day as night is setting in. Tell me anything you remember about that part of the movie?

7. In one of the later scenes, several of the parents of the campers come to visit the children. Tell me anything you remember about that part of the movie?

8. At one point, Delaney is hurriedly called into the Chiefs office. Tell me anything you remember about that part of the movie?

9. The final scene shows Delaney upset by the water. Tell me anything you remember about that part of the movie.
**APPENDIX E**

False Memory Development as a Function of Resistance

**Table E1. False Memory Development as a Function of Resistance, Experiment 1**

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<th>Resistance Type</th>
<th>Resistors</th>
<th>Non Resistors</th>
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**Table E2. False Memory Development as a Function of Resistance, Experiment 2**

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<td>Resistance Type</td>
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*p < .05, **p < .10