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Countless studies have demonstrated that exposure to post-event misinformation in the context of suggestive forensic interviews can lead eyewitnesses to develop confidently held false memories for the events that were merely suggested to them. The focus of my dissertation was to investigate one factor that may exacerbate eyewitness suggestibility – the use of complex questions. Recently, Chrobak and colleagues (2015; 2021) demonstrated that the use of complex, multifaceted questions, led to a disproportionate increase in eyewitness suggestibility errors among participants who had earlier been exposed to misleading suggestions. Experiment 1 sought to replicate and extend these findings, with the goal of assessing more definitively whether multifaceted questions (having to consider two propositions simultaneously) increases eyewitness suggestibility. Results showed that multifaceted questions decreased accuracy and increased suggestibility regardless of the order of the true and false proposition – suggesting that having to evaluate two propositions does increase eyewitness suggestibility. Experiment 2 assessed whether it might be possible to mitigate the deleterious effect of multifaceted questions on eyewitness suggestibility with a coaching manipulation that employs pre-test warnings, practice and feedback. My results revealed that coaching was effective when the false proposition is new information at the time of test; whereas if the false information was familiar at the time of test, coaching was ineffective. Taken together, my results demonstrate the powerful effect of multifaceted questions on eyewitness accuracy and suggestibility.

THE EFFECTS OF MULTIFACETED QUESTIONS ON EYEWITNESS ACCURACY AND SUGGESTIBILITY

A dissertation submitted to Kent State University in partial fulfillment of the requirements for the

degree of Doctor of Philosophy

by

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CHAPTER I INTRODUCTION

In forensic situations, eyewitnesses are asked to provide testimony about those events they witnessed. Short of DNA evidence, eyewitness testimony is one of the most important factors influencing juries (Berman et al., 1995; Brewer & Burke, 2002; Liberman et al., 2008, Lindsay et al., 1981; Maeder et al., 2017; Pozzulo et al., 2009; Skolnick & Shaw, 2001). An eyewitness's job may seem relatively simple – to accurately describe the events they have witnessed first-hand. However, decades of empirical research have documented that eyewitness memory is in fact prone to error and distortion (Brigham et al., 2007; Christianson & Loftus, 1991; Cutler et al., 1987; Deffenbacher et al., 2004; Drivdahl et al., 2009; Steblay, 1992; Wells, 1993; Wells & Olson, 2003; Wixted et al., 2018; Wulff & Hyman, 2022). One reason for these errors is that eyewitness events don't occur in isolation. Rather they are followed by related experiences, such as interviews with police, newspaper accounts of the incident, and conversations with others, all of which have the potential to contaminate their memories with new and even false information that they did not witness (Blank, 1998; Braun et al., 2021; Chan et al., 2009; Chrobak & Zaragoza, 2008, 2013; Chrobak et al., 2017; Eisen et al., 2017; Gabbert & Hope, 2018; Gabbert et al., 2003; Garry et al., 2008; Kassin et al., 2010; Luke et al., 2017; Zaragoza et al., 2017;).

Laboratory Studies of Eyewitness Suggestibility

A large body of empirical research examining the effects of suggestive interviews on eyewitness memory has demonstrated that eyewitness memory is far more malleable than once thought. Countless studies have demonstrated that exposure to post-event misinformation in the context of suggestive forensic interviews can lead eyewitnesses to develop confidently held false memories for the events that were merely suggested to them (Ackil & Zaragoza, 1998; Belli et al., 1994; Crozier & Strange, 2018; Eakin et al., 2003; Lindsay, 1990; Loftus, 1975; Loftus & Pickrell, 1995; Memon et al., 2003; McCloskey & Zaragoza, 1985; Pezdek et al., 2007; Putnam et al., 2017; Schreiber & Sergent, 1998; Zaragoza et al., 2001; for reviews, see Loftus, 2005; Zaragoza et al., 2006). Importantly, participants endorse these false memories even when they are warned before taking the test that they had earlier been exposed to false and misleading details that were not in the events they witnessed (Blank & Launay, 2014; Bulevich et al., 2022; Chambers & Zaragoza, 2001; Chan et al., 2021; Eakin et al., 2003; Higham et al., 2017; Wright 1993).

The focus of my dissertation was to investigate one factor that may exacerbate eyewitness suggestibility – the use of complex questions. Lawyers often use complex questions – negatives, double negatives, multifaceted questions, and questions with complex syntax – to trip up witnesses in an effort to discredit them (Ellison, 2001; Kapardis, 2010; Kebbel et al., 2003, 2004; Laver, n.d.). Chrobak and colleagues (2015; 2021) have demonstrated that when participant witnesses had earlier been exposed to misleading suggestions, the use of complex, multifaceted questions, led to a disproportionate increase in eyewitness suggestibility errors. Although relative to simple questions, multifaceted questions increase false assents for all participants, for misled participants, multifaceted questions more than doubled rate at which they falsely claimed to remember witnessing fictitious events that had only been suggested to them.

However, because the multifaceted questions employed by Chrobak and colleagues differed from the simple questions on more than one dimension, it is not clear to what extent the increase in errors was due to the multifaceted nature of the questions, per se. Hence, questions remain regarding the locus of this effect.

Building on these earlier findings (i.e., Chrobak et al. 2015, 2021), in my dissertation studies, I sought to replicate and extend these findings, with the goal of assessing more definitively whether multifaceted questions (having to consider two propositions simultaneously) increase eyewitness suggestibility. The second major goal of my dissertation was to investigate whether it might be possible to mitigate the deleterious effect of multifaceted questions on eyewitness suggestibility with a coaching manipulation that employs pre-test warnings, practice and feedback. In the next section, I provide a brief review of the empirical literature on eyewitness suggestibility and the mechanisms that contribute to these errors.

Mechanisms of Eyewitness Suggestibility

Most laboratory studies of eyewitness suggestibility have employed a variant of a threephase experimental paradigm initially developed by Loftus and colleagues (1978). In the first phase, participants first view an event (a videotaped event, or less commonly, a staged event) that is the target "eyewitness event." For example, participants might view a clip depicting a traffic accident (Loftus et al., 1978), a drug deal (Okado & Stark, 2005), or a house theft (Takarangi et al., 2006; Mitchell & Zaragoza, 1996; Zaragoza & Mitchell, 1996). The second "post-event" phase is intended to mimic interviews, conversations, or news accounts that witnesses might experience following the witnessed event. Importantly, in studies of eyewitness suggestibility, participants in the misled condition are exposed to false, misleading suggestions during this post-event phase, whereas participants in the control condition receive no

misinformation. For example, misled participants who witnessed a house theft might be exposed to the false suggestion that a thief carried a gun, when in fact the thief they saw carried no weapon of any sort. Finally, in the third phase of the experiment, all participants' memory for the witnessed event is assessed. The goal of this final test is to determine whether the misled participant's eyewitness memory has been contaminated by the misleading suggestions. To this end, participants take a memory test of the witnessed event where they are asked whether they remember witnessing the suggested items (e.g., the thief carrying a gun). A consistent and welldocumented finding is that eyewitness memory is susceptible to these misleading suggestions. Many studies have documented that, relative to control participants, misled participant-witnesses are much more likely to claim they remember witnessing the fictitious events that were merely suggested to them (e.g., claim that they witnessed the thief carrying a gun) thus providing evidence of "eyewitness suggestibility". Importantly, even when participants are accurately warned prior to the final test that they were exposed to false misinformation, misled participants persist in claiming that they witnessed the suggested events (e.g., the thief carrying a gun), and often do so with high confidence. Collectively, the evidence suggests that exposure to misleading suggestions can lead participants to develop false memories of having witnessed these fictitious events.

Why is it that people are susceptible to developing false memories for items that were merely suggested to them? A leading theoretical account, provided by the Source Monitoring Framework (SMF; Johnson et al., 1993), is that eyewitness suggestibility errors are examples of source misattribution errors – a situation where witnesses confuse suggested events for events they saw. There is a large body of evidence that demonstrates people are prone to confusing the source of their memories. For example, people are prone to confusing imagination with reality

(Cadwell et al., 2016; Garry et al., 1996; Pezdek et al., 2006; Wade et al., 2002), misremembering who said what (Brown et al., 1995; Koriat et al., 1998; Wagner, 1984), and are prone to misremembering other people's ideas as their own (e.g., the phenomenon of unconscious plagiarism, Brown & Halliday, 1991; Marsh & Bower, 1993; Marsh et al., 1997).

According to the SMF, source information is not stored as an explicit tag in memory – rather, memory representations contain features, or characteristics, that reflect the circumstances under which they were acquired. So, for example, a memory of a perceived event (e.g., attending a baseball game) should have many vivid sensory characteristics (sights, smells, crowds, open air) as well as emotional characteristics (one's own emotions as well as the emotion of the crowd), whereas one's memory of reading about the same baseball game in the newspaper should have a somewhat different set of memory characteristics (the type font, picture in the paper, what one was having for breakfast while reading about it, etc.). Source attributions are made via unconscious judgements processes that evaluate these characteristics of the memory representation (e.g., sensory and perceptual characteristics, contextual information, cognitive operations, semantics) and attribute them to a particular source (Johnson et al., 1993; Lindsay, 2008). Thus, when making source attributions, one has to compare the characteristics of the retrieved memory with the characteristics that are typical of a given source. For instance, on average, our memories of experienced events have more vivid sensory characteristics than our memories of events we read about (or imagined). Source misattributions can occur when a memory representation has characteristics that are typical of another source. So, for example, imagination can be confused with reality when the memory representation of the imagined or thought about event has sensory characteristics that are especially vivid or complete (e.g., you keep reminding yourself to turn off the stove before you leave the house - and imagine yourself

doing so - and later misremember that you in fact turned off the stove, when you never actually did so).

In studies of eyewitness suggestibility, eyewitnesses have trouble discriminating between what they saw and the misinformation they were exposed to in the context of suggestive interviews because these sources of information are highly related – they are both about the witnessed event. Moreover, during post-event interviews, witnesses are likely retrieving, rehearsing, and re-evaluating their visual memories of the witnessed event, thereby increasing the overlap between the witnessed event and post-event interviews about the event even further. Consistent with the tenets of SMF, factors that render the misleading suggestion more similar to the eyewitness event, lead to a corresponding increase in suggestibility errors. For, example, repeating the misleading suggestion- can increase false memory of having witnessed the suggestion (Foster et al., 2012; Mitchell & Zaragoza, 1996; Warren & Lane, 1995; Zaragoza & Mitchell, 1996). In addition, studies have shown that imagining the suggested event (Ceci et al., 1994; Goff & Roediger, 1998; Hyman & Petland, 1996; Loftus & Pickrell, 1995; Thomas & Loftus, 2002; Seaman et al., 2006; Suengas & Johnson, 1988) and mentally elaborating on the likely emotional consequences of the suggested event also increases the likelihood of source misattributions (Drivdahl et al., 2009; Lane & Zaragoza, 2007; Zaragoza et al., 2011). Repetition, imagination, and mental elaboration imbue the representation of the misleading suggestion with memory characteristics typical of witnessed events, which, in turn, increase the likelihood that suggested event is misremembered as a witnessed event.

According to the SMF, another factor that contributes to source misattribution errors is the fact that memory for the content of our memories (what happened) is much more easily retrieved, and much better preserved, than memory for the context in which it was acquired (i.e.,

it's source, e.g., Johnson et al., 1993). Many studies have shown that whereas some aspects of our memories, such as their familiarity, can be retrieved with little effort and almost automatically, retrieval of the source-specifying characteristics of our memories is very effortful and requires the allocation of considerable cognitive resources (Johnson et al., 1994). Hence, situations where cognitive resources are limited can lead to rather selective impairment of source-specifying information, rendering a memory highly susceptible to source misattribution (cf. Jacoby et al., 1989).

Consistent with the above, there is evidence that susceptibility to eyewitness suggestibility errors is heavily influenced by the circumstances at the time of test. Even though people have difficulty distinguishing between related sources of information in memory, studies have shown that people are better able to distinguish between related sources of information when the circumstances at test require them to make source discriminations, rather than asking them to make simple yes/no recognition judgments (Johnson et al., 1993; Lindsay & Johnson, 1989; Zaragoza & Lane, 1994). For example, when participant witnesses are asked to identify which test items they saw and which test items were from the post-event interview (e.g., they are given a source memory test), they are less likely to misattribute the suggested item to the witness event. Presumably, a test that asks participants to identify the source of the original and postevent details leads participants to devote more time and effort retrieving source specifying information than simply asking (yes or no) if they witnessed the test item (Lindsay, 1990, 2008; Zaragoza & Muench, 1989; Zaragoza and Lane, 1994).

The clearest evidence that cognitive resources at retrieval influence suggestibility errors comes from a study by Zaragoza and Lane (1998), who experimentally manipulated the cognitive resources participants had available at the time of test by forcing participants to make a

speeded response (or not). Participants watched a series of slides, subsequently answered questions about the event that contained misleading suggestions, and after a short delay, completed a source test of their memory for the witnessed event. Importantly, during the source test, participants had either ample time (and cognitive resources) to make the source judgment (8 seconds) or minimal time (and fewer cognitive resources) to make the source judgment (3 seconds). Their results demonstrated that the cognitive resources available while making source attributions influenced suggestibility errors. Specifically, relative to the ample time condition (8) sec), when participants' available processing resources were taxed at retrieval (3 sec response window) the rate at which participants misattributed the suggested items to the witnessed event increased significantly. Other findings in the literature are consistent with the conclusion that source memory is impaired by limitations in cognitive resources. For example, Jashchinski and Wentura (2002) demonstrated that, relative to those with high working memory capacity, participants with lower working memory capacity are more likely to develop false memory for the suggestions. Put simply: the availability of cognitive resources while making source judgments is an important factor that influences accuracy.

Effects of complex questions on false memories for suggested events

Assessing witness memory in a laboratory setting may not mimic – in important ways – the circumstances witnesses face when testifying in a court of law. For instance, in laboratory studies of suggestibility, the final test is in a highly controlled and distraction free context that will maximize accurate memory performance. In contrast, in a court of law, the circumstances under which witnesses attempt to remember the events they witnessed are much more challenging.

One challenge witness sometimes face is efforts by attorneys to intentionally discredit them (Kapardis, 2010). One-way lawyers accomplish this is by using complex questions such as negatives, double negatives, and multifaceted questions – especially during cross examination (Kapardis, 2010). Research has demonstrated that these complex questions have a detrimental effect on the testimonial accuracy of adults and children (Brennan & Brennan, 1988; Imhoff & Baker-Ward, 1999; Katz & Hershkowitz, 2012; Kebbel & Johnson, 2000; Perry et al., 1995; Wade & Spearing, in press). However, the interaction between complex questions and susceptibility to post-event suggestions has received relatively little attention in the eyewitness suggestibility literature. As discussed in the next section, to date, only two studies have assessed the effects of complex questions on eyewitness suggestibility, and both studies focused on one type of complex question sometimes employed by attorneys, multi-faceted questions. I describe these studies in detail, because they serve as the basis for my dissertation studies.

Multifaceted Questions at Final Test and Eyewitness Suggestibility

Two studies have assessed the impact of multifaceted questions on eyewitness suggestibility (Chrobak, Rindal, & Zaragoza, 2015; Chrobak, Braun, Smith, & Zaragoza, 2021). Multifaceted questions are questions that have multiple propositions (some of which are true and some of which are false) but require a single "yes" or "no" response. These questions have been utilized to trip witnesses by getting them to assent to the question (i.e., respond "yes"), thereby assenting to the false information that is embedded in the question. Chrobak and colleagues (2015, 2021) hypothesized that participant-witnesses might be especially prone to assenting to prior post-event misleading suggestions when they are presented in the context of a multifaceted question that also contains true propositions. This is because the multifaceted question can be expected to tax cognitive resources, hence impeding their ability to retrieve information that would permit them to identify that the suggestion – although familiar - was "not witnessed".

The materials and procedures employed by Chrobak et al. 2015 and Chrobak et al. 2021 were very similar, with the exception of the nature of the post-event suggestive interview. The Chrobak et al. (2015) study employed a forced fabrication paradigm where participants are pressed to generate misleading information, and the Chrobak et al. (2021) study employed the traditional misinformation paradigm, where participants are exposed to the misleading information. In both studies, all participants first viewed a video clip from a movie about two brothers at a summer camp and subsequently completed a suggestive post-event interview about what they witnessed. During the post event interview, participants in the misled condition were exposed to fictitious events that were not present in the video. As one example, participants who had witnessed two camp counselors sneak out at night on canoes, were exposed to the misleading suggestion that the counselors had snuck out on canoes to go the girls camp. This is a blatantly false suggestion, because the video never depicted where the camp counselors went or what they did after they snuck out on canoes, nor did the film clip ever depict them at a girls camp. Control participants were not exposed to the misleading details during the suggestive interview. At the final test, both control and misled participants were interviewed face-to-face about their memory for what they witnessed, and all participants were asked whether they remembered witnessing the suggested items at the final test. For misled participants, the suggestion was familiar because they were exposed to it during the second phase of the experiment; however, the suggestion was novel to control participants at the final test. To assess whether false assents to misleading suggestions would increase if the suggestions were embedded in a multifaceted questions. Chrobak and colleagues (2015;2021) utilized two question types: simple false and multifaceted true + false (see Table 1). In the simple condition, participants were asked about the suggestion in isolation. In the multifaceted true + false condition, participants were asked about the true event (sneaking off on canoes) and the fabricated event (going to the girls camp) in the same question (see Table 1).

Table 1.				
Simple False	When you watched the video did you see the <i>camp counselors go to the girls camp</i> ?			
Multifaceted True + False	When you watched the video did you see the camp counselors <u>sneak out</u> <u>on canoes</u> and <i>go to the girls camp</i> ?			
Multifaceted False + True (Experiment 2, Chrobak et al. 2015)	When you watched the video did you see the camp counselors <i>go to the girls camp</i> and <u>sneak out on canoes?</u>			

Table 1. Question type manipulation utilized in Chrobak et al., 2015; 2021. Italicized font represents the participants fabrication. Underlined font represents the true information.

The results of both studies demonstrated that, relative to simple false questions, multifaceted true

+ false questions led to an increase in false assents to the misleading suggestions and did so for both

control and misled participants. However, the increase in false assents following multi-faceted questions

was significantly greater for misled participants (for whom the suggestion was familiar) relative to

controls (for whom the suggestion was new; see Figure 1 for the results from Chrobak et al., 2021).





Figure 1. Results from Chrobak et al., 2021. Proportion of false assents to misinformation as a function of post-event information and question type. Error bars represent 95% confidence intervals

Can one conclude from the above findings that multifaceted questions increase suggestibility?

Inspection of Table 1 reveals that other factors may have contributed to the increase in false assents in the

multifaceted T+F group. As the table shows, the simple F and multifaceted T+F condition differ on a second dimension that is unrelated to whether or not the question was multifaceted: For participants in the multifaceted condition the true proposition was the focus of the question, whereas in the simple condition the false information was the focus of the question. This is because, for participants in the multifaceted T+F condition, the true proposition (i.e., sneak out on canoes) came immediately after the words "Did you see...?"., whereas for participants in the simple F condition the *false/misleading proposition* (i.e., go to the girls camp) came immediately after the words, "Did you see...?" (See Table 1). Hence, it is possible that the increase in false assents in the T+F condition was due to participants focusing on the true (rather than false) proposition, perhaps leading them to overlook or ignore the false proposition that followed. In contrast, in the simple F condition, the false proposition was the focus of the question, likely making it easier for participants to accurately reject the misleading event as not seen. Hence, it is possible that it was this change in the focus of the question (from a focus on a false proposition in the simple condition to a focus on a true proposition in the multifaceted condition) that led to the increase in false assents in the multifaceted condition, rather than the multifaceted nature of the question, per se. Therefore, assessing whether it is the multifaceted nature of the questions that led to the increase in suggestibility requires eliminating this confound. This can be accomplished by comparing simple and multi-faceted questions that have the same false proposition as the focus of the question and hence differ on the multifaceted dimension only.

Chrobak et al. (2015, Experiment 2) did just that, and conducted a second experiment where they tested a single group of misled participants with multifaceted F+T questions (e.g., "Did you see the counselors go to the girls camp (false proposition) after sneaking out on canoes?" (true proposition) – see bottom of Table 1). A comparison of the multifaceted F+T condition with the simple F condition (see Table 1) shows that the two conditions are identical (i.e., both have the false proposition as the focus of the question) with the exception that F+T is multi-faceted because it has two propositions. In their study, Chrobak et al (2015) compared the performance of participants in an F+T condition in Experiment 2 to the performance of participants in the Simple False condition in Experiment 1 (Chrobak et al. 2015 did

not test control participants with multifaceted F+T questions, only misled participants). The results provide tentative evidence that multifaceted questions increase suggestibility. In Chrobak et al. (2015), false assents in the multifaceted F+T condition of Experiment 2, exceeded false assents to the suggestion in the simple F condition of Experiment 1. Although this finding is consistent with the conclusion that having to evaluate multiple propositions increases suggestibility, these findings need to be interpreted with caution. The difference between the simple F and multifaceted F+T condition, although reliable, was modest. More importantly, the authors did not run the multifaceted F+T and simple (F only) conditions in the same experiment, and so their conclusions were based on a cross experiment comparison. Finally, Chrobak et al. (2015) found that false assents to the multifaceted F+T condition of E2, were significantly lower that false assents to the multifaceted T+F condition from E1, thus suggesting that having the true – rather than false- proposition as the focus of the question increases false assents to the suggestion.

Summary

In summary, prior studies that have employed multifaceted questions in studies of eyewitness suggestibility have established several clear findings. First, for both misled and control participants, giving participants a multifaceted T+F question at the time of test (e.g., Did you see them sneak out on canoes (true) and go to the girls camp (false)?) led to a robust increase in false assents to the question relative to giving participants a simple false question (e.g., Did you see them go to the girls camp?). Second, the increase in false assents observed in the multifaceted T+F question condition was greater for misled participants (where the false information was a previous suggestion) relative to control participants (where the false information was a previous suggestive interviews (Chrobak et al., 2015, and Chrobak et al. 2021), in both cases documenting that false assents to the suggestion when embedded in a multifaceted T+F question was double the false assents to the suggestion when presented alone (simple F question).

Nevertheless, many important questions remain about the effects of multifaceted questions on eyewitness suggestibility. First and most importantly, the above findings do not permit clear inferences

about the effects of multifaceted questions (i.e., having to consider two propositions simultaneously) on accuracy and suggestibility. Whereas the simple false condition has the false (misleading) proposition as the focus of the question, the multifaceted T+F condition has a true proposition as the focus of the question. Hence, from these findings (comparing simple F to multifaceted T+F) it is not possible to discern to what extent the increase in false assents is due to the multifaceted nature of the T+F condition, per se, and to what extent it might be due to the change in question focus. To assess whether multifaceted questions increase suggestibility, what is required is a multifaceted condition that eliminates this confound. One way to do this is to compare the simple False condition to a multifaceted F + T condition (see table 1).

Chrobak et al. (2015) made an initial attempt to assess more directly whether multifaceted questions increase suggestibility and reported evidence consistent with the conclusion that multifaceted F+ T questions increase suggestibility relative to simple False questions. However, this conclusion is based on a cross-experiment comparison and therefore needs to be interpreted with caution. Moreover, Chrobak et al. (2015) employed a forced fabrication paradigm (where participant had been pressed to self-generate misinformation during the suggestive interview). Hence, no studies have assessed the effects of multifaceted F+T final test questions in situations where participants had earlier been passively exposed to the misleading suggestion during the suggestive interview (rather than being forced to confabulate them). Finally, no studies have assessed the effect of multifaceted F+T questions in a control condition, so it is not known whether multifaceted F+T questions increase false assents in situations where the false information is new. Hence, additional evidence is needed to determine whether multifaceted questions decrease accuracy and increase suggestibility.

Current Study

Building on these earlier findings, the goal of Experiment 1 of my dissertation was to conduct a comprehensive and more definitive investigation of the effects of multifaceted questions on eyewitness accuracy and suggestibility. To do so, I employed a traditional

eyewitness suggestibility paradigm, and employed the stimuli and procedures used by Chrobak, Braun, Smith, and Zaragoza (2021). All participants viewed an eyewitness event and subsequently filled out a post event questionnaire. For misled participants, the questionnaire contained blatantly false misleading suggestions, and for control participants the questionnaire contained no false information. In the last phase, all participants were tested on their memory for the witnessed event. Participants were presented with the misleading suggestions at the time of test, and the primary dependent variable was the extent to which participants falsely assented to witnessing the false events that had earlier been earlier been suggested to them (Control participants were also presented with these same suggestions, but for control participants these false events were new).

The primary experimental manipulation was the format of the question that queried participants about the misleading suggestion. Experiment 1 employed three question types manipulated between subjects: simple False, multifaceted F+T and multifaceted T+F. In Experiment 1, I tested 3 hypotheses:

Hypothesis 1: Relative to simple questions, multifaceted questions will increase suggestibility in misled participants. The test of this hypothesis is a comparison of false assents in the misled multifaceted F + T group to false assents in the misled simple F group. If multifaceted questions increase suggestibility, false assents among misled participants should be greater in the multifaceted F + T group relative to the simple F condition.

Hypothesis 2: Suggestibility will be greater for multifaceted questions that have a true proposition as the focus of the question (multifaceted T + F) than for multifaceted questions that have a false proposition as the focus of the question (multifaceted F + T). The test of this

hypothesis is a comparison of false assents in the misled multifaceted T + F and misled multifaceted F + T groups, with the expectation that false assents will be greater in the former.

Hypothesis 3a: Relative to simple questions, multifaceted questions of both types (F + T and T + F) will increase false assents in control participants. The test of this hypothesis is a comparison of each the multifaceted groups (control F + T and control T + F) to the control simple F condition. The prediction is that, for control participants, false assents will be greater in the multifaceted question conditions (F+T and T+F) relative to the simple question conditions.

Hypothesis 3b: The effect of multifaceted questions on false assents will be greater for misled participants relative to control participants. The test of this hypothesis is a significant interaction between question type (simple vs. multifaceted) and post-event condition (misled vs. control), with the expectation that the effect of question type will be greater in the misled, relative to the control, groups.

CHAPTER II

EXPERIMENT

Method

Participants. Based on an a priori power analysis using G* Power (Faul et al., 2007), for the test of 2x3 interaction, using a small effect size (f = .12, $\alpha = .05$, $1 - \beta = .80$), I aimed to collect 180 participants. Sample size was based on the effect of the multifaceted F +T questions in Chrobak et al. (2015) study, where a small effect was observed (d = .27). A total of 220 participants from a large Midwest university participated to fulfill a course requirement. A total of 18 participants were removed from analyses because they indicated that they had seen the video before (likely in a previous experiment). In addition, anticipating that I was going to need to remove participants for previously seeing the video, I collected data until the end of the semester. To preserve equal n's in all conditions, I removed 22 more participants, resulting in a total of 180 participants (ages 18-53 (M = 20.4); 84% female).¹

Experiment 1 utilized a 2 (post event information: misled vs control) x 3 (question type: simple vs multifaceted F + T vs multifaceted T + F) between-subjects factorial design. Participants were tested entirely online and were randomly assigned to one of six conditions: misled-simple (n = 30), control-simple (n = 30), misled-multifaceted F + T (n = 30), controlmultifaceted F + T (n = 30), misled-multifaceted T + F (n = 30), and control-multifaceted T + F (n = 30).

¹ Results remain the same when all data are included.

Materials and procedure. Materials were adapted from Chrobak et al. (2021) with two exceptions. First, all three question types from Chrobak et al. (2015) were utilized – simple, multifaceted F + T, and multifaceted T + F. Second, the entire experiment completed online via Qualtrics (Provo, UT). Both experiments were preregistered and all materials and raw data can be found on the Open Science Framework (OSF) here:

https://osf.io/yub6t/?view_only=2f9624bffb7b4479accfdfba2483807b.

Phase 1: Eyewitness Event. Participants viewed an 18-minute clip from the movie "Looking for Miracles" (Grant & Sullivan, 1989) that depicts the adventures of two brothers at a summer camp. I used this movie because it was full of adventure, mischief, and action, such as such as poisonous snake bites, and campers drowning. In addition, it has been utilized in other prior work looking at the effects of multifaceted questions on eyewitness suggestibility.

Phase 2: Post-event Questionnaire. After a 20-minute filler (viewing an unrelated British crime video TV show), participants completed an eight-item questionnaire (identical to the one employed by Chrobak et al. 2021, see Appendix A), that queried them about salient events from the target video about the summer camp. The purpose of the post-event questionnaire was to implement the suggestibility manipulation. For participants in the misled condition, question # 4 and question #7 (listed below) contained misleading suggestions, but for participants in the control condition, the same questions did not contain suggestions. The remaining questions on the questionnaire were fillers.

Question # 4: This question was about a scene in the dining hall where one of the camp counselors stands up to give an announcement and suddenly loses his balance and falls flat on the floor. The video does not depict what caused him to fall. When queried about this scene, participants in the misled condition were asked: "The next scene takes place in the dining hall. Delaney is asked to stand up to give an announcement. <u>As a practical joke, 'Ratface' tied Delaney's shoelaces together</u>, causing him to end up on the floor. Give a detailed description of the dining hall. What did it look like and who was there?" [The underlined portion is the misleading suggestion].

The suggestion that Ratface tied Delaney's shoelaces together is a blatantly false suggestion because, although participants did see Delaney fall in the dining hall, the clip never depicted why he fell, and nowhere in the video does it depict Ratface (or anyone else) tying his shoelaces together. Participants in the control condition were asked the same question with the misleading suggestion omitted.

Question #7. This question was about a scene where two camp counselors sneak out on canoes at night. The video does not depict where they went or what they did after they got in the canoes. When queried about this scene, participants in the misled condition were asked: "Towards the end of the movie, Delaney and a friend use a boat to sneak off at night and <u>go</u> toilet paper the Chief's cabin, causing them to get in trouble. Describe everything you remember about the boat. For example, what type of boat was it and where did they get it from?" [The underlined portion is the misleading suggestion]."

Here, again, the suggestion that the counselors toilet papered the Chief's cabin is a blatantly false suggestion because, although participants did see them sneak out on canoes, the video never depicts what they did after sneaking out on canoes. Nowhere in the video are the counselors (or anyone else) depicted toilet papering any cabin, nor does the video depict vandalism of any sort. Participants in the control condition answered the same question with the misleading suggestion removed.

All participants then completed a 20-minute filler task where they answered questions about the filler video (the British TV show).

Phase 3: Final Test. Participants were then tested on their memory for the target video about the summer camp. The purpose of this final test was to assess whether participants would falsely assent to having witnessed the events that had only been suggested to them, and whether they would be more likely to do so when the suggestion was encountered in the context of a multifaceted question.

Participants received the following instructions: "*Earlier, you watched a video about two* brothers at a summer camp and then answered some questions about what you witnessed. Some of those questions referenced events that never actually happened in the video. The following are several additional questions regarding that video. Your task in this phase of the experiment is to indicate which items were actually depicted in the video and which items were not." Hence, participants were warned prior to completing the final test that some of the questions they answered in the second phase of the experiment may have contained misleading information, and were told that their task was to discriminate between those items that were depicted in the video and those that were not. In this way, I could ensure that participants were not simply going along with the suggestion because of perceived demand to do so.

The final test consisted of 9 questions that all began with the phrase, "When you watched the video, did you see______"? (see Appendix B). Whether the question contained one or two propositions varied (as described below). Included in these 9 test items were individual questions about each of the two the misleading suggestions: "Did you see… Ratface tying Delaney's shoe together" (question #4) and "Did you see …. the counselor toilet papering the Chief's cabin" (question #9). The measure of suggestibility was the extent to which participants

falsely assented to having witnessed these misleading suggestions. For control participants, these suggestions were new. Hence, control participants' false assents to these fictitious events provided a measure of the base rate of false assents to having witnessed these fictitious events (for participants who had witnessed the same eyewitness event).

The second, and primary, experimental manipulation was the format of the test question containing these misleading/ false suggestions: either simple false, multifaceted F+T or multifaceted T+F. Participants in the **simple false questions** condition were presented the misinformation in isolation:

Simple False prank: When you watched the video, did you see '*Rat Face' tie Delaney's shoelaces together* (suggested/false information)?

Simple False sneak: When you watched the video, did you see the *counselors toilet paper the Chief's cabin* (suggested/false information)?

For participants who received multifaceted questions, the question included both a true and false proposition and the order depended on the condition. Specifically, participants in the **multifaceted F** + **T condition** were presented a question where the focus of the question (i.e., the object of "Did you see…?) was the misleading information, and this was followed by a true event:

Multifaceted F + T prank: When you watched the video, did you see '*Rat Face' tie Delaney's shoelaces together* (suggested/false information) and *Delaney to fall in the dining hall* (true information)?

Multifaceted F + **T sneak**: When you watched the video, did you see *Delaney and Moe toilet paper the Chief's cabin* and sneak out on canoes?

For participants in the **multifaceted** $\mathbf{T} + \mathbf{F}$ condition, the question had a true event as the focus of the question followed by the misleading information:

Multifaceted T + F prank: When you watched the video, did you see Delaney fall in the dining hall (true information) when '*Rat Face' tied Delaney's shoelaces together* (suggested/false information)?

Multifaceted T + F sneak: When you watched the video, did you see Delaney and Moe sneak out on canoes (true information) and *toilet paper the Chief's cabin* (suggested/false information)?

For each of the nine items in the final test, participants rated their confidence on a 0 (not all confident) to 100 (extremely confident) sliding scale.

Results and Discussion.

The dependent variable of interest was the proportion of false assents to the misleading suggestions on the final test. Proportion of false assents was submitted to a 2 post-event information (misled vs control) x 3 question type (simple F vs multifaceted F +T vs multifaceted T + F) between-subjects ANOVA. Given the characteristics of the data, the results must be interpreted with caution, as the data violate two assumptions of ANOVA – the assumption of normality and the assumption of homogeneity of variance. However, based on central limit theorem, my large sample size makes violating the assumption of normality less of a concern (Field, 2017). To test whether the homogeneity of variance was an issue for my data, I conducted a Levene's test of equality of error variances. Results revealed a non-significant effect (p = .216), thus, there is no significant difference between the variances of my six groups, thus ameliorating this concern.

Results. The results are illustrated in Figure 2 as a function question format and postevent condition (misled vs. control). As predicted, there was a main effect of question format (F(2, 178) = 17.400, p < .001, $\eta^2 = .167$), a main effect of post-event information, F(1, 178) =17.075, p < .001, $\eta^2 = .089$), but no interaction (F(2, 178) = 1.290, p = .278).

The hypothesis that multifaceted questions would increase false assents (Hypothesis 1) was supported. Bonferroni post hoc tests revealed that, overall, false assents in the multifaceted F + T groups (M = .47, SD = .42) were significantly higher than false assents in the simple F groups (M = .21, SD = .35; p < .001). In addition, there was some evidence to support the hypothesis (Hypothesis 2) that false assents would be greater for multifaceted questions that have a true proposition (relative to a false proposition) as the focus of the question. Overall, false assents in the multifaceted T + F (M = .60, SD = .39) groups was numerically higher false assents than multifaceted F + T groups (M = .47, SD = .42), but did not reach significance (p = .15).

The finding that the main effect of question format (simple vs. multifaceted) did not interact with post-event condition (misled vs. control) supports the hypothesis (Hypothesis 3a) that multifaceted questions would increase false assents for control participants like they do for misled participants. This same finding also fails to support the hypothesis that (Hypothesis 3b), that the effect of question format (simple vs. multifaceted) would be greater for misled participants than control participants.





Figure 2. Proportion of false assents to test questions containing false/suggested information as a function of post-event information (misled vs. control) and question type for Experiment 1. Error bars represent 95% confidence intervals.

In summary, the results of Experiment 1 provide clear and unambiguous evidence that multifaceted questions decreased accuracy (among control participants) and increased suggestibility (among misled participants). The results show that encountering false misleading suggestions in the context of a multifaceted F+T question – where participants had to consider the false suggestion together with a true proposition – increased false assents relative to encountering the false suggestion in isolation (simple F). Although misled participants evidenced more false assents overall, the effect of the multifaceted F+T question on errors was comparable for both misled and control participants. Second, there was some evidence that the order of the true and false propositions in the multifaceted questions mattered, with false assents numerically higher in the multifaceted T+F than the multifaceted F+T condition, although this difference was not statistically significant with a two-tailed test.

Although I have argued that the increase in false assents following multifaceted questions is due to the increased cognitive load that results from having to evaluate two propositions simultaneously, there remain other potential interpretations of the multifaceted question effect. In particular, it is possible that some participants are unsure how to respond to multifaceted questions and adopt a strategy of responding "yes" if any aspect of the test question is correct. In Experiment 2, I investigate whether an intervention to mitigate the effects of multifaceted questions on false assents is effective. If participants are simply unsure how to respond to these questions, the intervention should be effective in minimizing the effects of multifaceted questions.

CHAPTER III

EXPERIMENT 2

Experiment 2 had two goals: (1) to replicate the findings of Experiment 1, and (2) to assess whether it is possible to mitigate the negative effect of multifaceted questions on eyewitness accuracy and suggestibility. In Experiment 2, I developed and tested a 4-part intervention I refer to as a "Coaching" manipulation. The Coaching intervention was designed to prepare and coach participants on how to respond to multifaceted questions. The intervention consists of four parts, that, when used in combination, is predicted to reduce false assents to multifaceted questions. The four elements of the Coaching intervention are: (1) education + warning, (2) instructions clarifying how to respond, (3) knowledge application and (4) feedback and explanation. I next describe each of these four elements in turn.

Part 1: Education + Warning. According to Gricean principles of communication (Grice, 1975, 1989) listeners expect others to behave *cooperatively* when communicating, and to that end they expect that others will be as truthful and clear as possible (i.e., with brief and unambiguous communications). Whereas the straightforward questions employed in the simple false conditions of Experiment 1 align with this expectation of cooperative communication, the multifaceted questions are a clear violation of this cooperative principle of communication. Multifaceted questions are not clear and are indeed intended to trick the witness. Hence, there are good reasons to predict that participants are not prepared for the multifaceted questions and may be confused and perhaps thrown off by them. Conversely, it is possible that preparing participants for these questions will allow them to reframe the task and perform more

accurately. If participants are instead expecting multifaceted questions, they will be on the lookout for these trick questions and systematically searching for false propositions embedded in multi-part questions.

Accordingly, the purpose of this element of the intervention is to educate participants about multifaceted questions (i.e., "tricky" questions containing multiple parts, some of which are true and others that are false) and warn participants to expect them. There are reasons to expect that such a manipulation might improve performance, even though cognitive resources may be taxed by the multifaceted questions. For example, there is evidence in the eyewitness suggestibility literature that fully disclosing to participants the purpose of deceptive suggestive manipulations can reduce and even eliminate suggestibility in some circumstances (a manipulation called "enlightenment warnings, see Blank & Oeberst, 2012; Higham et al., 2017). Once again, the idea is that if participants fully understand in advance how they are being "tricked", they approach the task in a manner that allows them to perform more accurately.

Part 2: Clarifying instructions. One potential explanation of the multi-faceted question effect is that participants are unsure how to respond to multifaceted questions and adopt a strategy of responding "yes" if any aspect of the test question is correct. If so, then simply clarifying for participants how they are supposed to respond to these questions might reduce false assents and even eliminate the multifaceted T + F question effect. Chrobak and colleagues (2021) attempted to test this hypothesis in a prior study, by giving participants the clarifying instruction "You should only answer "yes" if all of the information in the question is accurate and from the video" prior to taking the final test. Chrobak and colleagues (2021) found that this instruction reduced suggestibility somewhat but did not eliminate the effect of multifaceted T + F questions. Indeed, the suggestibility rate remained high (they did not include a multifaceted F + T condition in this study). However, this instruction was rather brief, and participants were not fully informed about multifaceted questions, nor were they expecting them, and may not have

fully comprehended what they were supposed to do. I hypothesized that giving these instructions together with information about multifaceted questions may further assist participants in understanding how to respond.

Part 3: Knowledge application. When lawyers are preparing witnesses for testifying, they often engage witnesses in role-playing to help prepare and improve their testimony (Boccaccini, 2002; Boaccaccini et al., 2014). Similarly, in Experiment 2, I ensured that participants knew how to apply the instructions on how to respond to multifaceted questions by having them work through an example of a multifaceted question. The practice multifaceted question were about the events they witnessed and contained both a true and a false proposition that corresponded in format to their assigned condition (F + T or T +F).

Part 4: Feedback and explanation. Finally, participants received feedback on their response to the practice question and also received an explanation why it was correct or incorrect.

The materials and procedures employed in Experiment 2 were similar to Experiment 1. The main difference is that, prior to the final test, half the participants in the multifaceted question test conditions received the standard test instructions and the other half received the coaching manipulation. I hypothesized that the coaching manipulation would reduce and perhaps eliminate the increase in false assents typically observed in the multifaceted questions conditions.

Method

Participants. Based on an a priori power analysis using G* Power (Faul et al., 2007), for the test of 2 x 2 x 2 interaction, using a small effect size (f = .12, $\alpha = .05$, 1 - $\beta = .80$), I aimed to collect 300 participants. As in Experiment 1, I collected data until the end of the semester in
anticipation that I would need to remove participants. In total, 682 participants from a large midwestern university participated to fulfill a course requirement. A total of 96 participants were removed from the analyses because they indicated that they had seen the video before (in all likelihood because they participated in the first experiment); 17 participants were removed due to a software error; and 54 participants were removed for not completing the experiment. To preserve equal n's across conditions, I analyzed the first 48 participants in each condition, for a total of 480 participants (Ages 18 - 42; 77% female).²

To assess the efficacy of the coaching manipulation, Experiment 2 utilized a 2 (coaching: standard instructions vs coaching) 2 (post event information: misled vs control) x 2 (question format: multifaceted F + T vs multifaceted T + F) between-subjects factorial design. In addition, to implement the replication of Experiment 1, two additional groups were included, misled-simple-false and control-simple- false. Note that participants in the simple false conditions did not receive the coaching manipulation, because the coaching manipulation addresses how to respond to multifaceted questions, and participants in the simple question conditions never encountered multifaceted questions. Inclusion of the simple false groups also provides a way to measure the efficacy of the coaching manipulation. If the coaching manipulation is completely effective, false assents in the coached multifaceted conditions should not exceed false assents in the simple F condition.

Participants were tested entirely online and were randomly assigned to one of 10 conditions: control – standard simple false (n = 48), misled-standard simple false (n = 48), control-standard-multifaceted F + T (n = 48), control-coaching-multifaceted F + T (n = 48), misled-standard-multifaceted F + T (n = 48), misled-coaching-multifaceted F + T (n = 48),

² Results remain the same when all data are included in the analyses.

control-standard-multifaceted T + F (n = 48), control-coaching-multifaceted T + F (n = 48), misled-standard-multifaceted T + F (n = 48), misled-coaching-multifaceted T + F (n = 48).

Materials and Procedures.

Phase 1 and Phase 2 were identical to Experiment 1.

Phase 3. Prior to the final test, the coaching manipulation was implemented. Participants in the standard condition received the same the same instructions employed in Experiment 1. Participants in the multifaceted coaching conditions first received the standard instruction used in Experiment 1 and then received the 4-part intervention described below.

Part 1. Education and warning. Participants were warned that they would be answering multifaceted questions: "Please be aware that some of the test questions are tricky, in that they contain multiple parts. In these multi-part questions, it is possible that one part is accurate, and another part is false."

Part 2. Clarifying instructions. After participants are told about multifaceted questions, they were explicitly instructed how to answer multifaceted questions: "You should answer "yes I saw it in the video" only in those cases where the information contained in all parts of the question is accurate and from the video. If the information contained in any part of a multi-part question was not in the video, you should answer "no."."

Part 3. Knowledge application. To ensure that participants knew how to apply this knowledge about how to respond, participants worked through an example of answering a multifaceted question. The format of the example question corresponded to the participant's condition (T+F or F+T).

For participants in the Multifaceted F + T question condition: "Before we begin the test, let's work through an example. Please answer the question following the instructions above:

"When you watched the video, did you see rat face pull out his pocketknife (false event) and then dunk Sullivan's head under water (true event)?" (information in parentheses added).

For participants in the Multifaceted T + F question condition: "Before we begin the test, let's work through an example. Please answer the question following the instructions above: "When you watched the video, did you see rat face dunk Sullivan's head under water (true event) and then pull out his pocketknife (false event)?" (information in parentheses added).

After answering the example question, participants were provided either confirmatory or corrective feedback, depending on the accuracy of their response

Confirmatory: "That's correct! For this question, you should say "no", because not all parts of the question are accurate. Although the video did depict Ratface dunking Sullivan's head under water, the video never depicted Ratface pulling out a pocketknife. You should only answer "yes" if all parts of the question accurately describe events depicted in the video you saw. Otherwise you should answer "no"."

Corrective: "The correct answer is actually "no". This is because not all parts of the question are accurate. Although the video did depict Ratface dunking Sullivan's head under water, the video never depicted Ratface pulling out a pocketknife. You should only answer "yes" if all parts of the question accurately describe events depicted in the video you saw. Otherwise you should answer "no"."

The final test was identical to Experiment 1.

Results

The dependent variable of interest was the proportion of false assents to the false/misleading suggestions on the final test. Before assessing the effects of the coaching manipulation, I first assessed whether I replicated the results of Experiment 1. To this end, I

conducted a separate analysis on the groups that were tested with the standard test instructions. As illustrated in Figure 3, and supported by the statistical analyses below, the results replicated the findings of Experiment 1. For the standard instruction groups, the proportion of false assents was submitted to a 2 post-event information (misled vs. control) x 3 question type (simple vs multifaceted F + T vs multifaceted T + F) between subjects ANOVA. There was a main effect of question type ($F(2, 282) = 24.32, p < .001, \eta^2 = .15$), a main effect of post-event information (with false assents higher in the misled groups relative to control groups, $F(1, 282) = 43.94, p < .001, \eta^2 = .14$), and no interaction (F(2, 282) = 1.06, p = .35). Bonferroni post hoc tests confirmed that, overall, false assents were higher in the multifaceted F + T groups (M = .40, SD = .38) relative to simple F questions (M = .23, SD = .34), p = .001, thus replicating the finding that multifaceted T + F groups (M = .58, SD = .38) relative to multifaceted F + T (M = .40, SD = .38) groups, p = .001, thus showing that false assents were especially high when the true proposition was the focus of the multifaceted question.



Figure 3. Proportion of false assents to misinformation as a function of post-event information and question type for Experiment 2. Error bars represent 95% confidence intervals.

Having established that I replicated the negative effects of multifaceted questions on accuracy and suggestibility, I next assessed whether the coaching manipulation reduced false assents to the multifaceted questions. To this end, I compared performance in the coached conditions to performance in the standard instruction conditions for the multifaceted question groups (both misled and control). These data are illustrated in Figure 4. For these groups, the proportion of false assents was submitted to a 2 (coaching condition: standard vs coaching) x 2 (post-event information: misled vs control) x 2 (multifaceted question type: F + T vs T + F) between subjects ANOVA.

As predicted, overall, participants who received the coaching manipulation evidenced fewer false assents than those who received the standard instructions, as evidenced by a main effect of coaching instructions ($F(1, 376) = 6.01 p = .015, \eta^2 = .016$. Although the coaching manipulation did not reliably interact with any of the other variables (post-event information x coaching, F (1, 376) = 1.90, p = .17; question type x coaching, F (1, 376) = .02, p = .87); post-event information x question type x coaching, F (1, 376) = 2.44, p = .13), inspection of Figure 4 clearly shows that, for the misled groups, false assents in the coached and uncoached conditions did not differ. Accordingly, I analyzed the data for the misled and control groups separately, submitting each to separate 2 (coaching condition: standard vs coaching) x 2 (multifaceted question type: F + T vs T + F) between subjects ANOVAs.



Figure 4. Proportion of false assents to misinformation as a function of post-event information, coaching condition, and question type for Experiment 2. Error bars represent 95% confidence intervals.

When the misled and control groups were analyzed separately, the main effect of coaching instructions was not reliable for the misled groups (F(1, 188) = .514, p = .474.), nor did the coaching manipulation interact with question type in the misled groups (F(1, 188) = .85, p = .35). In contrast, for the control groups, the main effect of coaching instructions was highly reliable ($F(1, 188) = 8.32, p = .004, \eta^2 = .042$) and did not interact with question type (F(1, 188) = 1.61, p = .206). In sum, these results provide evidence that the coaching manipulation was effective for the control groups but was not effective for the misled groups.

I next assessed whether the coaching manipulation eliminated the effect of the multifaceted questions in the control groups. If the coaching instruction was completely effective, it should reduce false assents to the level observed in the simple false control condition, where the false/suggested item is presented in isolation. The results of a one-way ANOVA showed that, for the control groups, false assents in the coached multifaceted conditions were not reliably greater than false assents to the simple false questions (Mean false assents were .14, .18 and .23 for the control simple false, coached control F+T, and coached

control T+F, respectively, F(2, 143) = 1.35, p = .26.) Bonferroni post hoc tests confirmed that there were no significant differences among these groups (all p's > .30). Thus, these results suggest that for the control groups, the coaching manipulation allowed participants to overcome the negative effects of multifaceted questions.

Conditionalized analyses. It is possible that, in spite of the coaching manipulation, some participants still did not fully understand how they were supposed to respond to the multifaceted questions. Hence, I next sought to assess whether the coaching manipulation was effective for those participants who understood the instructions. Accordingly, I conducted an analysis that was restricted to those cases where the participant had answered the example multifaceted question correctly during the coaching manipulation. Overall, the majority of participants responded correctly to this example multifaceted question (M = .84). For participants in the F + T condition 80% of participants answered the example question correctly and for participants in the T + F condition 89% of participants answered the example correctly; there were no significant differences between the groups (p = .26). Hence, I could be confident that the subgroup that answered the example correctly understood that they should respond "no, I did not witness" when a question contains both true and false propositions. After removing the 30 participants who answered the example question incorrectly, I analyzed the responses of the 354 participants who answered the example question correctly.

The results are illustrated in Figure 5, and replicate the findings with the entire sample, with a main effect of coaching (F(1, 346) = 10.47, p = .001, $\eta^2 = .029$), post-event information (F(1, 346) = 110.06, p < .001, $\eta^2 = .24$), question type (F(1, 346) = 31.95, p < .001, $\eta^2 = .085$) and no interactions (coaching x post-event information (F(1, 346) = 2.44, p = .12); coaching x question type (F(1, 346) = .35, p = .55); coaching x post-event information x question type (F



(1, 346) = 2.962, p = .08). As in Experiment 1, I next analyzed the control and misled groups separately.

Figure 5. Proportion of false assents to misinformation as a function of post-event information, coaching condition, and question type for conditionalize data of Experiment 2. Error bars represent 95% confidence intervals.

As in Experiment 1, when the misled groups were analyzed separately, the main effect to coaching was not reliable (F(1, 174) = 1.279, p = .26) nor was the question type x coaching interaction significant, F(1, 174) = 2.438, p = .12. In contrast for control groups, the main effect of coaching was highly reliable ($F(1, 172) = 12.790, p < .001, \eta^2 = .069$) and this main effect did not interact with question type (F(1, 172) = .708, p = .401). Hence, restricting the analysis to participants who had demonstrated that they understood how to respond correctly to the multifaceted questions did not change the pattern of results.

In summary, the results of Experiment 2 replicated Experiment 1 – multifaceted questions decrease accuracy and increase suggestibility. Additionally, Experiment 2 replicated the finding that encountering false misleading suggestions in the context of a multifaceted F+T question increased false assents relative to encountering the false suggestion in isolation (simple F). The goal of Experiment 2 was to assess whether the effects of multifaceted questions could be eliminated by coaching. The results demonstrated some evidence that coaching was effective – when the false suggestion was new at the time of final test (control participants), coaching was effective; whereas when the false suggestion was familiar (misled participants), coaching did not reduce false assents.

CHAPTER IV

GENERAL DISCUSSION

The goal of my dissertation studies was to assess one factor that may exacerbate suggestibility - the use of multifaceted questions. Across two studies, I assessed the effects of multifaceted questions – questions that have multiple propositions (some of which are true and some of which are false) but require a single "yes" or "no" response – on eyewitness accuracy and suggestibility. Prior studies that have investigated the effects of multifaceted questions on suggestibility (Chrobak et al., 2015; 2021) have employed multifaceted questions that differ from simple questions on more than one dimension. In the typical eyewitness suggestibility study, participants are simply asked whether they remember witnessing the post-event suggestion in a direct fashion. Hence, in the typical study, the false (suggested) information is the focus of the question. In contrast, prior studies that have assessed the effects of multifaceted questions have employed multifaceted questions (T+F) where true information was the focus of the question (e.g., Did you witness (true event) + (false/suggested event?). Although these studies have documented that T+F multifaceted questions lead to dramatic increases in suggestibility relative to simple questions, it is unclear to what extent this increase in false assents is due to the change in focus of the question (from the false suggestion to a true event) and to what extent the increase in false assents it is due to the multifaceted nature of the question (having to consider two propositions at once). As such, the first goal of my dissertation studies was to eliminate this

confound and more definitively assess the effects of multifaceted questions on accuracy and suggestibility. To this end, I ensured that both the simple and multifaceted questions had the false (suggested) information as the focus of the question (multifaceted F+T), thus eliminating the question focus confound.

The results of two experiments (Experiments 1 and 2) provide clear and unambiguous evidence that multifaceted questions exacerbate suggestibility: participants false assents to suggestions encountered in the context of a multifaceted question (e.g., F+T) was double the rate at which they falsely assented to the suggestion presented in isolation (e.g., simple F). The results also showed that multifaceted questions impaired the accuracy of control participants who had never been misled and for whom the false proposition was new at the time of test. Like the misled participants, control participants were better able to reject the false proposition when it was presented in isolation (simple false) than when it was encountered in the context of a multifaceted question. Finally, the results also showed that having true information as the focus of the question increased errors for both misled and control participants. False assents to the multifaceted T+F condition exceeded false assents to the multifaceted F + T condition (in Experiment 2).

Why did multifaceted F+T questions lead to an increase in errors in the misled conditions? The present findings rule out the possibility that participants were confused or simply were not sure how to respond to the multifaceted questions. When participants were given extensive coaching on how to respond to multifaceted questions (Experiment 2), the results remained unchanged: false assents in the misled multifaceted F+T condition exceeded false assents when the false proposition was presented in isolation (t (94) = 1.89, p = .031). Accordingly, I propose that multifaceted questions increased suggestibility because of the

increased cognitive load that resulted from having to evaluate two propositions simultaneously. According to the SMF, retrieving source specifying characteristics is effortful and requires cognitive resources, whereas familiarity can be retrieved with little effort (Johnson et al., 1994). I propose that this increased cognitive load impaired participants' ability to retrieve the source of the suggestion, leading them to misattribute it to the witnessed event. The misleading suggestion was plausible and familiar and had been encountered in the context of questions about the witnessed event. Hence, in the absence of information that the false suggestion was not seen, it is perhaps not surprising that participants misattributed it to the witnessed event. When the false proposition was presented in isolation (simple F), misled participants were better able to retrieve the source of the false proposition and reject it as not witnessed. As such, the current findings fit with other studies in the literature documenting that suggestibility errors are a function of the cognitive resources available at the time of test. When those resources are taxed, suggestibility errors increase (cf. Zaragoza & Lane, 1998). These results also fit with the recent finding that susceptibility to suggestion is related to working memory capacity (Jashchinski & Wentura, 2002). Exploring individual differences in susceptibility to multifaceted questions and the efficacy of coaching manipulations remains an exciting and important direction for future research.

Having established that multifaceted questions impair accuracy and increase suggestibility in Experiment 1, the second goal of Experiment 2 was to assess whether it is possible to mitigate the negative effect of multifaceted questions on eyewitness accuracy and suggestibility. To do so, I provided participants with a four-step coaching intervention. This intervention first warned participants that multifaceted questions are tricky and intended to trip up witnesses, and that they should expect multifaceted questions at the time of test. Then,

participants were provided clarifying instructions on how to answer multifaceted questions. Specifically, they were told that they should only say yes if all parts of the question are accurate and from the video. Then, participants were asked to apply the intervention with a practice question and were provided specific feedback about their answer prior to the final test.

My results revealed that the efficacy of the coaching intervention varied based on the type of post-event information. When the misleading information was new at the final test, the coaching manipulation was effective at eliminating the effect of the multifaceted questions: – regardless of the multifaceted question type, coached participants falsely assented to the suggestions at a rate that did not differ from that of participants who were asked simple questions. However, for misled participants, who had previously been exposed to the false proposition, the coaching intervention was ineffective at reducing false assents to both types of multifaceted questions. As mentioned earlier, even when the analysis was restricted to participants who demonstrated understanding of the coaching manipulation, the result remains the same – coaching was effective in the control condition but not in the misled condition.

Why did the efficacy of the coaching intervention vary by type of post-event information? The goal of the coaching manipulation was to warn participants that they would be receiving tricky, multifaceted questions that contained both true and false propositions. In doing so, the hope was that it would help participants slow down and exert more effort to retrieve the source of each proposition. Prior work has demonstrated that participants can make accurate source judgements when circumstances at the time of test require them to make source discriminations (Lindsay, 1990, 2008; Zaragoza & Muench, 1989; Zaragoza and Lane, 1994) and that warning participants, especially if they are educated about a suggestive manipulation, can

reduce suggestibility (Blank & Oeberst, 2012; Higham et al., 2017). So, there is some prior evidence that these types of intervention can work.

The results showed that when the false information was novel at the time of test (control participants), the extra effort and monitoring participants in the coached conditions likely engaged in successfully enhanced their ability to reject the false proposition as not witnessed, perhaps because they could make that judgment on the basis of the false propositions' relative lack of familiarity. As discussed earlier, assessing familiarity is not very resource demanding. However, in the misled conditions, where the false information was familiar, the extra effort and monitoring they likely attempted in response to the coaching instructions was not enough to overcome the cognitive demands of having to consider both propositions at once. That is, even though they might have slowed down, they still did not have sufficient resources to discriminate between the originally witnessed and suggested events. A fruitful direction for future research would be to assess whether coaching instructions influence reaction time when answering multifaceted questions. To the extent that coaching leads to additional effort and systematic monitoring as I have proposed, one would expect coaching to slow participants responses when responding to multifaceted questions.

Another possible reason that the coaching manipulation failed for misled, but not control, participants is that the practice multifaceted question they worked though during the coaching instructions did not match the kind of multifaceted question misled participants encountered on the final test, but it did match for control participants. This is because the practice multifaceted question participants answered during the coaching session contained a novel false proposition and a true proposition, which is exactly what control participants encountered on the final test: a novel false proposition and a true proposition. In contrast, for misled participants, the

multifaceted question they faced on the final test contained a familiar (suggested) false proposition and a true proposition. Identifying a novel item as not witnessed is much easier that identifying a familiar item (encountered in the related context of questions about the witnessed event) as not witnessed. Hence, when misled participants were told to be on the lookout for questions with both true and false propositions, they may have been expecting the false propositions to be new. This expectation may have reduced the efficacy of the intervention because they were searching for a narrow type of false information.

Finally, a third, and related possibility is that the practice question was too easy, and participants did not anticipate receiving false information that was much less obvious. The false information included in the practice question that "Ratface pulled out his pocket knife" was blatantly false and perhaps was viewed by participants as implausible – perhaps facilitating participants ability to answer the example question accurately. Indeed, 84% of participants answered the coaching practice question correctly. In addition, this blatantly false information could have primed participants to search for blatantly false information during the final test. Again, this strategy is more effective for control participants who were not exposed to the misleading suggestions during the post-event questionnaire because the suggestions are novel at time of test. Thus, it is entirely possible that presenting misled participants with practice multifaceted questions that more closely match the kind of multifaceted question they will encounter at the time of test (e.g., practice multifaceted questions where the false proposition is familiar) would greatly enhance the efficacy of the coaching manipulation. Testing this possibility remains an important question for future research. In addition, for both misled and control participants, it may be the case that having them work through multiple practice questions might enhance the efficacy of the intervention. Once again, manipulating both the

number and types of practice questions would seem a logical next step in assessing the efficacy of coaching interventions designed to prepare witnesses for multifaceted questions.

Although the results of the present study were clear, one limitation of the current findings is that they are based on a limited number of suggestions and employed materials that have been employed in prior studies. A feature of these suggestions that may have contributed to the high error rate in the multifaceted questions is that they served an explanatory function. Prior research has shown that when suggestions serve an explanatory role are more likely to develop into false memories relative to post-event suggestions that do not serve an explanatory function (Braun et al., 2021; Chrobak & Zaragoza, 2013; Rindal et al., 2017). Clearly, these results need to be replicated and extended to different materials and different events before general conclusions can be drawn.

Another potential limitation of the current findings is that it's not clear how the present findings will generalize to real world testimony situations. Both experiments were conducted entirely online, whereas, in a court of law, witnesses typically provide testimony in person. On the one hand, one might expect the deleterious effects of multifaceted questions to be amplified when testifying in a court of law. For example, while testifying, it is not uncommon for people to experience anxiety, in turn, that increased arousal can impair performance, especially when faced with cognitively challenging multifaceted questions. On the other hand, there are reasons to expect that a coaching manipulation administered in person might be more effective. Indeed, at least one study has documented that these kinds of interventions may be effective when delivered in person. In particular, Chrobak and colleagues (2021) delivered clarifying instructions (i.e., "only say yes when all parts of the question are accurate and from the video") to individual participants, face to face, and found that these instructions reduced false assents, even for misled

participants. The findings of the Chrobak et al. 2021 study stand in contrast to the current findings, where a much more extensive coaching manipulation, that included clarifying instructions, had no effect. Although resolving this disparity remains a question for future research, it is likely that delivering such instructions to individuals face to face is a much more potent intervention than reading it online. For purposes of generalizing the present findings to real-world scenarios, it will be important to conduct studies involving live interviews and in person coaching interventions.

Although the present findings represent a first step in understanding how to mitigate the effects of multifaceted questions, they nevertheless have important implications for the legal system. To improve and prepare for testimony, lawyers will often engage in witness-role playing (Boccaccini, 2002; Boaccaccini et al., 2014). The results showed that coaching participants on how to answer multifaceted questions was effective. Although the coaching effects reported here were modest, and limited to certain kinds of multifaceted questions, they nevertheless provide evidence that coaching can help to mitigate the effects of complex questions. When one considers that the coaching manipulation employed here was presented in the context of an online experiment (and with only one practice example), the finding that it was effective is very promising, in that it suggests that a more potent coaching intervention might be able to protect witnesses from falling prey to these multifaceted questions. Clearly, much more research is needed before an intervention can be scaled up to a courtroom setting. Nevertheless, the present findings suggest that additional research directed at identifying the effective "ingredients" of an effective coaching manipulation promises to have important practical implications.

In summary, the present study provides the first clear evidence that having to consider multiple propositions simultaneously increases suggestibility and decreases accuracy, regardless

of the order of the true and false propositions. These findings suggest that the increase in errors is due to the limited cognitive resources available while evaluating multiple propositions. In addition, the results provide novel evidence that coaching can mitigate the deleterious effects of multifaceted questions. When multifaceted questions contained a novel false and true proposition, coaching was effective at reducing errors. However, when the false proposition was a misleading suggestion they had encountered earlier, the coaching manipulation was ineffective, thus highlighting the threat that misleading suggestions pose for the reliability of eyewitness testimony.

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APPENDIX A

POST-EVENT QUESTIONNAIRE

APPENDIX A POST-EVENT QUESTIONNAIRE – EXPERIMENT 1

1. Have you seen this video before today? Yes/No If Yes, when?

2. 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?

3. 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?

4. The next scene takes place in the dining hall. Delaney is asked to stand up to give an announcement. <u>As a practical joke, 'rat face' tied Delaney's shoelaces together</u>, causing him to end up on the floor. Give a detailed description of the dining hall. What did it look like and who was there? [new information is underlined]

5. Later in the movie, all of the ladies and boys walk down to the water to take a tour on the canoes. The boat tour ended abruptly when some ladies noticed a <u>black widow spider's nest</u> in the boat. What happened in the rest of this scene? [new information is underlined]

6. 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?

7. Towards the end of the movie, Delaney and a friend use a boat to sneak off at night and <u>go</u> <u>toilet paper the Chief's cabin</u>, causing them to get in trouble. Describe everything you remember about the boat. For example, what type of boat was it and where did they get it from? [new information is underlined]

8. In the final scene, Delaney was sitting by the water and was very upset. What happened in this scene?

APPENDIX B

FINAL MEMORY TEST

APPENDIX B FINAL MEMORY TEST

1. In the opening scene of the video, did you see a boy named 'rat face' cause a commotion when he began fighting with some other boys?

2. In the next scene, one of the counselors is bitten by a poisonous snake. When you watched the video, did you see Delaney faint at the sight of blood?

3. When you watched the video, did you see a group of older ladies arrive at the camp in cars?

4. PRANK ITEM [Wording varied by Question Type condition]

Simple: When you watched the video, did you see '*Rat Face' tie Delaney's shoelaces together* (not in video; questionnaire only)?

Multifaceted F + **T**: When you watched the video, did you see '*Rat Face' tied Delaney's* shoelaces together (not in video; questionnaire only) and *Delaney fall in the dining hall* (in video)?

Multifaceted T + **F**: When you watched the video, did you see *Delaney fall in the dining hall* (in video) when '*Rat Face' tied Delaney's shoelaces together* (not in video; questionnaire only)?

5. When you watched the video, did you see a man fishing on the shore reel in a number of strange objects?

6. When you watched the video, did you see the camp director give Delaney a medal for his bravery?

7. When you watched the video, did you see one of the counselors stare at a nurse through the window and comment about her laundry to some of the other counselors?

8. SNEAK ITEM [Wording varied by Question Type condition]

Simple: When you watched the video, did you see the *counselors toilet paper the Chief's cabin* (not in video; questionnaire only)?

Multifaceted F + **T**: When you watched the video, did you see *Delaney and Moe toilet paper the Chief's cabin* (not in video; questionnaire only) and *sneak out on canoes* (in video)?

Multifaceted T + F: When you watched the video, did you see *Delaney and Moe sneak out on canoes* (in video) and *toilet paper the Chief's cabin* (not in video; questionnaire only)? 9. When you watched the video, did you see Delaney sitting on the beach after losing his scholarship?

APPENDIX C

COACHING INSTRUCTIONS
APPENDIX C COACHING INSTRUCTIONS

No coaching:

Earlier, you watched a video about two brothers at a summer camp and then answered some questions about what you witnessed. Some of those questions referenced events that never actually happened in the video. You will next be asked several additional questions about the summer camp video. Your task in this phase of the experiment is to indicate which items were actually depicted in the video and which items were not.

Coaching:

Earlier, you watched a video about two brothers at a summer camp and then answered some questions about what you witnessed. Some of those questions referenced events that never actually happened in the video. You will next be asked several additional questions regarding the summer camp video. Your task in this phase of the experiment is to indicate which items were actually depicted in the video and which items were not.

Please be aware that some of the test questions are tricky, in that they contain multiple parts. In these multi-part questions, it is possible that one part is accurate, and another part is false. You should answer "yes I saw it in the video" only in those cases where the information contained in all parts of the question is accurate and from the video. If the information contained in any part of a multi-part question was not in the video, you should answer "no." Before we begin the test, let's work through an example. Please answer the question following the instructions above: "When you watched the video, did you see rat face pull out his pocketknife and then dunk Sullivan's head under water?"

That's correct! For this question, you should say "no", because not all parts of the question are accurate. Although the video did depict Ratface dunking Sullivan's head under water, the video never depicted Ratface pulling out a pocketknife. You should only answer "yes" if all parts of the question accurately describe events depicted in the video you saw. Otherwise you should answer "no".

The correct answer is actually "no". This is because not all parts of the question are accurate. Although the video did depict Ratface dunking Sullivan's head under water, the video never depicted Ratface pulling out a pocketknife. You should only answer "yes" if all parts of the question accurately describe events depicted in the video you saw. Otherwise you should answer "no".