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Analyzing and Improving Investigative Interviewers' Memory for Content, Source, and Questions

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ANALYZING AND IMPROVING INVESTIGATIVE INTERVIEWERS' MEMORY FOR CONTENT, SOURCE, AND QUESTIONS

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To: Dean Michael R. Heithaus
College of Arts, Sciences and Education

This dissertation, written by Andrea Christina Franciska Wolfs, and entitled Analyzing and Improving Investigative Interviewers' Memory for Content, Source, and Questions, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Florida International University, 2021

DEDICATION

This dissertation is dedicated to the girls, the gays, and the theys. Everything I do, I do it for you. It is also dedicated to my husband, Justin Abdi, for putting up with me.

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ABSTRACT OF THE DISSERTATION

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by

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As witness interviews are rarely recorded in the U.S., interviewers' memory for these conversations is critical. In the present study, three types of memory were analyzed: what was said during the interview (content), who said it (source), and what questions were used to elicit information (question). Although content is the driving force in investigations, and research reveals that interviewers primarily recall the gist of the interview, source and question information are diagnostic of content accuracy. Individuals can misattribute interviewer information to the witness, making information seem more reliable than it was, and although yes/no questions are the least likely to elicit accurate information, they are the most commonly used questions in interviews (Evans & Fisher, 2011; Schreiber Compo et al., 2012). Furthermore, this study aimed to improve source and question memory by providing directed-focus instructions, which have been shown to improve recall (Crawley et al., 2010; Tatler & Tatler, 2013).

Aiming to measure and improve interviewer memory for witness interviews, this study examined the effects of directed-focus instructions on interviewers' memory for content, source, and questions. After receiving directed-focus instructions to focus on

source, questions, both, or neither (baseline group), participants interviewed a mock witness. They later recalled the interview in both a free-recall and cued-recall format.

Interviewers had worse memory for questions than for content and source, irrespective of directions specifically to recall them, suggesting we are right to worry about losing diagnostic information. Furthermore, the cued-recall format significantly decreased omission rates for all information types, but also resulted in a larger increase in incorrect than correct information. In other words, the new information that was gained via the use of a cued-recall format, compared to a free-recall format, was largely inaccurate, suggesting we should be careful using cued-recall questions in situations such as cross-examination. Finally, in line with research on acquainting interviews (e.g., Stafford & Daley, 1984; Stafford et al., 1987), interviewers showed better memory for information provided by the witness than for information they, themselves, provided, suggesting that it might go against the nature of an information-gathering interview for the interviewer to focus on their own contributions.

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I. INTRODUCTION

Although many jurisdictions dictate that interviews with child witnesses must be recorded (Fisher et al., 2014) and recommendations have been made to video record adult suspect interviews (e.g., Kassin, 2005), no such precautions or recommendations exist for adult witnesses. This leaves the burden of recalling statements made in the interview on the investigative interviewer, perhaps via the interviewer's report or during their deposition or testimony at any resulting legal prosecution. Despite this reliance on the memory of forensic investigators, little is empirically known about how well individuals remember forensic conversations, let alone investigators' memory for forensically relevant conversations (e.g., witness interviews). Yet numerous scholars have noted the importance of studying conversations in the legal arena (e.g., Brown-Schmidt & Benjamin, 2018).

The current study addresses this gap in the literature by analyzing interviewers' memory for a mock forensic interview, including whether encouraging participant interviewers to attend to certain key details of the interview (e.g., the source or the question) increases the interviewers' ability to later recall said details. Specifically, although memory contains a number of different details or aspects (e.g., explicit memory, implicit memory, gist memory, source memory), the current study proposes three types of information highly relevant to forensic interviews (and conversational memory, overall): what was said by the conversational partners (*content* or *what*), who said it (*source* or *who*), and how it was said or asked (*questions* or *how*). As discussed in detail in the individual sections below, although content is central to any investigation given its driving role in developing and solving a case, source and questions also provide vital

diagnostic information about the accuracy of the content (e.g., Evans & Fisher, 2011). Research on memory for source and questions, however, is limited as applied to forensic interview contexts. Few studies have used the participant as an active player and potential source in said conversations; instead, in most studies, participants listen to a conversation between two speakers and participants' source memory for said conversation is later tested (e.g., Boydell & Read, 2011; Crawley et al., 2010; Jurica & Shimamura, 1997; Korkman et al., 2015).

Further, no research has aimed to increase memory accuracy and decrease omissions for the what, who, and how of memory discussed above. Drawing on findings from the field of attention research, the current study aims to improve memory by instructing participant interviewers to focus on one or more types of information during the interview. These *directed-focus instructions* are hypothesized to improve memory for the type of information that is the focus of the attention instruction. Alternatively, instructing participants to focus on one particular area of the interview during encoding could cause an attentional trade-off. An attentional trade-off occurs when engaging in one task impairs performance on another simultaneous task that also requires attention. Moreover, attentional instructions could result in participants selectively reporting information related to the focus of the instruction rather than reporting all of the information that they encoded at the time of retrieval. To ensure recall was accurately measured without interference of selective reporting, participants also completed a *cued-recall* questionnaire, in which they were specifically asked about each piece of information. Therefore, the current study measured memory in both a *free-recall format* as well as a *cued-recall format*.

Memory accuracy can be defined in two ways: output-bound accuracy (or what we generally refer to as "accuracy," i.e., how correct someone is) and input-bound accuracy ("completeness," i.e., how much information someone provides; Brown-Schmidt & Benjamin, 2018). In this study, completeness will be assessed via its inverse, i.e., omissions. Completeness refers to the information that is provided, whereas omissions refer to the information that is *not* provided. Furthermore, accuracy will be calculated as *dependent* on omissions, or rather, as input-bound accuracy: Accuracy will not be defined as how correct participants were in what they remembered, but rather how many correct details the participants remembered of the total amount of possible details. The aim of the current study is to improve accuracy and decrease omissions, or to improve how much people recall of the conversation they had and how accurate that information is.

To empirically analyze these issues, in the current study, participant interviewers received instructions to either focus on the source of information during a mock interview with a confederate witness, focus on how they (i.e., the participant interviewer) elicited information from the witness, focus on both source and questions, or received no *directed-focus instructions* (*baseline* group). Participants' accuracy and omission rates for content, source, and questions were measured both during both *free recall* (in the form of a written report) and *cued recall* (in the form of a questionnaire).

Prior research on the three types of memory at issue (i.e., *content*, *source*, and *questions*) are discussed first, after which ways to improve memory are suggested, with a focus on attention, and specifically *directed-focus instructions*, in which participants are

explicitly directed to focus on a certain type of information. The possible issues of attentional trade-off and selective reporting are briefly raised, including how they could arise in the current study, which then leads into the discussion of the current study and my hypotheses. This is followed by the larger sections of methods, analyses, and discussion.

Memory for Content

For the purposes of this study, content is defined as the information about the crime relayed during the interview, such as a description of the perpetrator(s) or a description of the crime scene. Research on conversational memory has been limited, especially research concerning memory for forensic conversations. What research has been conducted, however, shows that participants remember few details of their prior conversations (Miller et al., 1996; Pezdek & Prull, 1993; Ross & Sicoly, 1979; Samp & Humphreys, 2007; Stafford et al., 1987; Stafford & Daly, 1984). For instance, Stafford and Daley (1984) had students engage in a conversation with one another and later asked both members of the dyad to recall their conversation. Participants recalled only about 10% of the content of that conversation after a five-minute long distractor video (see also Stafford et al., 1987). After an additional delay of one month, memory for content of a conversation drops to 4% of the information relayed (Stafford & Daley, 1984).

Content errors seem to stem primarily from omission errors (i.e., failing to recall something) rather than commission errors (i.e., recalling something that did not happen). In other words, completeness for conversational memory leaves much to be desired. Similar errors were found in research on notetaking in forensic conversations. Lamb et al.

(2000) compared written notes with audio recordings of forensic conversations with children and found that 25% of forensically relevant information divulged by the children was not written down. The rate of errors of commission was much lower, occurring at a rate of only 0.004%. Furthermore, results showed that investigators omitted 57% of their own utterances, leading to a loss of information on how the data was elicited from the child. The importance of recording interviewer statements will be discussed in more detail in the section on memory for questions.

Although participants often omit a large number of details from prior conversations, what they do recall is fairly accurate (Boydell & Read, 2011; Samp & Humphreys, 2007). Samp and Humphreys' (2007) participants engaged in a conversation and were later asked to recall the content. As with earlier studies, on average, participants freely recalled around 14% of what was said during the conversation. However, their accuracy scores paint a much brighter picture: Accuracy rates ranged from 68% to 99%, with most rates closer to the latter number. Other research has also shown accuracy rates above chance level, such as Boydell and Read (2011). In their study, participants viewed a videotaped mock confession and were then interviewed afterwards in a *free-recall format.* After the free recall, the experimenters followed up with directed questions if necessary. Results showed an overall recall accuracy of the perpetrator's account of 57% across conditions.

There are differences in individuals' performance in memory for content arising from statements made by oneself vs. statements made by one's conversational partner. Based on theories of egocentric bias (Ross & Sicoly, 1979), research on the self-

generation effect (Crutcher & Healy, 1989), and research on the self-reference effect, which shows that people process information related to the self better than information not related to the self (Kelly, 1955), people in conversation should remember their own contributions better than they do their partner's. However, evidence for this expectation is mixed (Miller et al., 1996). Most research has shown better gist (i.e., general overview of the content) memory for one's own statements than for those of their partner (Brown-Schmidt & Benjamin, 2018; Ross & Sicoly, 1979; Wagner, 1987), but some research has found better memory for the partner's statement than for their own (Stafford & Daley, 1984; Stafford et al., 1987). However, in the few studies that do report recall accuracy, although speakers were more *complete* in remembering their own statements, they were not more *accurate* in recalling their own statements.

Memory for Source

Information relayed by the witness to the interviewer is generally more accurate, content-wise, than information that was first raised by the interviewer (e.g., Schreiber Compo et al., 2012). After all, the witness has the information about the crime they witnessed, which is what the interviewer is interested in. Furthermore, research has shown that self-generated information, via open-ended questions, is more accurate than information obtained via closed-ended questions, which can introduce non-self-generated information (Evans & Fisher, 2011; Fisher et al., 2009). However, investigative interviewers tend to ask specific/closed questions (25.75% of questions asked) and even leading/suggestive questions (around six per witness interview), which can introduce information the witness has not (yet) offered, more than free recall or other questions that

encourage self-generation (Schreiber Compo et al., 2012). For these reasons, understanding not only investigative interviewers' memory for what information is raised (i.e., content), but also their memory for who raised it (i.e., source), is of vital interest to the legal and psychological communities.

Tracking from where a memory or piece of information derived, including whether information is first introduced by the interviewer or the interviewee/witness, is called source monitoring (Johnson et al., 1993). Source monitoring assumes that memories are not stored with specific information about their source, but that, upon retrieval, decision processes lead to evaluation of the memories and attribution to their sources (Johnson et al., 1993). Source memory fades faster than content memory (Marsh & Bower, 1993). When memories are linked to the incorrect source, this is called source misattribution. Source misattribution is less likely to happen when the original memory to which a source is to be linked is elaborate and distinct from other memories (Davis & Friedman, 2007). Therefore, source memory benefits when one engages in deep elaborative processing and when an event is significantly distinct from other events.

Source monitoring becomes increasingly difficult when participants are asked to distinguish among a series of repetitive or similar events (Davis & Friedman, 2007). Forensic interviewers, who engage in a number of criminally relevant conversations over the course of a year, similarly must tease apart highly related conversations. Davis and Friedman (2007) give the example of a series of similar conversations between a professional and their patients or clients. This could easily be translated into a more legal setting as a series of similar conversations between a police officer and multiple

witnesses, or even repeated interviewing of one witness or similar questions within one witness interview. An investigating officer might confuse statements made by two witnesses spread over multiple separate interviews, or even, and more relevant to the current study, statements made by themselves or the witness within one conversation.

One such source monitoring error that is likely to occur when investigators are asked to recall repeated interviews with others is cryptomnesia, which specifically refers to confusions between statements made by the self and statements made by others (e.g., Brown et al., 1995; Davis et al., 2005). Although this distinction (i.e., between one's own and someone else's contributions) is of interest in the current study, rather than distinguishing between two external sources, this process will be referred to by the general term of source monitoring.

Interviewers may be more likely to remember statements that they themselves made, as individuals have improved memory accuracy when one is a part of the conversation compared to when they are just listeners (Raye & Johnson, 1980). Furthermore, previous research suggests a bias towards remembering our own statements better than our conversational partner's (e.g., Ross & Sicoly, 1979). In an experiment by Raye and Johnson (1980), participants were divided into groups of two speakers, two recorders, and two or more listeners. Speakers spoke to each other, recorders made a verbatim record of the conversation, and, as the name would suggest, listeners passively listened. Participants were all later given a memory test. Recorders and listeners did not differ in their performance for the source of information, but both were outperformed by the speakers, who were better at identifying the source than the recorders and listeners.

In Raye and Johnson's (1980) study, the authors only examined memory for words rather than a spoken conversation. Conversations are much more elaborate than single words and require more working memory, as participating in a conversation requires you to pay attention to what is said, process it enough to understand the gist, make inferences, and search your own memory for appropriate responses (Matlin, 2015). We need to use our memory during the conversation to keep track of the narrative and unresolved details, and to understand our partner's intentions and knowledge (Brown-Schmidt & Benjamin, 2018). In short, engaging in a conversation is much more cognitively demanding than remembering some spoken words, and memory for conversations in which one participated might therefore be poorer than suggested in the Raye and Johnson (1980) study.

As mentioned in the content section above, people tend to remember the content of statements made by themselves better than of those made by others. Based on this, one might also expect a bias in remembering oneself as a source (compared to remembering a conversational partner as a source). However, findings on source memory accuracy for one's own and other's contributions are mixed (Brown et al., 1995; Fischer et al., 2015; Gopie & MacLeod, 2009; Jurica & Shimamura, 1999; cf. McKinley et al., 2017). Despite these mixed findings, research on content recall in acquainting conversations, in which the goal is to learn more about one's conversational partner, has shown that content recall of the conversational partner's utterances was significantly higher than that of the participants' own contributions, both immediately and after a one-month delay (Stafford & Daley, 1984; Stafford et al., 1987). Although these studies measured *content* recall and not *source* recall, this bias towards remembering content first raised by the conversational

partner may translate into better source memory for the partner, especially because of the goal of an acquainting conversation. As an acquainting conversation is arguably similar to a forensic interview, where the investigative interviewer is trying to learn more about the witness (in particular, what the interviewee witnessed), investigative interviewers should show better recollection for witness statements than their own contributions in the interview.

Few studies have examined source monitoring for conversations in an investigative setting. In a study by Korkman and colleagues (2015), parents with preschool and school-aged children listened to a recording of a conversation between a mother and daughter about suspected child sexual abuse. After listening to the conversation, participants were asked to freely report "what the child told." About 51% of information participants reported as said by the child was in fact said by the mother, indicating a source accuracy for the child of 49%. However, after administering a source-monitoring questionnaire (whereby the participants were asked to specifically identify who made what statements, if anyone; also called a recognition test), mothers accurately identified the child as a source for approximately 80% of the statements. These findings suggest that source may often actually be encoded accurately by interviewers and that asking interviewers to monitor the origin of their memory's sources after encoding may increase accuracy in reporting content, source, and the types of questions that interviewers asked.

In conclusion, although research regarding memory for sources in conversation shows mixed results for whether or not one remembers their own utterances or others'

utterances better, we can expect that investigative interviewers will demonstrate greater source memory accuracy for the witness rather than for themselves, as per the findings in acquainting conversations.

Memory for Questions

In addition to content and source memory, the final type of information analyzed in the current study is the nature of the question used to elicit the target information (e.g., free recall, closed questions). An open-ended question (also called *free recall* or *free narrative*) can consist of asking the witness to "tell me what happened," whereas specific/closed questions ask about specific pieces of information, such as "how tall was the perpetrator" (Schreiber Compo et al., 2012). As the names state, a yes/no question leaves the witness with only the options of "yes" and "no" when responding to a question (e.g., "Was the perpetrator a man?") and a multiple-choice question forces the witness to choose their response from previously defined responses (e.g., "Was the perpetrator White, Black, or Hispanic?"; Schreiber Compo et al., 2012). Finally, a suggestive/leading question offers a piece of information that the witness has not previously raised (e.g., "Was the getaway car red?" when the witness has not mentioned a color). How content information was elicited from witnesses by the interviewer is often diagnostic of the veracity of the responses. Specifically, open-ended questions elicit more accurate responses than other question types, such as yes/no questions, specific/closed questions, multiple-choice questions, and suggestive/leading questions (e.g., Eisen et al., 2002; Evans & Fisher, 2011; Fisher et al., 2009).

The superiority of open-ended questions (or free narratives) for obtaining accurate responses can be explained by a model of metacognitive control, as developed by Goldsmith et al. (2014). In their model, each recalled piece of information is first compared to a confidence criterion. If one's confidence in the recalled information exceeds this criterion, the individual will offer the information. However, if confidence does not exceed the criterion, then there are two courses of action: (1) Do not offer the piece of information and offer a "don't know" response (*control of report option*), or (2) move to the next, larger grain size of information and see if this piece of information exceeds the confidence criterion (*control of grain size*). By controlling grain size, one reduces the relevance or informativeness of an answer in favor of a less informative, but more accurate answer.

How much control individuals have over report option and grain size depends on the question they are asked. When responding to an open-ended question, one has the most control over both report option and grain size, as they can choose what information to include as well as how detailed their response is. When asked a yes/no question, one has no control over grain size and can only control the report option (i.e., answering the question or saying "don't know"). Indeed, this is the pattern of control found by Evans and Fisher (2011). In their study, Evans and Fisher (2011) interviewed mock witnesses in one of three ways: using a free narrative (an open-ended question, "Please tell me everything that you remember about the crime that you witnessed"), specific/cued questions, or yes/no questions. Accuracy was highest in the free narrative condition, as participants in this condition had the most metacognitive control. Furthermore, participants in the yes/no condition gave more "don't know" responses than participants

in the specific/cued questions condition, as control of report option was the only viable mechanism for maintaining accuracy at their disposal.

Finally, Köhnken et al. (1994) demonstrated the importance of using open-ended questions in a witness interview not only for the accuracy of the interviewees' responses but also, potentially, the interviewers' memory for the interview. Similar to the current study, participants's in Köhnken and colleagues study interviewed an eyewitness and later memorialized the interview in a report. The authors divided participants up into interviewers and interviewees. Half of the interviewers were trained in the Cognitive Interview (CI), which encourages the use of open-ended questions, and the other half were only told about different types of questions that can be used in an investigative interview. After training, interviewers were asked to interview the other participants (interviewees) about a video the interviewees watched. At the end of the interview, interviewers were asked to write a protocol, which was similar to a report. Interviewers who had been trained in the CI wrote more accurate protocols, containing about 50% more correct facts compared to protocols written by interviewers in the control condition. Although this study focuses on witness information, not interviewer questions, it highlights the benefits of using open-ended questions for interviewer memory.

The use of closed-ended, yes/no, multiple-choice, and suggestive/leading questions is problematic, as they reduce the interviewee's metacognitive control, which can lead to a less accurate witness account (e.g., Evans & Fisher, 2011). However, the most problematic question type is arguably suggestive/leading questions, as this type of question indicates the desired answer to the witness. Furthermore, in suggestive/leading

questions, interviewers introduce information that may not be new only in the witness interview, but new to the witness in general. Research on misinformation has shown that introducing misinformation (i.e., incorrect new information) can lead participants to mix up sources. For example, Loftus et al. (1978) showed participants slides of a car stopped at a stop sign, but later asked the participants if they saw another car that was stopped at a *yield* sign. Participants who received the misinformation showed significantly worse memory for the original event (i.e., the stop sign), with the participants who received no misinformation being twice as accurate as the participants who received misinformation, indicating a mix-up of the slides and the suggestive questions as a source of information.

On the other hand, some research has shown that, if the interviewee detects the misinformation as it is offered and remembers the change from the original information, this leads to better memory for the original source (Putnam et al., 2017). Yet, this is not always the case, and witnesses may often be asked to remember details that may not particularly stand out. It cannot be guaranteed that witnesses will detect the misinformation possibly presented by an investigative interviewer in the form of a leading question, and therefore, the use of suggestive/leading questions in witness interviews is still highly discouraged.

Although the benefits of using open-ended questions are well-established (Eisen et al., 2002; Evans & Fisher, 2011; Fisher et al., 2009) and interviewing guidelines recommend using them (e.g., Technical Working Group: Eyewitness Evidence, 1999), research has shown that this recommendation is not always heeded in practice (Schreiber Compo et al., 2012). Schreiber Compo and colleagues (2012) analyzed a sample of real-

world audiotaped witness and victim interviews that the participants (i.e., real-world investigative interviewers) had recently conducted to determine how often different types of questions were asked by investigative interviewers in real victim and witness interviews. Only 10.81% of questions asked by the 26 investigators were open-ended, as opposed to more yes/no (59.25%) and specific/closed (25.75%) questions. Furthermore, interviewers asked an average of 5.87 suggestive/leading questions per witness interview. An overview of question types used by participants in Hyman Gregory's (2009) participant interviewer study showed that police officers asked significantly fewer open-ended questions (13%) than student interviewers (20%). However, following the pattern found by Schreiber Compo and colleagues (2012), yes/no questions were the most common type of questions asked by both groups, 51% for police officers and 48% for student interviewers, respectively, followed by specific/closed, and then open-ended questions. Witness statements (and therefore content) retrieved during interviews are apparently frequently elicited by problematic questions, and should therefore be regarded with caution, given that the quality of any witness information gathered is a direct function of how it was elicited.

Information regarding the question format interviewers used, which could be used by other legal professionals to assess the reliability of the content information elicited, is frequently unavailable. Although witness interviews are not always recorded, investigative interviewers do write reports about the witness interview and some take notes during the interview. However, research on these notes shows that they are severely lacking in information about the format of interviewer questions. Cauchi and Powell (2009) found that 46% of interviewers did not include any interviewer questions in their

notes. As discussed earlier, Lamb and colleagues (2000) found that investigators omitted 57% of their own utterances in forensic conversations with children from their written notes. Hyman Gregory and colleagues (2011) found that, of the 13 police officers who participated in their study, only one wrote down some of their questions in their notes. Interestingly, the questions were subsequently omitted from their report. Analyses of the reports showed none of the police officers included interviewer questions in their reports.

Although memory for content and source have been studied in previous research, there seems to be little to no published research on memory for questions that participants themselves asked; what research has been conducted focuses primarily on what participants were asked by someone else (e.g., Johnson-Laird & Bethell-Fox, 1978). Studies do show that listeners remember significantly less (both questions and answers) from a conversation than speakers (both inquirers, i.e., those asking questions, and responders, i.e., those answering questions) at immediate recall but, after a one-week delay, responders outperformed both inquirers and listeners (Brown et al., 1995). Inquirers thus show a decrement in memory performance, including, by extension, the "questions" they asked.

Other studies similarly show that individuals, often in informal interview contexts, have difficulty recalling the nature of the questions that they asked. For instance, Bruck et al. (1999) tested recall accuracy of mothers who had interviewed their four-year-old children. Mothers correctly recalled only about 16-17% of questions they had asked and could often not remember if the child spontaneously offered information or if it was prompted. Similarly, Hyman Gregory (2009) conducted two studies in which

participants conducted an interview with a mock witness and subsequently wrote up a verbatim or summarized report. Across the two studies and conditions, the overall omission rate for interviewer questions in the report ranged from 44-50%. The two report types differed in omission rates, as verbatim report writers omitted more specific/closed questions, whereas summarized reports omitted more yes/no and suggestive/leading questions. In conclusion, not much is known yet about memory for questions asked. However, based on previous research, we can expect a higher omission rate for questions than for content and sources.

Directed Attention and Improving Memory Performance

The current study seeks to not only analyze interviewers' ability to remember the three facets of an interview (content, source, and questions) but to empirically test techniques that may improve investigative interviewers' memory for source and questions, preferably without decreasing their memory accuracy for content. Improving memory starts at encoding, or the processing of external information to be stored in memory. If we can improve the encoding of source and question information, we would expect to see better memory for these details later at recall. Improving the encoding of information can be done in several ways, including encouraging semantic processing (Craik & Lockhart, 1972) and elaborative processing of a source (Davis & Friedman, 2007). The current study utilized attention instructions, which encourage participants to attend to a particular portion of an interview, as a way to improve memory for source and questions.

People remember an event better when they are told that there will be a memory test about said event (cf. Bruck et al., 1999), possibly as a result of increased attention in response to the expectation of a memory test (Stafford et al., 1987; Stafford & Daley, 1984; Tatler & Tatler, 2013). Stafford and Daley (1984) found that participants who had been instructed that they would be asked to recall the conversation later and should aim to recall as much as possible, recalled significantly more verbatim recollections or paraphrases of items of information given during an interview than participants who did not receive any recall instructions (59% and 44%, respectively). Similarly, Stafford and colleagues (1987) found that participants who received the recall instructions reported more content during recall. In other words, participants who knew there was going to be a memory test remembered more of the conversation they had had.

Knowing there will be a memory test leads to an improvement in recall, arguably because of increased attention. So, what happens when the participants' attention is explicitly directed to a particular item or category of items by the experimenters? Tatler and Tatler (2013) aimed to answer this question and found similar results to the ones described above for the general expectation of a memory test, but they elaborated on the attention manipulation to include a condition with directed attention. The researchers sent participants into a room and instructed them they had 60 seconds in which they were free to walk around and take in the room. In the two experimental conditions, participants were told there would be a memory test of objects in the room later. This was not the case in the free viewing condition, which served as a control. In the undirected memory condition, participants were only told there would be a memory test later, whereas in the directed memory condition, participants were instructed to remember as many objects

from the room as possible that could be used to make a cup of tea. After the 60 seconds, participants completed a memory questionnaire. Results showed two relevant things: 1) overall memory performance was higher in the directed and undirected memory conditions compared to the free viewing condition, indicating better memory performance when participants expected the memory task; and 2) memory for tea-related objects was better than for non-tea-related objects, but only in the directed memory condition, indicating better memory for a category of items when instructed to pay attention to that category. Additionally, memory was better for tea-related items and worse for non-tea-related items in the directed memory condition compared to the same objects in the undirected memory condition, showing not only that directions can improve memory for the relevant objects, but decrease memory for non-relevant items.

Similar results were found by Guynn and Roediger (1995), who looked at memory for words, rather than objects. The researchers presented participants with lists of 15 words, one of which was an animal and one of which was a sport. Before presenting the lists, the researchers instructed participants that they would receive a memory test after some lists, but not all, and to pay special attention to either the animal (in the animal condition) or the sport (in the sport condition) on the list. On the free-recall memory test, memory for the animal and sport words were compared, as each person functioned as their own control. Based on the condition, one category (i.e., the instructed focus category) functioned as the critical word, and the other category (i.e., the category which they were not given *any directed-focus instructions* for) functioned as the control. For example, if a participant was instructed to focus on the animal on the lists, their memory for animals (critical words) was compared to their memory for sports (control

words). Results showed a large difference in memory: Participants freely recalled 88% of the critical words, compared to only 33% of the control words (which were remembered at the same rate as other, non-sport and non-animal words. In other words, if participants were instructed to pay attention to a category of words, their memory for this category significantly increased compared to word categories they had not been instructed to focus on.

Although to date no research to my knowledge has been conducted on the relation between (directed) attention and memory for conversations, some research has focused on this relation for statements. Crawley and colleagues (2010) had children ages four and six watch a video in which two female speakers made statements. These statements expressed opinions on topics that were relevant to children (e.g., a dislike for broccoli, going to the library). After each statement made by one of the two speakers, the children were asked a question that focused on themselves (i.e., "self-focus") or a question that focused on the speaker of that statement (i.e., "other-focus"). For example, after a statement, a self-focus question would be "What color is your shirt?," whereas an other-focus question would be "What color is her hair?" (referring to the speaker). After listening to all the statements, the children were presented with a list of the previously spoken statements and asked to indicate who uttered them. Source monitoring was better in the other-focus conditions, arguably because the children's focus was directed to the source of the information. In other words, this research suggests that directing attention to a source improves source memory.

In sum, preliminary research has shown improved memory when participants received directed attention instructions, but to date and to my knowledge, no published research has shown this effect in the specific context in which it is studied in the current study, interviewers' memory for a conversation. As the current study aims to improve investigative interviewers' memory for source and questions, a simple solution might be to direct their attention to source and questions with *directed-focus instructions*.

Potential Downsides of Focusing Attention

Encoding: Attentional Trade-off. Instructions to allocate attention to source or questions at the time of encoding may increase memory for the information that is the target of the instruction, but they might also lead to decrements in memory for the areas that are not the focus of the instruction. Attentional trade-off occurs when there is a decrease in memory performance in one area due to encouraging focus on another (Jurica & Shimamura, 1999). For instance, in the current study, the mock investigative interviewers received *directed-focus instructions* that instructed them to pay close attention to a particular aspect or aspects of the interview with the confederate witness (i.e., the source of information, the questions they asked, both source and questions, or neither [*baseline condition*]). By instructing participants to pay attention to source and/or questions, attentional trade-offs may occur. More specifically, when instructed to focus on source, questions, or both, participants may pay less attention to content (or the other information type they were not instructed to focus on, e.g., source if instructed to focus on questions). Furthermore, if participants are instructed to focus on *both* source and questions, will their memory for either of these types of information be less accurate than if they only focused on one type of information?

Jurica and Shimamura (1999) found that encouraging participants to focus on content can lead to reduced performance on source accuracy. In their study, source memory was impaired when participants were asked to answer questions about information. In other words, when participants focused on content, they showed impaired source accuracy.

Furthermore, Baddeley and Hitch's working memory model, which poses that working memory consists of different systems (i.e., visuospatial sketchpad and phonological loop) that process different types of information and are directed by a central executive, is supported by research that shows performance is impaired when we engage in multiple tasks that draw on the same system (Baddeley & Hitch, 1974). For example, research on articulatory suppression shows that, when performing a verbal task, such as repeating certain words out loud, performance on recall for a list of words decreases (e.g., Russo & Grammatopoulou, 2003). Both tasks rely on the same module of the working memory model, namely the phonological loop. Although the different types of memory might not lend themselves to neat distribution across the working memory systems, a similar effect could arise in the current study, in which performing one task (e.g., focusing on source) leads to impairment on another (e.g., memory for questions). However, the working memory model explains that performance is not impaired if people engage in tasks that draw on different systems. For example, Baddeley and Hitch (1974) showed that participants can engage in a visuospatial and phonological task simultaneously with little loss of accuracy in either task. It is possible that the three types of memory operate within different systems, similar to Baddeley and Hitch's model, and therefore do not interfere with one another.

Research on divided attention, where one attempts to pay attention to more than one thing at once, has also shown detrimental effects on performance (e.g., Gutierrez-Davila et al., 2017; Strayer & Johnston, 2001). These studies used the dual task paradigm, where participants initially perform one task and then perform it again while also engaging in a distractor task, to show that speed and accuracy on the main task decrease when participants are focusing on a secondary topic or issue.

This begs an important question: If participants are instructed to pay attention to two things at once, such as both source and questions, will their memory performance for source and questions be affected? Although literature on the dual-task paradigm states that these results will occur as long as both tasks require attention (e.g., Baddeley & Hitch, 1974; Gutierrez-Davila et al., 2017; Russo & Grammatopoulou, 2003; Strayer & Johnston, 2001), we cannot be sure that the same effect will occur for memory for two types of information. Although attentional trade-offs have been well-established within the field of cognitive psychology, little research has been conducted on dual-task paradigms looking specifically at different types of memory as the dependent variable. Rather, dependent variables tend to consist of speed and accuracy at performing the task.

One study that did consider memory as the dependent variable found that performance in a dual-task paradigm does not always impair memory performance (Choi et al., 2008). As in the classic dual-task paradigm studies, children's (ages seven to 14) performance in a single-task condition (either repeating words *or* recalling digits) was compared to performance in the dual-task condition (repeating words and recalling

digits). Of note, children in the dual-task condition showed *improved* memory for words (but not digits, for which performance decreased) compared to the single-task condition.

Although the rationale for this finding is not clear, the arguments provided below could be taken to support or detract from such a finding in the current study (i.e., if the current study found that instructing participants to focus on one type of memory improved multiple types of memory). The authors suggest the counterintuitive results of improved memory in the dual-task condition might show a lack of development in top-down controlled attention allocation. In other words, children may not have adequately evolved the skill of allocating attention to one task only yet. This effect would not be expected in adults, who have more developed attentional control abilities (Choi et al., 2008). However, even for the children, memory for digits did significantly decrease in the dual-task condition compared to the single-task condition, providing some initial support that memory might decrease as people attempt to engage in more than one task at a time. The lack of controlled attention hypothesized by the authors to explain the increased performance on the word task therefore resulted in worse memory performance on the digit task, which came first, and more memory allocation and therefore better memory performance for the words, which were presented after the digits. In other words, memory for digits was decreased in the dual-task condition, and although memory for words was not, it can be expected that this is unique to children, who are hypothesized to have trouble with allocating attention, and would be decreased in the dual-task condition with adult participants.

Based on the research on memory and directed attention mentioned above, one might expect that divided attention would also decrease memory performance for content (as well as source and questions). Much like participants in the *undirected attention* condition in Tatler and Tatler's (2013) study, where participants were told there would be a memory task about the objects in the room but were not told to pay attention to specific objects, participants in this study might simply not remember content information because it was not the focus of their targeted instructions. Indeed, in Tatler and Tatler's *directed memory* condition, where participants were told to pay attention specifically to objects that could be used to make tea, participants remembered *fewer* non-tea-related items compared to the undirected memory condition. This effect could be replicated in the current study and result in decreased memory accuracy for content as compared to participants who do not receive any such instruction.

There are, however, reasons to think that no such trade-off would exist. Although prior research has found a trade-off in content and source memory (Jurica & Shimamura, 1999), no published research has analyzed performance on content memory accuracy when the focus manipulation instructed directed attention for source (as opposed to Jurica and Shimamura's (1999) study, where a decrease in source memory was found when participants were instructed to focus on content). Focus on source memory arguably also puts focus on content. Remembering who contributed facts or ideas to a conversation and how those facts were elicited includes remembering what those facts and ideas were. As content is intertwined with source and question format, there might not be an attentional trade-off after all.

Indeed, some research suggests a link between content and source memory. In a study by Goldsmith and Pillemer (1988), participants were asked to simply recall the first spoken statement they heard that day that came to their mind. Although there was no way of verifying the accuracy of said statement, content analysis of the statements showed that 30% of statements provided by the participants had some information about the speaker (i.e., source). Unlike the Jurica and Shimamura (1999) study mentioned above, which found impaired source accuracy when participants were asked to recall content, the Goldsmith and Pillemer (1988) study found that recall of content could also correspondingly cue recall of source.

Furthermore, all participants in the current study, regardless of *directed-focus instructions* condition, were told that they would have to write a verbatim report about the interview afterwards. This means that all participants received *undirected-focus instructions*. As previous research has shown an increase in memory when participants are aware of a future memory test, the *undirected-focus instructions* could play a role in decreasing or eliminating a potential attentional trade-off.

Finally, content may not show any decrement in the current study given its vital role in investigative interviews. Whether this knowledge stems from general knowledge, specific knowledge of police practices, or television shows and movies, people generally know that the purpose of a witness interview is to glean information from the witness about what happened during the crime. Furthermore, all of the instructions encourage participants to focus on information that might help the police solve the crime. This once

again reiterates the importance of learning what happened during the crime, which is content information.

Based on these findings, I am not hypothesizing an attentional trade-off. However, due to a paucity of literature, arguments can be made for both hypotheses including an attentional trade-off and hypotheses without an attentional trade-off.

Retrieval: Selective Reporting. Instructions to allocate attention to source or questions might also negatively impact omission rates at the time of retrieval. In the current study, the memory test consists of a free-recall mock police report. Although participants are instructed to report everything that was said during the interview, participants might focus primarily on reporting details (regardless of what they actually encoded) specific to the *directed-focus instructions* they received. For example, because participants were told to focus on who contributed which facts and ideas to the conversation, in writing their report, they might focus on providing the source information to the detriment of non-source information.

As discussed above, people can manipulate their accuracy by using control of report option and grain size (e.g., Evans & Fisher, 2011; Goldsmith et al., 2014; Koriat et al., 2001). Moreover, the instructions may encourage people to believe that the current study is only interested in the type of information (e.g., source) that was the focus of their instructions. Instructing participants to pay attention to one type of information might lead to them reporting less of the other types of information. Participants in directed-focus conditions would thus arguably report less content information. In addition to instructing participants to write down everything that they remember, one could also

check whether participants are selectively reporting (i.e., actually encoded but are not reporting non-target information) by directly enquiring about the target items and non-target items (e.g., through a cued-recall questionnaire). This should decrease participant's control of report option, possibly leading to more complete, but possibly also less accurate, information about the interview.

Current Study

The current study aims to expand on previous literature by comparing investigative interviewers' memory for conversations during a forensic witness interview as to three types of information: content, source, and questions. In addition to gathering interviewers' ability to remember said conversation at baseline, the current study also aims to improve interviewers' memory for source and questions through focus instruction manipulations. Specifically, participants received directed instructions to focus on source only, questions only, both source and questions, or neither (*baseline condition*). Interviewer's memory was tested in two ways: by means of a report, which served as a free-recall measure, and through a cued-recall questionnaire.

Participants were instructed to write the reports verbatim rather than summarize them, as research has shown that: a) the most common question type asked is yes/no questions, and b) participants writing summarized reports omitted more yes/no questions than other types of questions (Hyman Gregory, 2009; Schreiber Compo et al., 2012). This ensures participant interviewers' memory for questions can be more accurately assessed, information that would likely be lost if participants were instructed to summarize the interview.

The cued-recall questionnaire tested whether any differences found in the report between conditions were a result of memory, rather than selective reporting. This is because the cued-recall questionnaire limits response options and inquires as to all three types of memory, regardless of experimental condition. However, the cued-recall questionnaire was not fully forced-response, as participants had the option of selecting "I don't know" and were instructed to choose this option if they truly did not remember the information, which should prevent a drop in accuracy in the cued-recall condition. If the cued-recall questionnaire had been strictly forced-response (i.e., forcing participants to answer each question and not give them the option to answer "I don't know), accuracy rates would likely drop, as participants would be forced to guess when answering questions to which they truly do not know the answer. Additionally, as the cued-recall questions should serve as memory cues, accuracy might be improved, compared to the free-recall condition. Personality, cognitive, and social measures were collected between the interview and writing the report to prevent rehearsal of the interview, ensure sufficient delay between the event and recall, and permit analyses of individual differences between the interviewers. The results of this study will start to fill a gap in the legal-psychological literature on memory for conversations (see Brown-Schmidt & Benjamin, 2018), add to our knowledge of the ability to improve memory for different types of information in a conversation, and have the potential to change investigative interviewing policy.

The current study is a 4 (*directed-focus instructions condition*: source vs. questions vs. source and questions vs. no *directed-focus instructions*) × 3 (*information type*: content vs. source vs. questions) × 2 (*recall format*: free recall vs. cued recall)

mixed design, with the *directed-focus instructions manipulation* between subjects and the *information type* and *recall format* within subjects.

Hypotheses

There are four hypotheses for the present study[1]:

1. There will be a main effect of *directed-focus instructions condition*, where participants will show improved memory, both in terms of increased accuracy and decreased omission rates. However, this effect will be completely subsumed by the interaction with *information type*, such that improved memory in the *directed-focus instructions conditions* will only occur for the type(s) of information participants were instructed to focus on, as compared to the *baseline* condition.
2. There will be a main effect of *information type*, with participants showing better memory, both in terms of increased accuracy and decreased omission rates, for *content* than for *source* and *questions*. This effect is expected to be overridden by the main effect of and hypothesized interaction with *directed-focus instructions* (Hypothesis 1), such that the effect will only occur in the *directed-focus instructions baseline condition* (i.e., the condition without any directed-focus instructions).

[1] Although there is limited literature on this and I am not hypothesizing specific effects, I will also look at error rates, i.e., the amount of information incorrectly recalled from the interview.

3. There will be a main effect of *recall format*, with participants showing better memory in *cued-recall format* than *free-recall format*, both in terms of increased accuracy rate and decreased omission rates.

4. There will be a three-way interaction between the *directed-focus instructions condition*, *information type*, and *recall format*, such that *directed-focus instructions* will improve memory for their respective types of information more in the *cued-recall format* than in the *free-recall format*. See Figures 1 and 2 for the hypothesized three-way interactions.

Figure 1

Hypothesized Three-way Interaction for Accuracy

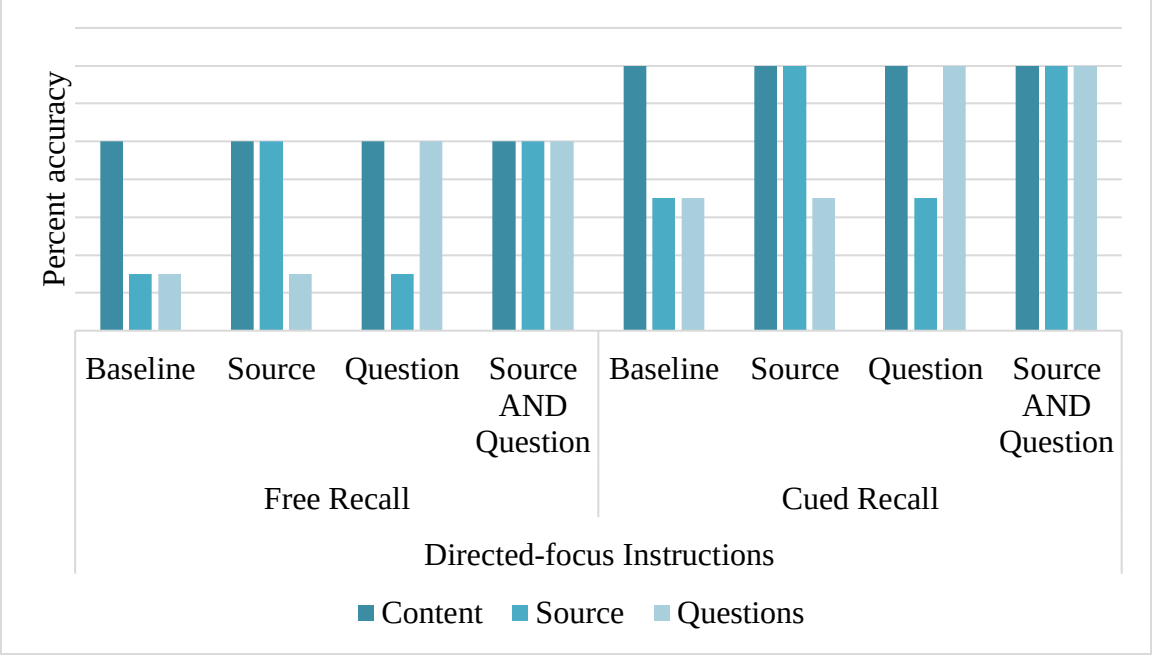
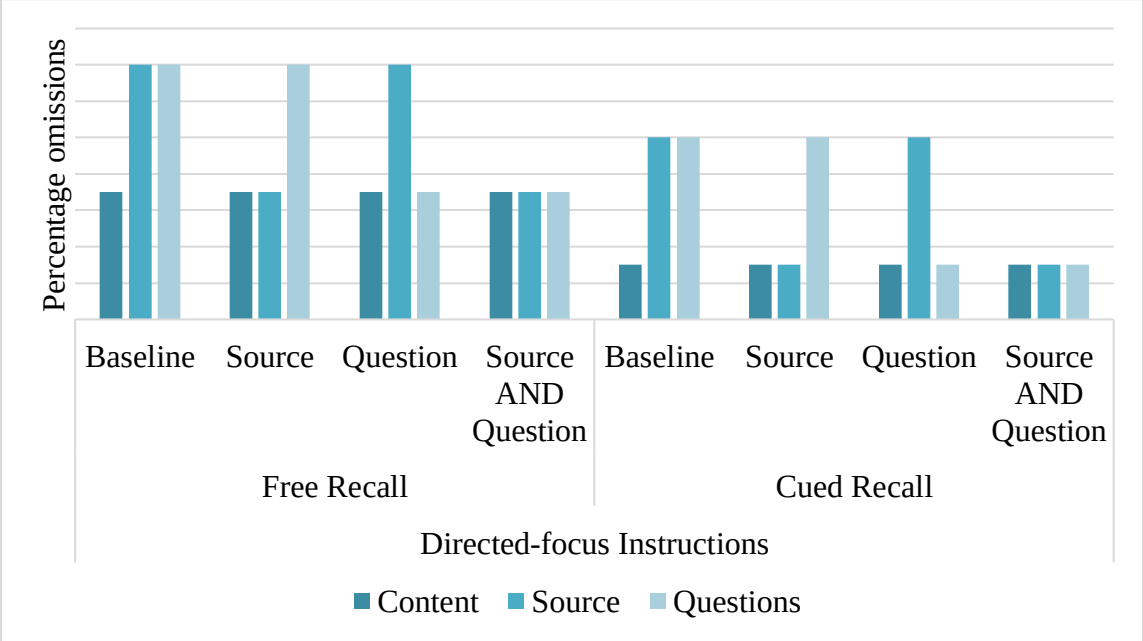


Figure 2

Hypothesized Three-way Interaction for Omissions



II. METHOD

Participants

Power analyses conducted with G*Power 3 (Faul et al., 2007) estimated the need for 128 participants, based on a power of .80, four between-subjects groups (*directed-focus instructions* groups), and two repeated measures (i.e., *information type* and *recall format*). Although the prior research is limited in its reporting of effect sizes, most of the prior studies found a medium effect size (i.e., $f = .25$). As a power analysis with that effect size resulted in an estimated sample size of 48 participants, with six participants per cell, for the sake of caution, the expected effect size was adjusted to .15 (small to medium), which resulted in an estimated sample size of 128 participants.

In total, 151 participants were recruited from an undergraduate Psychology participant pool at a large Southeastern university and randomly assigned to conditions. Students were compensated for their participation with two SONA credits (one credit per hour of participation). Of these participants, seven experienced technical issues that resulted in an early end to their session and subsequent loss of data. Of the remaining 144 participants, 11 screened out as a result of failing the manipulation check. These participants did finish the session, as they completed the individual difference predictors, but did not conduct an interview and therefore do not have data to be analyzed here. Finally, data of the remaining 133 participants was analyzed for outliers. A participant was considered an outlier if their score on one of the dependent variables or their number of interview omissions (i.e., the number of errors made by either the participant or witness RA during the interview that resulted in scripted information being left out of the interview) were three standard deviations above or below the mean for that variable.

These variables were chosen as exclusion criteria for outliers as they either were dependent variables, or were used to calculate them (i.e., the interview omissions). Fifteen participants were considered outliers and removed from the analyses. As a result, data from 118 participants was included in the final analyses.[2] Although 128 participants were needed to find an effect of .15, an effect of .16 required a sample size of 112, indicating that the collected sample size should still be sufficient to detect a small effect. Outliers were identified and removed after COVID-19 regulations had already prohibited in-person interviews, which is why the decision was made not to collect more data.

The final sample was mostly female (n = 99; 83%) and Hispanic (n = 94; 79%), with a mean age of 22 years (SD = 5.23). Most participants indicated English was their native language (n = 79; 66%), with most participants who indicated that English was not their native language (n = 39) being native Spanish speakers (n = 36). The average highest level of education completed was junior year in college (n = 46; 39%).

Materials

Participant Interviewer Training Videos

Participant interviewer training videos introduced participants to both the general instructions for the interviewing task and their condition-specific manipulations. The initial (non-manipulated) instructions were the same across all conditions: The instructor on the video explained that the participant was about to interview someone (referred to as a witness) about a crime that the interviewee witnessed. The participant was instructed to

[2] Results did not differ when outliers were included.

gather as much information (i.e., increase completeness/decrease omissions as much as possible) that was also as accurate as possible from the interviewee – in other words, the participants were instructed to obtain answers from the witness that were as complete as possible, while also as accurate as possible. To standardize individual differences in note taking, the instructor then explained that the participants were not allowed to take notes and that they would be asked to write a verbatim (i.e., non-summarized) report after the interview.

The video then varied by the four different focus instruction conditions (see Appendices A through D). For the *baseline* group, the video ended after these basic instructions and did not include any instructions to focus on a particular aspect of the interview. For the *source-focus* group, the instructor informed participants that it was important to focus on and pay careful attention to *who first* raised a fact or idea during the interview (i.e., the *source*). For the *question-focus* group, participants were encouraged to focus on and pay careful attention to *how* questions were phrased, but were not provided with sample question types, as they did not need to recall question type but rather their actual questions. For the *both-focus* group, the instructor in the video instructed participants that it was important to focus on both who raised a fact or idea and how it was phrased and to pay careful attention to these things. To control for an order effect of instructions in the *both-focus* group (i.e., whether the instructor states that the participant should attend to the "who" or the "how" first), instruction orders were counterbalanced across participants. The duration of the *baseline*, *source-focus*, *question-focus*, and *both-focus* videos (two counter-balanced versions) are 94 s, 109 s, 114 s, 115 s, and 115 s, respectively.

After watching the first video, participants reviewed facts about the alleged crime that was the focus of their interview. They then watched a second video, which, for the experimental groups, consisted of a reiteration of the *directed-focus instructions*. This second video helped reinstate the condition prior to participants conducting the interview. For the baseline group, the second video simply reiterated that they were about to conduct a witness interview. The duration of the *baseline*, *source-focus*, *question-focus*, and *both-focus* videos (two counter-balanced versions) were 20 s, 28 s, 28 s, 30 s, and 30 s, respectively.

Based on preliminary pilot testing, to strengthen the manipulation, a summary of the video's main takeaway points was added underneath each video, including once again the *directed-focus instructions* for the experimental groups. The baseline group was simply presented with the other main takeaway points (Video 1: "A good investigator: a) makes the witness feel comfortable, b) gives the witness time to respond, c) starts with open-ended questions and follows up with more specific questions"; Video 2: "Most important points: a) You have unlimited time for the interview, b) You will have to write up a report about this interview (so pay attention)").

Pre-interview information for the Confederate Witness

As opposed to a standard witness interviewing study, the witnesses in this study were trained confederates rather than other participants. The confederate witnesses studied a scripted interview describing the crime, in which a girl was robbed of her backpack by two men in a parking lot. The crime was based on a mock crime video used in previous research (Wolfs et al., in preparation).

Pre-interview Information for the Participant Interviewers (Incident Report)

Between watching the first and second instruction videos, participant interviewers received some initial information about the target crime in the form of an incident report, which they were told consisted of a short summary of a witness interview with another witness (i.e., not the witness they are about to interview; see Appendix E). The incident report contained basic information about the crime (type of crime, number of perpetrators, gender and ethnicity of victim and perpetrators); every participant received the same information, regardless of condition.

In addition to these basic details, participants also received 13 additional pieces of information about the crime, such as the fact that the main perpetrator had (1) blond hair and (2) wore glasses. Of these 13 pieces, seven were correct (e.g., the perpetrator wore glasses) and six were incorrect (e.g., the perpetrator was blond). Including both correct and incorrect pieces of information allowed interviewers to later introduce information into the interview via the script, as we know police officers do by asking yes/no and suggestive/leading questions (Schreiber Compo et al., 2012).

Manipulation Check

The manipulation check consisted of a single question: "Think back to the instruction videos you just watched. In the videos, you might have been instructed to pay attention to something specific in the interview you are about to conduct. The instructor might have pointed out what a good investigator pays attention to and instructed you to pay attention to that, too. What, if anything, were you instructed to pay attention to?" This particular language was used to echo the language used in the video.

Interview

The interviews took place in a standard laboratory room separate from the laboratory room in which the rest of the study took place. All interviews were audio recorded. Participant interviewers conducted the witness interview with the confederate eyewitnesses. Participants conducted a fully scripted interview. This ensured interview quality, variability of the three types of information within the interview, and standardization. The use of a script was also expected to lower the cognitive load of participants both having to remember how to conduct an interview while also encoding the target information. Furthermore, the fully scripted interview ensured that each participant discussed all the target pieces of information for the memory test, which proved difficult for participants in pilot testing. Finally, pilot testing revealed that questions generated by participant interviewers did not allow for sufficient variability in question type, as people tended to mostly or only ask yes/no questions, and often pertained to issues peripheral to the crime (e.g., "Did you take your medication this morning?"). For an overview of the scripted interview, see Appendix F.

In total, 26 pieces of information about the crime were formulated. Pieces of information were chosen based on questions asked in a pilot study, where participants unfamiliar with the crime video were told to act as investigators and ask questions about the crime. These questions determined which pieces of information individuals found to be most salient about the crime. Of these 26 pieces of information about the crime selected based on the pilot, half were randomly selected to first be mentioned by the witness during the interview, and the other half was selected to be included in the police

report so they could later be first mentioned by the interviewer during the interview, resulting in a total of 13 pieces of information included in the report, as described above.

These 13 pieces in the report were used for the leading questions in the scripted interview and were therefore always brought up first by the interviewer (see Appendix F for a table with the breakdown of the interview), with the exception of the presence of the glasses. Furthermore, one of the leading questions in the script is a follow-up question to an answer the confederate witness gives and is therefore not presented in the report (i.e. "So were both the perpetrators clean-shaven" in response to the confederate witness' statement that the perpetrator was clean-shaven and did not have a beard, as the interviewer suggests). To ensure half of the pieces of information were present in the report, the piece of information concerning the main perpetrator wearing glasses was included but was not introduced in the form of a leading question later during the interview.

The 13 pieces of information that were first raised by the witness were also always correct. Additionally, the confederate witness's scripted answers to the questions about the 13 pieces of information the interviewer first raised during the interview were always correct. Of the 13 pieces of information the interviewer brings up during the interview, seven were correct and six were incorrect. Whenever the interviewer was the first to bring up information, the witness would respond to this information by either confirming or correcting the information, resulting in 26 pieces of information said by the witness (i.e., 13 pieces of information they raised first, seven which were raised first by the interviewer and which they confirmed, and six which were first raised by the

interviewer and which they corrected) and 13 pieces of information said by the interviewer.

The fact that all witness information was correct allowed for comparison of the three categories of information offered during the interview across all participants: correct interviewer-offered information (7 pieces), incorrect interviewer-offered information (6 pieces), and witness-offered information (13 pieces). Although differences in accuracy across these differing questions were not hypothesized, it allows exploratory analyses to be conducted on whether interviewers have better memory for information they raised that was confirmed by the confederate witness, information they raised that was corrected by the confederate witness, or for information that the confederate witness raised.

The scripted interview was initially constructed in such a way to ensure variability within questions as well, but this proved harder than expected, particularly because the options for open-ended questions are limited. Only two open-ended questions were included ("*Tell me about what happened*" at the beginning of the interview and "*Do you remember any additional information*" at the end). Only the first question was scripted to elicit information, as the "any additional information" question was included as a failsafe in case the witness forgot to mention a piece of information or did not get the chance to raise it due to participant error. Therefore, any information that was elicited by the "any additional information" failsafe question was coded as having been elicited by an open-ended question. The resulting script contained the following numbers of information-eliciting questions: one open-ended, seven yes/no, and nine specific/closed. Police officers rarely ask multiple-choice questions, which were therefore not included in the

script (e.g., Schreiber Compo et al., 2012). To ensure variability in both the source and accuracy of the information introduced by the interviewer, five questions were correct-leading (i.e., the interviewer introduced correct information), four were incorrect-leading (i.e., the interviewer introduced incorrect information), and two questions contained both correct-leading and incorrect-leading information. Both correct-leading and incorrect-leading questions were introduced to ensure there were leading questions that the confederate witness would correct during the interview (i.e., incorrect-leading questions) and leading questions that the confederate witness would agree with during the interview (i.e., correct-leading questions). For the two mixed-leading questions, the confederate witness would specifically agree with the correct-leading information and correct the incorrect-leading information. Second, who first brings up the information during the interview is equivalent, with 13 pieces of information first brought up by the confederate witness and 13 by the participant interviewer. This allows for adequate variability per type of information. Third, of the 26 pieces of information, 13 pertain to a description of the crime, 11 pertain to a description of the perpetrators, and two pertain to a description of the victim.

Free-recall Questionnaire (Interviewer Report)

The free-recall questionnaire was completed by the participant interviewer and included an instructions page and an essay text entry box for their report (see Appendix G). The instructions read: “Earlier, you interviewed someone about a crime that they witnessed. Please record verbatim (i.e., word for word) <u>everything</u> that was said **during the interview you just conducted**. This includes things that you said and that the witness said. Please try and record information in transcript format, <u>using the exact words you</u>

and the victim used during the interview. Make sure that you complete this exercise as you would if you were an actual investigator in a real crime. The study will go on to help law enforcement solve actual crimes. Good reports will be rewarded with SONA credits. If you have any questions about this task, please ask the experimenter." The essay text entry box was a forced response and had a minimum character length of 1000 characters, which corresponds to roughly 150 words. Other than reminding participants of the interview they just conducted, no additional prompts were given.

Cued-recall Questionnaire

The cued-recall questionnaire consisted of cued-recall questions about all 26 critical pieces of information raised during the interview. This questionnaire was created for this study for the purpose of comparing participants' cued recall with their free recall (i.e., the report they write). Instructions at the beginning of the cued-recall questionnaire clarified that any information asked about refers to the interview the participant just conducted, not to what they read in the incident report.

For each of the 26 pieces of information, participants were asked up to four questions (see Appendix H). First, participants were asked to accurately recall the content for that piece of information. For example, for the target information regarding the perpetrator having brown hair, participants were asked "*What color was the perpetrator's hair?*" and had to fill out the answer in a text box. Participants could indicate "I don't know" but were encouraged only to do so if they were absolutely unsure. Second, participants indicated who was the source of the information (i.e., who initially raised this piece of information) from four options: the witness (i.e., confederate witness), the interviewer (i.e., participant), it was not discussed, or they do not remember. Instructions

at the beginning of the cued-recall questionnaire explained what was understood by "first brought up." To ensure "was not discussed during the interview" was sometimes the correct option, participants were also presented with the four questions for five additional pieces of information that were not mentioned in either the police report or the interview. Third, participants wrote out verbatim the question they asked to elicit this information. The fourth question was only presented if the participant indicated that they raised the piece of information first. This question asked about the witness's response to the participant's statement or question about the target information; participants could state that they: agreed with the interviewer (e.g., the interviewer asked if the perpetrator had brown hair and the witness agreed that he did), disagreed with/corrected the interview (e.g., the interviewer asked if the perpetrator had blonde hair and the witness corrected them, stating that the perpetrator had brown hair), or said something else. For each answer, the participant was asked to write down what the witness had said during the interview.

Demographic Questionnaire

A demographic questionnaire with basic background questions like age, gender, and ethnicity was designed to collect demographic data (Appendix I). Additionally, this questionnaire assessed participants' knowledge of study-relevant topics, such as cognitive psychology, memory, and investigative interviews. These questions were included to check for differences in performance for participants who had more knowledge about relevant topics to this study.

Procedure

Participants were welcomed and asked by an experimenter (a research assistant) to consent to participate in the study. If consent was obtained, the participants were randomly assigned to a condition and watched the corresponding participant interviewer training video on Qualtrics. This video explained there had been a crime and that the participants now need to interview the witness of the crime. The witness was played by a trained research assistant, but participants were not informed of this fact. Participants were told that they should act as though they were actual interviewers in real criminal investigations. The video also explained participants would be asked to create a transcript of the interview (i.e., non-summarized report). The video ended differently depending on the condition, with the *directed-focus instructions* differing between the groups (see *Materials*). All participants saw the same initial (non-manipulated) instructions part of the video regardless of condition, and all participants within conditions saw the exact same instructions that corresponded with their *directed-focus instructions* condition. This allowed for complete standardization of instructions within each condition.

After watching the video, the participants received the pre-interview case information (i.e., the incident report). When participants had finished reading the incident report, they watched the second part of the instruction video that reiterated the *directed-focus instructions* (or simply that the participant will now begin the witness interview for the baseline group).

After participants received full instructions, the experimenter administered the manipulation check, which asked the participant to recall the instructions they received to check if they remember their *directed-focus instructions* (if any). If a participant failed

the manipulation check, the videos were presented again (but not the incident report). If they failed a second time, they skipped the witness interview and went straight to the individual difference predictor tasks.

If the participant passed the manipulation check, either on the first or the second try[3], Qualtrics then presented the list of questions the participants would ask during the interview (i.e., the interviewer part of the scripted interview). Before presenting participants with the questions, they were informed that a hard copy of the list was available in the interview room and there was therefore no need to study the questions. Questions remained on the screen for 60 seconds, to ensure that participants only had enough time to read through the questions once but not study them, as participants in the *question-focus* condition might have taken this time to study the questions. Both in the instructions here and the hard copy instructions available to them in the interview room, participants were instructed to ask all the questions listed in the order in which they were listed. On the hard copy version, they were further instructed to only ask the questions listed.

Participants were then led to an interviewing room by the experimenter and asked to commence the interview with the confederate witness, another research assistant. Interviewers were not allowed to take notes and were told they had unlimited time to conduct the interview. While walking the participant to the interviewing room, the experimenter instructed them that the audio recorder was already recording, and they

[3] There were no significant differences in outcome variables between participants who passed the manipulation check on the first or the second try.

could start the interview whenever they wanted. Furthermore, the experimenter reiterated that there was a hard copy of the interviewer question list in the room, which the interviewer should use when conducting the interview.

Once the interview was completed, participants were led back to the initial study room where they filled out the individual difference predictor tasks, which introduced a delay between encoding and recall. Data from pilot testing showed the average time needed to complete the filler tasks was 45 minutes (N = 20). After the individual difference tasks, participants completed their free-recall report about the interview, which served as the *free-recall measure* (see Appendix G), and the cued-recall questionnaire, which served as the *cued-recall* measure (see Appendix H), on Qualtrics. After participants filled out this questionnaire, Qualtrics presented them with a suspicion check[4], which asked participants to guess what the study was about. Participants were then thanked for their time and debriefed.

[4] No participants accurately guessed the true purpose of the study.

III. CODING

Free Recall

After interviews were transcribed, two condition and hypotheses-unaware coders were trained to code the free-recall reports. For each report, coders coded content, source, and question for each of the 26 critical pieces of information. If information was mentioned in the free recall that was not brought up during the interview, this information was coded as an addition error. However, due to floor effects, addition errors were not included in any analyses. Across the three information types, there were four common ways to code a piece of information: correct, incorrect, omitted (i.e., not mentioned), and interview omission. A piece of information was coded as omitted when the information was brought up during the interview but not written down in the report. A piece of information was coded as an interview omission when, due to either experimenter or participant error, the piece of information was not mentioned during the interview. Finally, at times, due to experimenter or participant error, pieces of information that were not scripted would be mentioned during the interview. These interview additions were not coded as they were not part of the coding checklist.

Content

A piece of content information was coded as correct when the reported piece matched the one from the interview verbatim, or when an acceptable alternative was offered. For example, a participant accurately reported that a backpack was stolen if they mentioned either a backpack or a book bag. Acceptable alternatives were determined via discussion between the coders and the author, as well as Google Image searches. For

example, an acceptable alternative for baseball cap was “hat,” as a Google Image search of “hat” resulted in mostly pictures of baseball caps. A piece of information was coded as incorrect when the reported piece of information did not match the one from the interview or any of the acceptable answers. For example, if a participant indicated the perpetrator had red hair, this would be incorrect, as the perpetrator was mentioned to have brown hair.

One of the 26 pieces of critical information was a “don’t know” response. When asked “Did anyone else talk to the victim?,” the trained witness RAs were instructed to respond: “I don’t know.” This piece of content information was only coded as correct if participants explicitly reported an answer with a degree of uncertainty, such as “the witness did not know” or “the witness did not remember.” Any answer that did not indicate uncertainty, such as “no one else talked to the victim,” was coded as incorrect.

Source

Although there was a total of 39 pieces of content information mentioned during the interview (see Appendix F) and each piece of information was brought up by a source, source was coded as who *first* raised the 26 critical pieces of information. This resulted in a total of 26 source pieces of information, overall. A source was coded as correct when the participant accurately reported who *first* raised a piece of information. For example, if the interviewer asked if the perpetrator was *blond*, and the witness corrected them by saying the perpetrator had *brown* hair, then the first person to raise the perpetrator’s hair color was the interviewer, even though this information was incorrect. Coders were instructed that the first person to raise an example of a critical piece of

information should be coded as the source. For example, if the interviewer had merely asked "What color was the perpetrator's hair?," they would not be the first one to bring up *a* hair color, but rather inquire about hair color. This would therefore not count as the interviewer being the source. A source was coded as incorrect when a participant reported a piece of content information as being raised first by the incorrect source. As no participant mentioned a source that was not the interviewer or witness, no addition errors were made for source.

Questions

Similar to the source coding, because of the dyadic nature of the interview, the 39 pieces of content information were all linked to questions, for a total of 39 questions that could be coded. However, as the decision was made to only code the witness information to result in coded data for the 26 critical pieces of information, only the questions linked to the 26 pieces of witness information were used in the question accuracy and omission rates calculations (see Appendix F). A question was coded as correct when the question type (e.g., open-ended, yes/no) matched that of the question asked during the interview *and* when the content of the question reported matched that of the question asked during the interview. However, questions did not need to be reported verbatim. For example, if the question asked during the interview to elicit the stolen items was "What was it exactly that they stole?," a correct reported question might be "What did they steal?" or "What was stolen?," but not "What did the perpetrators do?" (incorrect content) or "Tell me everything that you remember" (incorrect question type). Questions were coded as incorrect if the question type did not match that of the question asked during the interview or if the content of the question reported did not match that of the question

asked during the interview. If a question was leading, such as "Since he wasn't wearing a coat, could you see what was on his shirt," the leading part of the question (i.e., "wasn't wearing a coat") did not have to be reported in order for the question to be coded as correct, as "leadingness" was coded separately.

Inter-rater Reliability

Both coders were individually trained by the author and comparing coding between themselves and the author. After they were trained, weekly (and later biweekly) coding meetings were held, first with both coders and the author, later individually with the author and each coder. During the initial group sessions, the coders would compare their coding of the data and inconsistencies would be resolved through discussion. Strict rules for later coding were set wherever possible. The coders' initial coding, not the resolved coding, was used to determine inter-rater reliability. After the overlap necessary for calculating inter-rater reliability was reached (i.e., 28 participants, or 24%), the remaining data was divided over the two coders by participant. In other words, coder 1 coded half of the remaining participants and coder 2 coded the other half. Biweekly meetings with the author were utilized to talk through any issues the coders encountered during their coding of the latest batch of data.

To calculate inter-rater reliability, the coders' coding of 28 participants' data was compared.[5] Intraclass correlation coefficients between the coders ranged from .780 to

[5] Only 27 datapoints were available to calculate the intra-class correlation coefficient for source omissions, due to missing data.

.916, indicating good to excellent inter-rater reliability for all measures, with *Cronbach's alphas* ranging from .876 to .956, indicating sufficiently high inter-rater reliability. Specific coefficients can be found in Table 1.

Table 1

Intra-class Correlation Coefficients for Each Outcome Variable

Variable	Intra-class Correlation Coefficient	*Cronbach's α*
Content accuracy	.909	.953
Source accuracy	.780	.876
Question accuracy	.916	.956
Content omissions	.877	.934
Source omissions	.910	.953
Question omissions	.859	.924

Cued Recall

After interviews were transcribed, two coders (who were not the free-recall coders) were trained to code the cued-recall questionnaires. The cued-recall questionnaires were coded via a checklist. The author coded cued-recall content accuracy, as this was easily coded and objective. Furthermore, omission rates for content, source, and questions were easily coded, as participants would explicitly indicate "do not remember" and could therefore simply be counted. The coders therefore only coded the two remaining variables, source and question accuracy, using a scoring sheet. The coders

checked the transcripts to code whether the information reported in the cued-recall questionnaire was correct or incorrect. Criteria for whether a piece of content or source information should be coded as correct or incorrect were identical to the criteria specified for the free-recall data. Questions were mostly coded similarly as in free recall as well (i.e., question type and content had to match to be coded as correct), with one exception: The same question that elicited multiple pieces of information could be reported differently for each different piece of information it elicited, and still be coded as correct. For example, the interviewer asked: "Can you tell me a bit more about the main perpetrator's appearance besides the fact that he had blond hair?" When probing question memory for the perpetrator's hair color, the word "blond" had to be mentioned to be coded as correct, as this is what turned this into a leading question. During the interview, the same question was also used to elicit the perpetrator's height (5'10), but for this piece of information, any question that matched the question type and general content was coded as correct, regardless of whether the reported question included the word "blond," as this was not relevant for how the information on the perpetrator's height was elicited. This hardly ever occurred in free recall, as participants generally reported both the perpetrator's hair color and height in the same answer.

Participants also had the option to indicate that a particular piece of information was not mentioned. If this information was indeed accidentally omitted from the actual interview (i.e., the "interview omissions" from free recall), this answer was coded as correct, as this information was indeed not discussed. If this information had been discussed during the interview but the participant mentioned it was not discussed, it was coded as incorrect. At times, information was accidentally omitted from the interview,

but participants did recall the information during cued recall, likely as a result of having read the information either in the incident report before the interview or in the script of the interview. However, as I was only interested in and coding for information mentioned during the witness interview, this information was coded as incorrect. Finally, if information was accidentally omitted from the interview (i.e., was indeed not discussed) but participants indicated "do not remember" rather than "was not discussed," this was treated as a regular "do not remember" and therefore coded as an omission.

Both coders were individually trained by the author through thorough instructions and a session in which coding was compared between themselves and the author. The coders then both fully coded 28 participants to allow the calculation of inter-rater reliability coefficients. The rest of the data were divided over the two coders by variables. In other words, coder 1 coded half of the variables for all participants and coder 2 coded the other half. This decision was made as it was easier to code one variable completely and then move on to the next, rather than code each variable once per participant and then do the same for the next participant. As this portion of coding was more straightforward than free-recall coding, because of the presence of a coding checklist, no (bi)weekly meetings were scheduled, but coders rather contacted the author with specific questions about the data (of which there were few).

Inter-rater Reliability

To calculate inter-rater reliability, the coders' coding of 28 participants' data was compared for source accuracy and question accuracy. Intraclass correlation coefficients between the coders ranged from .732 (for source accuracy, *Cronbach's* α = .845) to .799

(for question accuracy, *Cronbach's* α = .888), indicating good inter-rater reliability for both measures.

Calculation of Dependent Variables

Accuracy

To calculate the percentage of accurate pieces reported in the report (for free recall) the number of accurate pieces reported (out of 26) was divided by the total number of pieces mentioned in the interview (i.e., 26), from which the number of interview omissions (i.e., the pieces of information that were omitted from the interview) was subtracted, where applicable. To calculate the percentage of accurate pieces reported in the cued-recall questionnaire (for cued recall), the number of accurate pieces reported (out of 26) was divided by the total number of pieces mentioned in the interview (i.e., 26). There was no need to subtract the interview omissions for cued recall, as participants had the option to indicate "not mentioned in the interview." Therefore, all interview omissions were coded as either correct or incorrect. These percentages were used as the *content accuracy* measures for the main analyses. The same method was used for source and questions to calculate the *source accuracy* measure and the *question accuracy* measure.

Omissions

To calculate the percent of pieces of information not reported, the number of pieces of information that was not reported (for free recall) or that the participant indicated they did not remember (for cued recall) was divided by the total number of pieces mentioned in the interview (i.e., 26), from which the number of interview

omissions (i.e., the pieces of information that were omitted from the interview) was subtracted, where applicable. Again, interview omissions were only subtracted for free recall, not cued recall. These percentages were used as the *content omissions* measures in the main analyses. The same method was used for source and questions to calculate the *source omissions* measure and the *question omissions* measure.

Errors

In addition to accurate pieces of information and omitted pieces of information, the data was also coded for incorrect pieces of information (i.e., information that was mentioned, but was incorrect). To calculate the percentage of incorrect pieces reported in the report (for free recall) and recalled in the cued-recall questionnaire (for cued recall), the number of incorrect pieces reported (out of 26) was divided by the total number of pieces mentioned in the interview (i.e., 26), from which the number of interview omissions (i.e., the pieces of information that were omitted from the interview) was subtracted, where applicable. This percentage was used as the *content errors* measure for the main analyses. The same method was used for source and questions to calculate the *source errors* measure and the *question errors* measure.

IV. RESULTS

Main Analyses

To analyze if the hypothesized effects of *directed-focus instruction condition* and *information type* occurred, and if they differed per *recall format*, two mixed-model ANOVAs were conducted with *directed-focus instructions condition* (i.e., baseline, source-focus, question-focus, both-focus) as the between-subjects factor, *information type* (i.e., content, source, question) as the first repeated measures factor, *recall format* (i.e., free recall, cued recall) as the second repeated measures factor, and percentage *accuracy* and *omissions* as the dependent variables, respectively. Additionally, although results from this analysis were not hypothesized, a third mixed-model ANOVA, including the same independent variables, was conducted with *errors* as the dependent variable. ANOVAs were used instead of MANOVAs as some of the dependent variables were too highly correlated (e.g., correlations of .80). To lower the chance of a Type I error, an alpha correction was applied. As the main analyses consisted of three ANOVAs, the corrected alpha was set at .05 / 3 = .017.

Note that the *accuracy, omissions*, and *error* measures each consisted of their respective measure for content, source, and questions per *directed-focus* condition, and each of those had a measure for free recall and cued recall. The means and standard deviations of each of these specific *accuracy, omission*, and *error* rates can be found in Table 2 (see Table 3 for an overview of the overall average *accuracy*, *omission*, and *error* rates). Data was only coded as correct, incorrect, omitted (i.e., not mentioned), and interview omission. As interview omissions were only used to calculate the percentage

accuracy, omissions, and errors, these three percentages add up to 100% (allowing for some rounding errors) in each condition. In other words, each row in the table adds up to 100%.

Table 2

Means and Standard Deviations of Accuracy, Omission, and Error Rates for the Directed-focus Instructions Conditions per Information Type and Format

Format	Information Type	Directed-focus Instructions	Accuracy		Omissions		Errors	
			M	*SD*	*M*	*SD*	*M*	*SD*
Free recall	Content	Baseline	50.20	14.18	45.86	13.30	3.95	3.98
		Source	44.77	12.90	51.68	12.36	3.68	4.54
		Question	45.09	14.36	51.45	14.78	3.32	3.63
		Both	46.84	9.92	50.42	10.52	2.74	2.59
	Source	Baseline	39.24	15.15	46.97	14.64	13.34	6.74
		Source	40.12	13.46	52.54	14.90	7.34	5.90
		Question	37.98	13.56	51.16	14.59	10.87	6.40
		Both	39.80	14.88	50.97	14.03	9.63	5.85
	Questions	Baseline	27.41	15.52	57.82	20.35	14.51	7.86
		Source	32.26	12.87	55.17	16.07	12.20	7.79
		Question	31.37	11.83	54.65	13.89	13.27	6.76
		Both	31.28	14.36	55.47	16.68	12.65	6.17
Cued recall	Content	Baseline	58.89	11.17	9.68	9.06	31.43	9.86
		Source	57.07	12.80	11.29	7.69	31.64	10.40
		Question	53.05	14.62	15.25	8.51	31.70	16.05
		Both	58.89	8.23	10.88	9.02	30.24	11.43
	Source	Baseline	50.40	13.26	10.08	9.77	39.52	12.11

		Source	45.41	13.78	11.29	9.83	43.30	10.79
		Question	44.83	9.09	14.85	11.06	40.32	13.35
		Both	48.81	10.28	11.41	10.76	39.79	11.73
	Questions	Baseline	30.24	12.11	20.42	16.83	49.34	11.26
		Source	31.39	13.55	21.09	17.73	47.52	14.03
		Question	27.98	12.37	30.50	15.99	41.51	14.55
		Both	28.38	10.35	22.68	15.33	48.94	16.76

Note. $N = 118$ ($n = 29$ for the *baseline, question,* and *both* conditions; $n = 31$ for the *source* condition).

Table 3

Average Accuracy, Omission, and Error Rates

		Accuracy		Omissions		Errors	
		M	*SD*	*M*	*SD*	*M*	*SD*
Content	Free Recall	46.69	12.98	49.88	12.88	3.43	3.74
	Cued Recall	56.98	12.04	11.77	8.71	31.26	12.01
	Total	51.83	12.51	30.82	10.80	17.34	7.88
Source	Free Recall	39.30	14.11	50.44	14.51	10.24	6.53
	Cued Recall	47.33	11.88	11.90	10.38	40.78	11.95
	Total	43.31	13.00	31.17	12.45	25.51	9.24
Questions	Free Recall	30.61	13.66	55.76	16.72	13.14	7.15
	Cued Recall	29.53	12.10	23.63	16.79	46.84	14.44
	Total	30.07	12.88	39.70	16.76	29.99	10.80
Total	Free Recall	38.87	13.58	52.03	14.70	8.94	5.81
	Cued Recall	44.61	12.01	15.76	11.96	39.62	12.80

	Overall	41.74	12.79	33.90	13.33	24.28	9.31

Accuracy

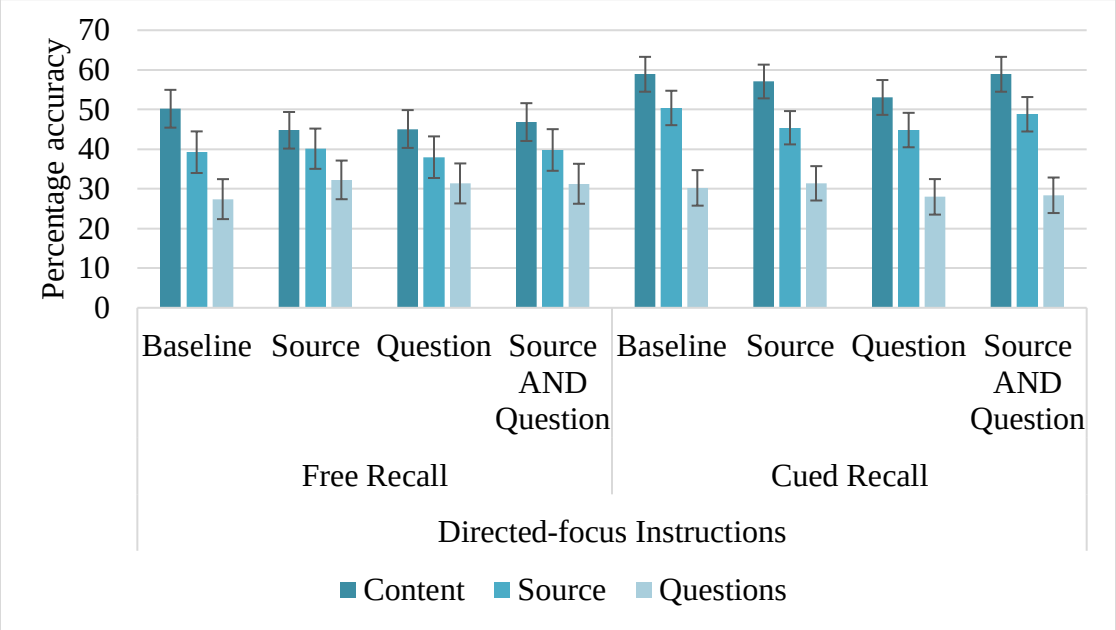
A mixed-model ANOVA was conducted with *directed-focus instructions condition* as the between-subjects factor, *information type* as the first repeated measures factor, *recall format* as the second repeated factor, all two- and three-way interactions included, and *accuracy* as the dependent variable. See Figure 3 for all accuracy rates. Contrary to Hypothesis 1, there was no main effect of *directed-focus instructions* (p = .766). Furthermore, there was no interaction between *directed-focus instructions* and either *information type* (p = .055) or *recall format* (p = .439); instructions did not improve accuracy for their respective types of information in either free or cued recall. In partial support of Hypothesis 2, a main effect of *information type* was found, $F(1.86, 211.66) = 379.12$, p = <.001, ηp^2 = .77, with *content* accuracy being significantly higher than *source* accuracy, which was significantly higher than *question accuracy*, indicating participants remembered *content* information most accurately and *question* information least accurately. However, this main effect was not overridden by its hypothesized interaction with directed-focus instructions, as this interaction was not significant (p = .055).

Hypothesis 3 was partially supported as a main effect of *recall format* was found, $F(1, 114) = 51.17$, p = <.001, ηp^2 = .31, although this effect was overridden by its interaction with *information type*, $F(2, 228) = 48.22$, p = <.001, ηp^2 = .30. The interaction showed that the hypothesized effect of *recall format* was only present for *content* and

source, where cued recall significantly improved accuracy rates compared to free recall, but not for *questions*, where no difference in accuracy rates was found between the two recall formats. In other words, a cued-recall format improved participants' accuracy for *content* and *source* information, but it neither increased nor decreased accuracy for *question* information. On the other hand, the main effect of *information type* was not overridden by its interaction with *recall format*, as the same pattern was present in both recall formats. Finally, no significant three-way interaction was found, $F(6, 228) = 2.08$, $p = .059$, $\eta p^2 = .06$, failing to support the hypothesis that *directed-focus instructions* improved accuracy for their respective types of information more in the cued-recall than in the free-recall format (Hypothesis 4).

Figure 3

Accuracy Across Conditions



Omissions

A mixed-model ANOVA was conducted with *directed-focus instructions condition* as the between-subjects factor, *information type* as the first repeated measures factor, *recall format* as the second repeated factor, all two- and three-way interactions included, and *omissions* as the dependent variable. See Figure 4 for all omission rates. As a reminder, omissions in free recall were coded as any information mentioned during the interview that was not reported, whereas in cued recall, participants explicit "don't know" choices for each piece of information were coded as omissions. Contrary to Hypothesis 1, there was no main effect of *directed-focus instructions* (p = .381). Furthermore, there was no interaction between *directed-focus instructions* and either *information type* (p = .340) or *recall format* (p = .337); instructions did not improve accuracy for their respective

types of information in either free or cued recall. In partial support of Hypothesis 2, a main effect of *information type* was found, $F(1.49, 170.29) = 88.83$, $p = <.001$, $\eta p^2 = .44$, with *question* omissions being significantly higher than *source* and *content* omissions, which did not differ significantly from one another, indicating participants omitted significantly more questions than content and source information. This main effect was not overridden by its hypothesized interaction with *directed-focus instructions*, as this interaction was not significant ($p = .339$). Hypothesis 3 was supported as a main effect of *recall format* was found, $F(1.00, 114.00) = 776.02$, $p = <.001$, $\eta p^2 = .87$, showing a significant decrease in omission rates in cued recall, compared to free recall, indicating that a cued-recall format resulted in significantly fewer omissions, overall, than a free-recall format.

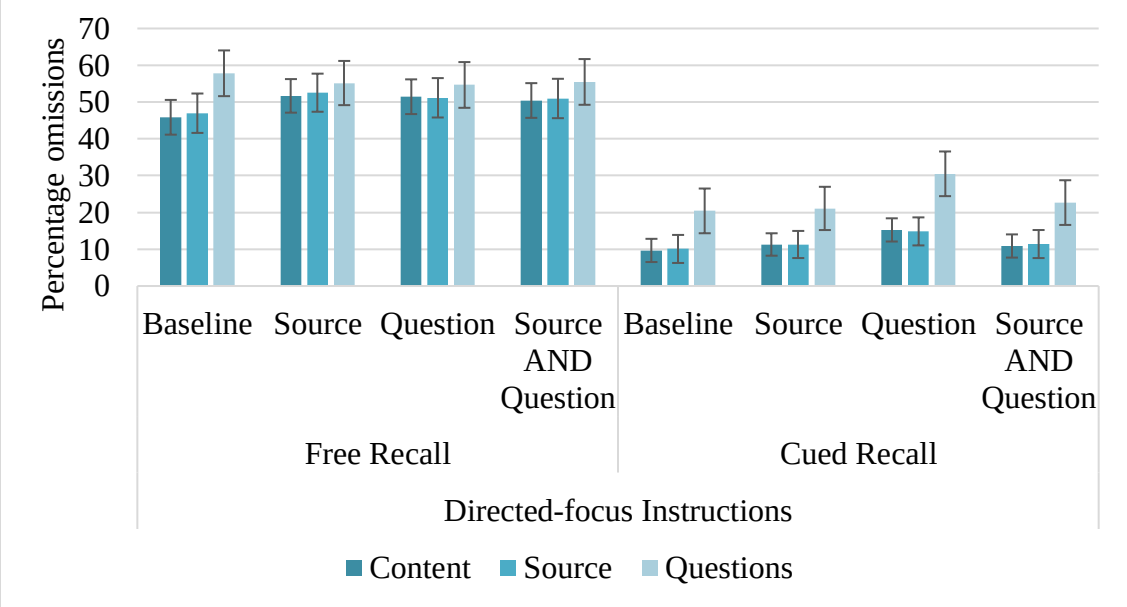
Although there was a significant two-way interaction between *information type* and *recall format*, $F(1.61, 114.00) = 14.62$, $p < .001$, $\eta p^2 = .11$, this interaction did not override either of the two main effects. In other words, *question omissions* were significantly higher than *source* and *content* omissions, which did not differ significantly, in both *free* and *cued* recall. Furthermore, omissions rates were significantly lower in *cued recall* compared to *free recall* for all three *information types*. It seems, rather, that the interaction indicates a difference in the size of these effects. *Hedges' g* indeed shows that the differences between *question omissions* and *source* (*Hedges' g* = 1.47) and *content omissions* (*Hedges' g* = 1.49) have a large effect size in *cued recall*, whereas the differences between *question omissions* and *source* (*Hedges' g* = .67) and *content omissions* (*Hedges' g* = .74) have a small effect in *free recall*. Effect sizes comparing the

decrease of omissions from *free* to *cued recall* were large (ranging from 4.01 to 4.76) across all *information types*.

Finally, no significant three-way interaction was found, $F(4.84, 184.00) = 2.68$, $p = .025$, $\eta p^2 = .07$, failing to support the hypothesis that *directed-focus instructions* improved accuracy for their respective types of information more in the cued-recall than in the free-recall format (Hypothesis 4).

Figure 4

Omissions Across Conditions



Errors

A mixed-model ANOVA was conducted with *directed-focus instructions condition* as the between-subjects factor, *information type* as the first repeated measures factor, *recall format* as the second repeated factor, all two- and three-way interactions,

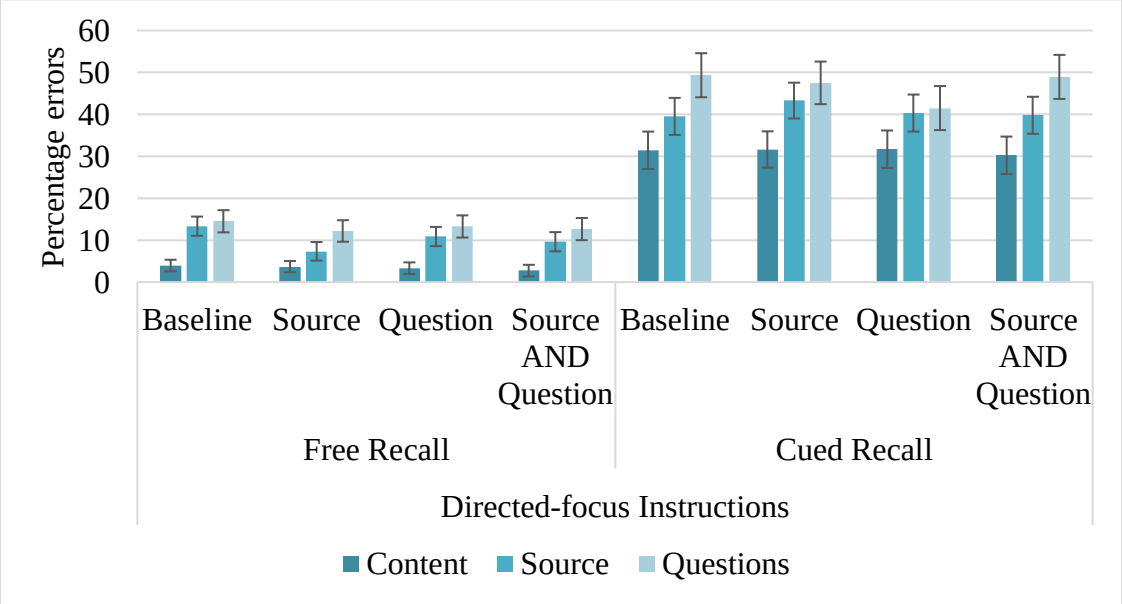
and *errors* (i.e., information that was *incorrectly* reported) as the dependent variable. See Figure 5 for all error rates. There was no main effect of *directed-focus instructions* (p = .653), nor an interaction between *directed-focus instructions* and either *information type* (p = .254) or *recall format* (p = .464). A main effect of *information type* was found, $F(1.83, 208.86) = 161.96$, $p = <.001$, $\eta p^2 = .59$, with *content* error rates being significantly lower than *source* error rates, which were significantly lower than *question* error rates, indicating participants committed the most errors in remembering *question* information and the least errors in remembering *content* information. This main effect was subsumed by the three-way interaction, which is described below. A main effect of *recall format* was found, $F(1, 114) = 828.70$, $p = <.001$, $\eta p^2 = .88$, showing a significant increase in error rates in cued recall, compared to free recall, indicating that a cued-recall format resulted in significantly more errors, overall, than a free-recall format. Although a three-way interaction was found (see below), the main effect of *recall format* was not overridden by it, as the same pattern was present for all information types and across all *directed-focus* conditions.

Results showed a significant three-way interaction, $F(5.63, 213.74) = 3.25$, p = .005, $\eta p^2 = .08$. In free recall, *content* error rates were significantly lower than *source* and *question* error rates, which did not differ significantly from each other, across all conditions but the *source-focus* condition. In the *source*-focus condition, error rates for *source* information significantly decreased compared to the *baseline* condition. This, in turn, resulted in a pattern resembling the main effect of *information type*, showing *content* error rates being significantly lower than *source* error rates, which in turn were significantly lower than *question* error rates. The main effect's pattern was also found in

the *baseline* and *both*-focus (i.e., *source AND question*-focus) conditions in cued recall. The remaining two cued-recall conditions, i.e., the *source*-focus and *question*-focus conditions, displayed the previously discussed pattern, where *content* error rates were significantly lower than *source* and *question* error rates, which did not differ significantly from one another.

Figure 5

Errors Across Conditions



Exploratory Analyses

Correct vs. Incorrect Interviewer-offered Information vs. Witness-offered Information

As explained in the Materials section, the way the interview was scripted allows for comparison between three different categories of information in addition to the three different information types discussed so far (i.e., content, source, and questions): correct interviewer-offered information (i.e., information first raised by the interviewer that was

confirmed by the witness), incorrect interviewer-offered information (i.e., information first raised by the interviewer that was corrected by the witness, and witness-offered information (i.e., information first raised by the witness, which was always correct). As these exploratory analyses only concern interviewers' baseline memory for these three categories, neither of the manipulated variables (i.e., *directed-focus instructions* and *recall format*) were included.

Three repeated-measures ANOVAs were conducted with the information category (i.e., correct interviewer-offered information, incorrect interviewer-offered information, witness-offered information) as the first repeated measures factor, information type (i.e., content, source, and questions) as the second repeated measures factor, and percentage accuracy, omissions, and error rates as the dependent variables, respectively. The means and standard deviations of each of the specific accuracy, omission, and error rates can be found in Table 4. Once again, each row in the table adds up to 100%.

Accuracy. A repeated-measures ANOVA was conducted with the information category (i.e., correct interviewer-offered information, incorrect interviewer-offered information, witness-offered information) as the first repeated measures factor, information type (i.e., content, source, and questions) as the second repeated measures factor, all two- and three-way interactions, and percentage accuracy as the dependent variable. See Table 4 for all accuracy rates. Main effects were found both for both information category, $F(2, 232) = 53.57$, $p < .001$, $\eta p^2 = .32$, and information type, $F(1.83, 211.88) = 111.58$, $p < .001$, $\eta p^2 = .49$. Incorrect interviewer-offered information accuracy was significantly higher than witness-offered information accuracy, which was

significantly higher than correct interviewer-offered information. This finding indicates that information that was offered by the interviewer but corrected by the witness was remembered most accurately, and information that was offered by the interviewer and confirmed by the witness was remembered least accurately. The main effect pattern of information type mimicked the effect from the hypothesis-testing analysis, with *content* accuracy being significantly higher than *source* accuracy, which was significantly higher than *question accuracy*.

A significant interaction was found, $F(3.52, 407.79) = 35.98$, $p < .001$, $\eta p^2 = .24$. Both main effects differed per level of the other variable, but, as the only pattern of interest is that of information category per information type, only this effect will be discussed. For *content* and *questions*, incorrect interviewer-offered information had higher accuracy rates ($M = 65.71$; $M = 39.03$) than witness-offered information ($M = 41.07$; $M = 29.31$) and correct interviewer-offered information ($M = 39.86$; $M = 25.01$), both ps $< .001$, which did not differ significantly ($p = 1.000$). For *source*, correct interviewer-offered information had lower accuracy rates ($M = 26.85$) than incorrect interviewer-offered information ($M = 44.94$) and witness information ($M = 43.18$), both ps $< .001$, which did not differ significantly ($p = 1.000$). In short, across all three information types, information offered by the interviewer that was corrected by the witness was remembered more accurately than information offered by the interviewer that was confirmed by the witness.

Omissions. A repeated-measures ANOVA was conducted with the information category (i.e., correct interviewer-offered information, incorrect interviewer-offered

information, witness-offered information) as the first repeated measures factor, information type (i.e., content, source, and questions) as the second repeated measures factor, all two- and three-way interactions, and percentage omissions as the dependent variable. See Table 4 for all omission rates. Main effects were found both for both information category, $F(2, 232) = 71.86$, $p < .001$, $\eta p^2 = .38$, and information type, $F(1.69, 195.85) = 23.04$, $p < .001$, $\eta p^2 = .17$. Omissions were significantly lower for incorrect interviewer-offered information compared to witness-offered information and correct interviewer-offered information, which did not differ significantly. This pattern suggests that information that was offered by the interviewer but corrected by the witness was remembered more often than information that was offered by the interviewer and confirmed by the witness or information that was offered by the witness. The main effect pattern of information type mimicked the effect from the hypothesis-testing analysis, with *question* omissions being significantly higher than *source* and *content* omissions, which did not differ significantly from one another. Although a significant interaction was found, $F(3.25, 377.51) = 3.71$, $p = .01$, $\eta p^2 = .031$, neither main effect pattern differed per level of the other variable.

Errors. A repeated-measures ANOVA was conducted with the information category (i.e., correct interviewer-offered information, incorrect interviewer-offered information, witness-offered information) as the first repeated measures factor, information type (i.e., content, source, and questions) as the second repeated measures factor, all two- and three-way interactions, and percentage errors as the dependent variable. See Table 4 for all error rates. Main effects were found both for both information category, $F(1.87, 217.35) = 47.72$, $p < .001$, $\eta p^2 = .29$, and information type,

$F(1.84, 213.65) = 94.61$, $p < .001$, $\eta p^2 = .45$. Witness-offered information error rates were significantly lower than those for correct interviewer-offered information, which in turn were significantly lower than those for incorrect interviewer-offered information. The main effect pattern of information type differed slightly from the effect from the hypothesis-testing analysis, with significantly lower *content* error rates than *source* and *question* error rates, which did not differ significantly.

A significant interaction was found, $F(2.93, 339.78) = 58.47$, $p < .001$, $\eta p^2 = .34$. Both main effects differed per level of the other variable, but, as the only pattern of interest is that of information category per information type, only this effect will be discussed. For *content*, witness-offered information ($M = 5.05$) had significantly higher error rates than correct ($M = 2.37$) and incorrect ($M = 1.17$) interviewer-offered information, both *p*s < .002, which did not differ significantly ($p = .313$). The opposite pattern was found in *source*, where witness-offered information ($M = 1.28$) had significantly lower error rates than correct ($M = 17.03$) and incorrect ($M = 22.18$) interviewer-offered information, both *p*s < .001. Furthermore, in *source*, error rates for correct interviewer-offered information were significantly lower than those for incorrect interviewer-offered information, $p = .017$. For *questions*, error rates were significantly higher for incorrect interviewer-offered information ($M = 19.63$) compared to correct interviewer-offered information ($M = 10.63$) and witness information ($M = 11.57$), both *p*s < .001, which did not differ significantly ($p = .001$).

In short, incorrect interviewer-offered information had the highest accuracy rates and lowest omission rates across all information types, with low error rates for content,

but high error rates for source and questions. This pattern suggests that information that was offered by the interviewer, but was corrected by the witness, was remembered better, although memory for source and questions showed higher error rates than memory for correct interviewer-offered information and witness information. A recent study by Guillory and Geraci (2016) similarly found higher accuracy rates for information that was corrected compared to information that was not corrected.

Table 4

Means and Standard Deviations of Accuracy, Omission, and Error Rates for the Information Categories per Information Type

Information Type	Information Category	Accuracy		Omissions		Errors	
		M	*SD*	*M*	*SD*	*M*	*SD*
Content	Correct interviewer-offered information	39.86	20.56	57.77	21.62	2.37	6.24
	Incorrect interviewer-offered information	65.71	21.89	33.12	21.82	1.17	4.34
	Witness information	41.07	16.58	53.82	16.04	5.05	5.88
Source	Correct interviewer-offered information	26.85	20.87	56.13	22.90	17.03	14.11
	Incorrect interviewer-offered information	44.94	26.24	32.74	22.18	22.18	19.06
	Witness information	43.18	15.44	55.41	15.92	1.28	3.08

Questions	Correct interviewer-offered information	25.01	19.61	63.83	23.46	10.63	12.54
	Incorrect interviewer-offered information	39.03	20.80	41.34	27.16	19.63	15.48
	Witness information	29.31	16.14	58.71	17.98	11.57	7.41

"Don't Know" Question

A "don't know" question was included in the interview to probe participants' reporting of an uncertain witness response: In response to the interviewer question "Did anyone else talk to the victim?," the mock witness responded with "I don't know". Accuracy and omission rates for this "don't know" item (i.e., the fact that the witness expressed they *did not know* whether anyone spoke to the victim after the crime) were analyzed separately. A free recall response was accurate if the witness's uncertainty was made explicit (e.g., "the witness did not know") and a cued recall was accurate if the participant either chose "don't know" or verbalized the witness's uncertainty in the open response portion of the question. As these analyses concern only one data point per participant, and chi-square analyses showed no effect of *directed-focus instructions*, the overall proportions for accuracy and omission of the item were compared to the overall means of participants' total recall (see Table 5). Accuracy and omission rates for the "don't know" item were calculated identically to the overall accuracy and omission rates, i.e., accuracy or omission divided by accuracy, errors, and omissions.

Results show that omission rates for the "don't know" item largely mirror the overall omission rates found in the study, both in free and cued recall. However, accuracy rates show differences in recall of the "don't know" item compared to overall recall. In free recall, although the *source* and *question* accuracies mimic the means for the overall study's *source* and *question* accuracy, *content accuracy* (16.90%) is significantly lower than the average found in the study (M = 46.69). This is likely the result of many participants failing to explicitly include the witness's uncertainty in their answer, which the author and the coders noticed happened often while coding this item. A similar difference was found in cued recall (14.40% compared to M_{study} = 56.98), where *source accuracy* shows a similar pattern (13.60% compared to M_{study} = 47.33) and *question accuracy* shows the opposite pattern (44.90% compared to M_{study} = 29.53).

Table 5

Percentages of "Don't Know" Item Accuracy and Omissions Compared to Average Accuracy and Omission Rates

		Accuracy		Omissions	
		M_{study}	*% "Don't Know" Item*	M_{study}	*% "Don't Know" Item*
Content	Free Recall	46.69	16.90	49.88	55.90
	Cued Recall	56.98	14.40	11.77	0.00
	Total	51.83	*N/A*	30.82	*N/A*
Source	Free Recall	39.30	44.10	50.44	55.90
	Cued Recall	47.33	13.60	11.90	9.30
	Total	43.31	*N/A*	31.17	*N/A*
Questions	Free Recall	30.61	36.40	55.76	61.00

Cued Recall	29.53	44.90	23.63	33.90
Total	30.07	*N/A*	39.70	*N/A*

Source of Information

To probe a possible bias in remembering either interviewer or witness content, three mixed model ANOVAs were conducted with *directed-focus instructions condition* as the between-subjects factor, *source of information* (i.e., the interviewer or the witness) as the repeated measures factors, and with *accuracy, omissions,* and *error* rates as the dependent variables, respectively. Note that, rather than 26, a total of 39 pieces of information were coded per participant, as this analysis does not utilize the definition of source as "first person to raise information" but rather in the more traditional sense. For example, if the interviewer implied the perpetrator was blond but the witness corrected them and said the perpetrator had brown hair, source as "first person to raise the information" would be coded as "interviewer," as the interviewer was the first to raise a hair color. However, in these analyses, both the source of "blond" and the source of "brown" were coded.

There was no effect of *directed-focus instructions* on accuracy (p = .640), omissions (p = .699), or error rates (p = .237). However, an effect of *source* was found for *content accuracy* $F(1, 114) = 27.29$, $p = <.001$, $\eta p^2 = .19$, *omissions* $F(1, 114) = 37.17$, $p = <.001$, $\eta p^2 = .25$, and *error* rates $F(1, 114) = 26.01$, $p = <.001$, $\eta p^2 = .19$. Results showed higher *accuracy* rates for *witness information* (M = 46.69, SD = 12.98) than *interviewer information* (M = 37.45, SD = 19.02), lower *omission* rates for *witness*

information (*M* = 49.88, *SD* = 12.88) than *interviewer information* (*M* = 63.08, *SD* = 23.51), and higher *error* rates for *witness information* (*M* = 3.43, *SD* = 3.74) than *interviewer information* (*M* = 1.23, *SD* = 3.41). In short, these findings suggest better memory for the witness' contributions than for the interviewer's own contributions, in line with findings in the research on acquainting conversations (Stafford & Daley, 1984; Stafford et al., 1987) as well as those of Lamb and colleagues (2000), who found better memory for the interviewee's contributions than the interviewers' own contributions.

Cued Recall for Non-mentioned Pieces of Information

Five non-mentioned pieces of information were included in the cued-recall questionnaire, to probe whether participants could differentiate between information from the interview and brand-new information. These pieces of information were coded as correct when the participant explicitly indicated "was not discussed," with the exception of the question "Did the accomplice have an umbrella," where the answer "No" was also coded as correct. Any answer where the participant did not indicate the information was not discussed, but instead indicated "do not know" was coded as an omission, and any answer where the participant neither indicated "was not discussed" nor "do not know" was coded as incorrect.

Although five non-mentioned pieces of information were included in the cued-recall questionnaire, only three were included in the accuracy, omission, and error rate calculations. Many participants struggled differentiating between a backpack and a purse, both in free and cued recall. Therefore, the question "Did the perpetrators ask for the victim's purse during the crime," which should have been mentioned with "not

mentioned," was often answered incorrectly (46 incorrect content responses, 66 incorrect sources reported, 44 incorrect questions reported), and therefore excluded. Additionally, in response to the question "What, if anything, did the victim do right after the crime took place," most incorrect answers consisted of descriptions of what the perpetrators did after the crime (i.e., ran off) or what the witness did after the crime (i.e., call 911). Incorrect answers were not uncommon for this piece of information (15 incorrect content responses, 21 incorrect sources reported, 19 incorrect questions reported), and this piece of information was therefore also excluded from the analyses. As for the question probing the color of the victim's car, which was never mentioned, most incorrect answers suggested that participants misunderstood this question as asking about the color of the victim's hair, which was discussed during the interview (it was brown). However, there were not many incorrect answers (two incorrect content responses, eight incorrect sources reported, six incorrect questions reported), suggesting this was not a common error. Therefore, this piece of information was included in the analyses.

Three mixed-model ANOVAs were conducted with *directed-focus instructions condition* as the between-subjects factor, *information type* as the within-subjects factor, and *accuracy*, *omissions*, and *error rates* as the dependent variables, respectively. No significant differences were found across any of the analyses (with *p*-values ranging from .018 to .658; note that the required *p*-value for significance is .017 in the current study due to alpha correction), likely as a result of ceiling effects for accuracy (accuracy rates ranging from 81-82%) and floor effects for error rates (ranging from 2-3%), with omission rates ranging from 16-17%.

V. DISCUSSION

The current study aimed to investigate interviewers' memory for content, source, and questions in a witness interview. Furthermore, the study set out to improve investigative interviewers' memory for source and questions, with a focus on memory for questions asked, as research has shown that how information is elicited is indicative of its accuracy (e.g., Eisen et al., 2002; Evans & Fisher, 2011; Fisher et al., 2009). Specifically, the study sought to analyze whether providing interviewers with *directed-focus instructions*, which instructed them to focus on either source, questions, or both source and questions, increases interviewers' accuracy and decreases their omissions in remembering these types of information.

This section discusses the main takeaway points, linking the study's results to prior research and discussing implications. Limitations and future directions will be discussed, as well, followed by a succinct conclusion reiterating the key findings and implications of the current study.

We Are Right to Worry About Losing Diagnostic Question Information

Research on interview questions has shown that how content information is elicited (i.e., which questions are used) from witnesses by the interviewer is diagnostic of the veracity of those responses, specifically recommending the use of open-ended questions over other question formats, and particularly condemning the use of leading questions (e.g., Eisen et al., 2002; Evans & Fisher, 2011; Fisher et al., 2009). However, out of the three types of information studied in the current paper, literature on memory for questions is the most lacking. The limited research on questions generally focuses on

how many questions are recorded in interviewers' notes during the interview, rather than how many questions interviewers remember—and how accurately they remember them. The few studies that studied question memory found sobering results: Bruck and colleagues (1999) found accuracy rates of 16-17%, and Hyman Gregory (2009) found omission rates ranging from 44-50%. Accuracy rates found in the current study reveal a more positive picture, with an average of 30%, which jumps to 54% accuracy when calculated as *independent* of omissions. However, accuracy rates for questions were the lowest out of the three types of information, and the analyses indicated significantly worse accuracy for questions.

Furthermore, question omissions were the highest omissions out of the three types of information, once again indicating worse memory for questions. The omission rates found in this study were similar to those found by Hyman Gregory (2009), averaging 40%, with 56% of question information omitted in the current study's free-recall report, similar to Hyman Gregory's measure. Overall, these results suggest we are right to be worried about losing diagnostic information about content through the loss of question information. This loss of information means our judgments of content accuracy are impaired, as content may have been elicited through either very reliable methods (e.g., using open-ended questions) or inherently problematic methods (e.g., using leading questions). Without information on *how* content was elicited, we cannot make an adequately informed judgement about content accuracy.

Directed-focus Instructions Do Not Improve Memory

The current study utilized *directed-focus instructions*, instructing participants to focus on either source, questions, or both, or not instructing participants to focus on anything in particular (i.e., baseline condition) before they conducted their interview. Drawing attention to the different types of information was hypothesized to increase memory for these types of information, in line with previous literature (Crawley et al., 2010; Guynn & Roediger, 1995; Tatler & Tatler, 2013). However, the results did not show a robust effect of *directed-focus instructions*: There was no effect of *directed-focus instructions* whatsoever on *accuracy* or *omission rates*, as neither a main effect of nor any interaction effects with directed-focus condition were discovered for either of these outcome variables. A three-way interaction was found in the *error* rates, where *directed-focus instructions* conditions, in combination with *recall format*, altered the effect of *information type* via a three-way interaction. In the only pattern supporting the hypothesized effect of *directed-focus instructions*, participants in the *source-focus* condition had a significantly lower *source error rate* than participants in the *baseline condition*. However, this effect was only found in free recall.

These results are not in line with previous research findings that show participants who were instructed to pay attention to certain stimuli had better later recall (e.g., Guynn & Roediger, 1995; Tatler & Tatler, 2013). Perhaps simple *directed-focus instructions* are not sufficient to ensure participants pay attention. In a situation with as many moving parts and a high cognitive demand such as conducting an interview, it is possible that these instructions were simply not adequate to focus participants' attention to source

and/or questions. Furthermore, it is possible that the bias towards remembering content that the current study has found, particularly in terms of accuracy, overrides any possible effects of *directed-focus instructions* on *source* and *question* memory. The content bias may simply be too large and negate any effects of the focus instructions, which may have had an effect on source and question memory, but not one large enough to not be overwhelmed by the content bias.

It seems unlikely that the lack of significant effect of the *directed-focus instructions* in this study was a result of an unreliable *directed-focus instructions* manipulation, as *directed-focus instructions* used in previous studies have been much less explicit (see Crawley et al., 2010; Guynn & Roediger, 1995; Ross & Sicoly, 1979; Tatler & Tatler, 2013). The current manipulation instructed participants to focus on a certain type of information, on two separate occasions. This level of manipulation is arguably stronger than that found in earlier studies, as previous studies instructed participants only once to pay attention to the target information. The previous studies that manipulated *content*-focus simply instructed their participants to pay attention to a specific category of content: Tatler and Tatler's (2013) *directed-focus manipulation* consisted of instructing the participants to try to "remember as much as possible about the objects in the room that could be used to make a cup of tea" (p. 4), and Guynn and Roediger's (1995) instructed their participants to "be especially sure to remember either the animal (*animals* condition) or the sport (*sports* condition) in each list" (p. 194). The previous studies that manipulated *source*-focus did not even explicitly instruct their participants to focus on source: Ross and Sicoly's (1979) *source*-focus manipulation consisted of instructing the participants to either write down their own statements (*self-focus*) or their conversational

partner's statements (*other-focus*), and Crawley and colleagues (2010) manipulated *source*-focus by either asking a question about the participant or about the speaker. Although their manipulations draw attention to source, neither explicitly instructed their participants to focus on source.

Rather than being indicative of an insufficient *directed-focus instructions* manipulation, these results suggest that *directed-focus instructions* may not be sufficient to increase accuracy and decrease omission rates for *content*, *source*, and *question* memory. This conclusion, however, runs contrary to the findings of Tatler and Tatler (2013) and Guynn and Roediger (1995), who found a robust effect of *directed-focus instructions* on *content* information. Furthermore, Crawley et al. (2010) found that *directed-focus instructions* improved differentiation between two *sources*. However, these studies directed attention to very distinct categories (tea-related vs. non-tea-related items, and animal words vs. sports words, respectively) or to two different people. It is possible that shifting attention from one semantic category to another, or differentiating between two people, is more easily done than categorizing between three types of information, all of which together form a memory. In other words, the three types of information in the current study may simply be too similar or too inextricably linked to manipulate independently using *directed-focus instructions*.

In addition to the superior memory for content found in this study, results also suggested a bias towards remembering the witness's contributions, as the exploratory analysis on source of information found that witness information (i.e., information provided by the witness during the interview) was remembered more accurately and more

completely than interviewer information (i.e., information provided by the interviewer). Although the exploratory analysis comparing correct interviewer-offered information, incorrect interviewer-offered information, and witness information found higher accuracy and lower omission rates for incorrect interviewer-offered content information than for witness information, this is likely the result of the interviewer being contradicted by the witness, who explicitly corrected the incorrect information introduced by the interviewer, again indicating a bias towards remembering the witness's contributions. Furthermore, this witness information bias can also be explained by negativity bias, where negative things are generally remembered better than positive things (Rozin & Royzman, 2001). Additionally, research has shown that receiving negative feedback results in change of response more than neutral feedback (Gudjonsson, 2003; Henkel, 2014; McGroarty & Baxter, 2007; McMurtrie et al., 2012).

Although *directed-focus instructions* do not seem to aid in improving *source* and *question* memory, there were also no findings suggesting they would harm *source* and *question* memory. No significant effects were found for *content* memory either, although the means do suggest the possibility of a small attentional trade-off: Content *omissions* were lower in the baseline condition (46% in free recall, 10% in cued recall) than in the directed-focus conditions (50-52% in free recall, 11-15% in cued recall). Content *accuracy* was higher in the baseline condition (50% in free recall, 59% in cued recall) than in the directed-focus conditions (45-47% in free recall, 53-59% in cued recall), although cued-recall content accuracy in the source *and* question-focus condition was identical to baseline accuracy. Although none of these differences were statistically significant, the overall pattern does suggest the possibility of a small attentional trade-off,

as suggested by some of the literature discussed earlier (e.g., Jurica & Shimamura, 1999). However, the lack of a significant attentional trade-off found in the current study is also supported by attentional trade-off literature (e.g., Goldsmith & Pillemer, 1988) as the literature has found both situations with and without attentional tradeoffs.

Cued Recall Reduces Omissions but Increases Errors

The most robust effect found across all main analyses was that of recall format. Just like Korkman and colleagues (2015) found improved accuracy and completeness in their cued-recall measure compared to their free-recall measure, the current study found that participants benefited from a cued-recall format. In the current study, a main effect of recall format was found across all analyses, with cued recall resulting in increased *accuracy* rates and decreased *omission* rates. The only disruption of recall format's main effect was found in the *accuracy* analysis, where a two-way interaction with *information type* showed that cued recall only increased accuracy for *content* and *source*, but not for *questions*. In short, although *question accuracy* did not benefit from a cued-recall format, accuracy for both other types of information and omission rates for all information types improved in cued recall, with accuracy increasing and omission rates decreasing compared to a free-recall format.

Yet, an important observation must be made about the decrease in *omission* rates for all three information types: Although all information types benefited from a cued-recall format, the information that was gained was mostly incorrect. Whereas content accuracy increased 10% from free to cued recall, content errors increased by 28%; source accuracy increased by 8% compared to a 31% increase in errors, and question accuracy

actually dropped by 2%, compared to a 34% increase in errors. Although content and source still had higher overall rates of accuracy (57% and 47%, respectively) than errors (31% and 41%, respectively) in cued recall, the rate of errors for questions in cued recall (47%) was *higher* than the accuracy rate (29%). These results suggest that, although the cued-recall questionnaire had the desired and hypothesized effect of decreasing omissions, the information gained from using a cued-recall format, compared to a free-recall format, was mostly incorrect. Therefore, cued recall should be used carefully in court settings, such as when an interviewer is cross-examined about an interview they conducted.

Selective Reporting

The cued-recall measure was included in this study to ensure that information omitted from the free recall was omitted simply because it was not remembered, or not remembered with enough confidence to report, rather than because participants felt they should only report certain types of information. The large increase of incorrect information in cued recall, compared to the much smaller increase in accurate information, suggests two things. Following the reasoning of Goldsmith et al. (2014), participants shifted their response criterion in response to the perceived loss of control of report option and grain size. Specifically, Goldsmith et al.'s participants were found to lower their criterion when they were required to report fine-grained answers. Because my participants were highly encouraged to be complete in their cued recall, and because the questions asked were very specific, participants lost a large amount of control of report option and of grain size. Therefore, whereas their confidence in a piece of information may not have been large enough to clear the threshold set in the free-recall format, this

threshold was lowered for the cued-recall questionnaire, resulting in pieces of information with much lower confidence being reported. As a result, many of these pieces of information were in fact incorrect. In fact, if we look at the accuracy rates for cued recall as calculated *independently* of *omissions*, we find an overall average of 52% accuracy; indicating performance at chance level. This suggests that participants were more or less guessing during cued recall, and that the decrease in omissions in cued recall was not the result of selective reporting based on directed-focus instructions during free recall.

This suggested guessing behavior may be the result of the presence of weak memory traces. In the exploratory analyses, participants' performance for non-mentioned pieces of information in cued recall showed that overall, participants were very good at deciding whether a piece of information presented during cued recall was new (i.e., did not have a memory trace) or old (i.e., had a memory trace due to it being presented before, either in the report or during the witness interview). If participants were just guessing across the entire cued-recall measure, accuracy rates for these nonmentioned pieces of information (81-82%) would be lower, mimicking the overall accuracy for the 26 pieces of information in cued recall, i.e., 45%. This suggests that the guessing behavior only occurred when participants realized they had a memory trace for a piece of information, but it was weak. Wearing (1970) indeed found that participants can differentiate between the strength of memory traces for their responses.

Comparing Accuracy and Omission Rates to the Literature

The patterns of accuracy and omissions found in the current study reflect those found in the literature, with higher accuracy for content than for source and questions, and higher omission rates for questions than for content and source. Further, the specific rates found in the current study are also similar to past research: Question omissions ranged from 24-56%, mimicking the omission rates of 44-50% found by Hyman Gregory (2009), source accuracy averaged 43%, in line with Korkman et al.'s average of 49%, and content omissions ranged from 12-50%, similar to the range of 25-57% reported by Lamb et al. (2000). However, the average content accuracy found in the current study, at 52%, differs significantly from the range of 48-99% reported by Boydell and Read (2011) and the range of 68-99% reported by Samp and Humphreys (2007). This stark difference in accuracy rates may be the result of differing calculations of accuracy, which makes comparing accuracy rates and, by extension, the effect of interventions, difficult. In the current study, accuracy was calculated as dependent on omission rates. If accuracy was calculated as independent of omissions, e.g., by dividing accuracy rates by the total number of reported pieces of information (i.e., total pieces of correctly reported information plus total pieces of incorrectly reported information), participants who only reported a handful of the 26 total pieces of information could obtain a higher accuracy than those who reported more pieces of accurate information. For example, if Participant A only reported five pieces of information, four of which were correct, they would have an accuracy rate of 80%. Say that Participant B reported ten pieces of information, seven of which were correct, their accuracy rate would be 70%. However, overall, Participant B reported more accurate information than Participant A; as per the current study's

calculations, Participant A's accuracy would be 15% (number of correctly reported pieces of information divided by 26) and Participant B's accuracy rate would be 27%.

The literature cited in this paper rarely, if ever, provided an explanation of how accuracy was calculated, as either input-bound or output-bound. In addition to the fact that this makes it hard to compare accuracy rates and effects, it also makes it difficult to interpret these results, as participants may come across as much more informative than they actually were. It is likely, especially with accuracy rates as high as 99%, that accuracy was calculated as *independent* of omissions. The accuracy rates found in the current study, with a global average of 42% and an average of 52% for content, might seem poor, but they were calculated as *dependent* on omission rates. If accuracy had been calculated as *independent* of omission rates, accuracy rates for this study would have ranged from 54% for questions to 79% for content, with a high of 93% accuracy for content in free recall, and a global average of 66%. All these estimates are in line with what has been previously reported in literature on content accuracy, e.g., the 48% to 99% range by Boydell and Read (2011).

Limitations

Cued-recall Questionnaire

Although results showed significantly higher accuracy for *content* than for *source* in the cued-recall questionnaire, this might be the result of participants not fully understanding the instructions. For example, performance was very poor for the question of who first raised the sleeve length. The scripted question mentioned the word "t-shirt," which indicates short sleeve length. The witness then replied by saying the accomplice

wore a long-sleeved shirt. However, many participants indicated that the witness was the first to indicate a sleeve length. It is possible more training was needed for participants to understand when the interviewer was the first to raise a piece of information, as this information could be implied by specific phrasing, rather than explicitly mentioned. Therefore, *source accuracy* from the cued-recall questionnaire may underestimate actual accuracy rates.

Ecological Validity

A limitation of the current study was the use of undergraduate students as interviewers, rather than real-life investigative interviewers. However, Hyman Gregory (2009) found no significant differences between police officers and undergraduate students in memory accuracy for witness information or questions. Additionally, unlike the average police officer or investigative interviewer, participants of the current study only engaged in a singular interview. Yet repeated interviews with the same witness or even different witnesses could impair source memory, as each interview becomes less distinct (Davis & Friedman, 2007). As the participants in the current study only conducted one interview, it can be expected that source memory for real-life investigative interviewers is worse than that of the current sample. Thus, the source accuracy found in the current study likely overestimates source accuracy of real-world interviewers.

Using a scripted interview itself also decreased ecological validity. Although police officers might use a standard set of questions in each witness interview, more specific follow-up questions will differ per interview as they focus on the information the witness offers, reducing the ecological validity of the current study. Furthermore, as the

current study aimed to measure (and improve) memory for questions, using a scripted interview eliminates the self-generation effect (Crutcher & Healy, 1989). Eliminating the self-generation effect could have reduced memory for questions asked. This would mean that real-world interviewers could have better memory for questions than what was found in this study. That being said, participants are still stating the questions themselves and have a vested role as an interviewer in this study. Finally, the scripted interview consisted of only 26 critical pieces of information to ensure the confederate witnesses would not forget or mix up information. However, as this study was the first to examine interviewers' content, source, and question memory, the decision was made to optimize the internal validity of the study, prioritizing standardization and variability, rather than aiming for high ecological validity.

Future Directions

Future research should focus on improving the ecological validity of the current study, such as by collecting data using police officers as participants, rather than undergraduate students, and having the interviewers conduct their own interviews, rather than scripted ones. Additional research should also focus more on the cognitive processes underlying the different types of memory and try to parse out how the different types of information are similar and different, and if they rely on the same processes and brain structures or not. Furthermore, as the current study's results show better memory for witness information than for the interviewers' own contributions, in line with research on acquainting conversations, perhaps future research should not aim to override the suggested inherent bias towards witness information, but rather focus on increasing the

recording of interviewer questions. Perhaps research can attempt to increase note-taking behaviors during interviews. Finally, future research could analyze whether the presence and quality of interviewer questions during testimony at trial influences juror's impressions of witness reliability. Even though research has shown that source and question information are diagnostic of content, it is worth studying if jurors understand this link and if they weigh witness testimony differently depending on A) whether source and question information is available, and B) if this information is available, what it says about witness reliability (i.e., do the source and question information suggest the witness testimony is reliable or not?).

Conclusion

The current study shows that we are right to be worried about losing diagnostic information about content memory in the form of question memory, as question memory was inferior to content and source memory across almost all measures. The results also suggest that directed-focus instructions are not a viable mechanism to improve memory for source and questions. Exploratory analyses hint that this may be a result of an inherent bias towards witness information, at the cost of memory for one's own contributions, resulting in the question of whether it might simply go against the nature of an information-gathering interview for an interviewer to focus on their own contributions. Finally, results indicate that we should be careful when asking investigative interviewers cued-recall questions during their testimony, as any information not freely recalled and attempted to be gained via cued recall is more likely incorrect than correct.

REFERENCES

Baddeley, A. D., & Hitch, G. (1974). Working memory. In G.H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 8, pp. 47-89). New York: Academic Press.

Boydell, C. A., & Read, J. D. (2011). Accuracy of and confidence in mock jailhouse informants' recall of criminal accounts. *Applied Cognitive Psychology, 25*(2), 255-264. https://doi.org/10.1002/acp.1672

Brown, A. S., Jones, E. M., & Davis, T. L. (1995). Age differences in conversational source monitoring. *Psychology and Aging, 10*(1), 111-122. https://doi.org/10.1037/0882-7974.10.1.111

Brown-Schmidt, S., & Benjamin, A. S. (2018). How we remember conversation: Implications in legal settings. *Policy Insights from the Behavioral and Brain Sciences, 5*(2), 187–194. https://doi.org/10.1177/2372732218786975

Bruck, M., Ceci, S., & Francoeur, E. (1999). The accuracy of mothers' memories of conversations with their preschool children. *Journal of Experimental Psychology: Applied, 5*(1), 89-106. https://doi.org/10.1037/1076-898X.5.1.89

Cauchi, R., & Powell, M. B. (2009). An examination of police officers' notes of interviews with alleged child abuse victims. *International Journal of Police Science and Management, 11*(4), 505-515. https://doi.org/10.1350/ijps.2009.11.4.147

Choi, S., Lotto, A., Lewis, D., Hoover, B., & Stelmachowicz, P. (2008). Attentional modulation of word recognition by children in a dual-task paradigm. *Journal of Speech Language and Hearing Research, 51*(4), 1042-1054. https://doi.org/10.1044/1092-4388(2008/076)

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. Psychological Review, 82(6), 407–428. https://doi.org/10.1037/0033-295x.82.6.407

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*(6), 671-684. https://doi.org/10.1016/s0022-5371(72)80001-x

Crawley, S. L., Newcombe, N. S., & Bingman, H. (2010). How focus at encoding affects children's source monitoring. *Journal of Experimental Child Psychology, 105*(4), 273-285. https://doi.org/10.1016/j.jecp.2009.12.003

Crutcher, R. J., & Healy, A. F. (1989). Cognitive operations and the generation effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15*(4), 669-675. https://doi.org/10.1037/0278-7393.15.4.669

Davis, D., & Friedman, R. D. (2007). Memory for conversation: The orphan child of witness memory researchers. In M. P. Toglia, D. J. Read, D. F. Ross, & R. C. L. Lindsay (Eds.), *The handbook of eyewitness psychology, Vol I: Memory for events* (3-52). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Davis, D., Kemmelmeier, M., & Follette, W. C. (2005). Memory for conversation on trial. In Y. I. Noy & W. Karwowski (Eds.), *Handbook of human factors in litigation* (281-316). Boca Raton, FL: CRC Press

Eisen, M. L., Quas, J. A., & Goodman, G. S. (2002). *Memory and suggestibility in the forensic interview.* Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Evans, J. R., & Fisher, R. P. (2010). Eyewitness memory: Balancing the accuracy, precision and quantity of information through metacognitive monitoring and control. *Applied Cognitive Psychology, 25*(3), 501–508. https://doi.org/10.1002/acp.1722

Fischer, N. M., Schult, J. C., & Steffens, M. C. (2015). Source and destination memory in face-to-face interaction: A multinomial modeling approach. *Journal of Experimental Psychology: Applied, 21*(2), 195-204. https://doi.org/10.1037/xap0000046

Fisher, R. P., Brewer, N., & Mitchell, G. (2009). The relation between consistency and accuracy of eyewitness testimony: Legal versus cognitive explanations. In T. Williamson, R. Bull, & T. Valentine (Eds.), *Handbook of psychology of investigative interviewing: Current developments and future directions* (121-136). Hoboken, NJ: John Wiley & Sons.

Fisher, R. P, Schreiber Compo, N., Rivard, J., & Hirn, D. (2014). Interviewing witnesses. In Perfect, T. J. & Lindsay, D. S. (Eds.), *The SAGE Handbook of Applied Memory* (559-587). SAGE Publications Ltd

Goldsmith, M., Pansky, A., & Koriat, A. (2014). Metacognitive control of memory reporting. In T. J. Perfect & D. S. Lindsay (Eds.), *The SAGE Handbook of Applied Memory* (481-500). Newbury Park, CA: SAGE Publishing.

Goldsmith, L. R., & Pillemer, D. B. (1988). Memories of statements spoken in everyday contexts. *Applied Cognitive Psychology, 2*(4), 273–286. https://doi.org/10.1002/acp.2350020405

Gopie, N., & MacLeod, C. M. (2009). Destination memory: Stop me if I've told you this before. *Psychological Science, 20*(12), 1492-1499. Doi :10.1111/j.1467-9280.2009.02472.x

Gudjonsson, G. H. (2003). *The psychology of interrogations and confessions: A handbook*. Wiley. https://doi.org/10.1002/9780470713297

Guillory, J. J., & Geraci, L. (2015). The persistence of erroneous information in memory: The effect of valence on the acceptance of corrected information. *Applied Cognitive Psychology, 30*(2), 282–288. https://doi.org/10.1002/acp.3183

Gutiérrez-Davila, M., Rojas, F. J., Gutiérrez-Cruz, C., & Navarro, E. (2017). Effect of dual-attention task on attack and defensive actions in fencing. *European Journal of Sport Science, 17*(8), 1004–1012. https://doi.org/10.1080/17461391.2017.1332100

Guynn, M. J., & Roediger, H. L. (1995). High-priority event instructions affect implicit and explicit memory tests. *Psychological Research, 57*(3-4), 192-202. https://doi.org/10.1007/bf00431280

Henkel, L. A. (2014). Do older adults change their eyewitness reports when re-questioned? *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 69*(3), 356-365. https://doi.org/10.1093/geronb/gbt071

Hickman, M. J., & Reaves, B. A. (2003). *Local police departments, 2003*. Retrieved from https://www.bjs.gov/content/pub/pdf/lpd03.pdf

Hyman Gregory, A. (2009). *Investigative interviewing and memory: How accurate are interviewers' recollections of investigative interviews?* (Doctoral dissertation). Retrieved from FIU Electronic Theses and Dissertations. (199). https://doi.org/10.25148/etd.fi10022523

Hyman Gregory, A., Schreiber Compo, N., Vertefeuille, L., & Zambruski, G. (2011). A comparison of US police interviewers' notes with their subsequent reports. *Journal of Investigative Psychology and Offender Profiling, 8*(2), 203-215. https://doi.org/10.1002/jip.139

Johnson, H., Hashtroudi, S., & Lindsay, S. (1993). Source monitoring. *Psychological Bulletin, 114*(1), 3-28.

Johnson-Laird, P. N., & Bethell-Fox, C. E. (1978). Memory for questions and amount of processing. *Memory & Cognition, 6*(5), 496-501. https://doi.org/10.3758/bf03198237

Jurica, P. J., & Shimamura, A. P. (1999). Monitoring item and source information: Evidence for a negative generation effect in source memory. *Memory & Cognition, 27*(4), 648-656. https://doi.org/10.3758/bf03211558

Kassin, S. M. (2005). On the psychology of confessions: Does innocence put innocents at risk? *American Psychologist, 60*(3), 215-228. https://doi.org/10.1037/0003-066x.60.3.215

Kelly, G. (1955). *The Psychology of Personal Constructs.* New York: Norton.

Köhnken, G., Thürer, C., & Zoberbier, D. (1994). The cognitive interview: Are the interviewers' memories enhanced, too? *Applied Cognitive Psychology, 8*, 13-24. https://doi.org/10.1002/acp.2350080103

Koriat, A., Goldsmith, M., Schneider, W., & Nakash-Dura, M. (2001). The credibility of children's testimony: Can children control the accuracy of their memory reports? *Journal of Experimental Child Psychology, 79*(4), 405-437. https://doi.org/10.1006/jecp.2000.2612

Korkman, J., Laajasalo, T., Juusola, A., Uusivuori, L., & Santtila, P. (2015). What did the child tell? The accuracy of parents' reports of a child's statements when suspecting child sexual abuse. *Journal of Forensic Psychology Practice, 15*(2), 93-113. https://doi.org/10.1080/15228932.2015.1003439

Lamb, M. E., Orbach, Y., Sternberg, K. J., Hershkowitz, I., & Horowitz, D. (2000). Accuracy of investigators' verbatim notes of their forensic interviews with alleged child abuse victims. *Law and Human Behavior, 24*(5), 699-708. https://doi.org/10.1023/A:1005556404636

Loftus, E. F., Miller, D. G., & Burns, H. J. (1978). Semantic integration of verbal information into a visual memory. *Journal of Experimental Psychology: Human Learning and Memory, 4*(1), 19–31. https://doi.org/10.1037/0278-7393.4.1.19

MacLeod, C. M., Gopie, N., Hourihan, K. L., Neary, K. R., & Ozubko, J. D. (2010). The production effect: Delineation of a phenomenon. Journal of Experimental Psychology: Learning, Memory, and Cognition, 36(3), 671–685. https://doi.org/10.1037/a0018785

Marsh, R. L., & Bower, G. H. (1993). Eliciting cryptomnesia: Unconscious plagiarism in a puzzle task. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19*(3), 673–688. https://doi.org/10.1037/0278-7393.19.3.673

Matlin, M. W., & Farmer, T. A. (2015). *Cognition* (9th edition). Hoboken, NJ: Wiley

McGroarty, A., & Baxter, J. S. (2007). Interrogative pressure in simulated forensic interviews: The effects of negative feedback. *British Journal of Psychology, 98*, 455-465. https://doi.org/10.1348/000712606x147510

McKinley, G. L., Brown-Schmidt, S., & Benjamin, A. S. (2017). Memory for conversation and the development of common ground. *Memory & Cognition, 45*(8), 1281-1294. https://doi.org/10.3758/s13421-017-0730-3

McMurtrie, H., Baxter, J. S., Obonsawin, M. C., & Hunter, S. C. (2012). Consistent witness responses: The effects of age and negative feedback. *Personality and Individual Differences, 53*, 958-962. https://doi.org/10.1016/j.paid.2012.07.008

Miller, J. B., deWinstanley, P., & Carey, P. (1996). Memory for conversation. *Memory, 4*(6), 615–632. https://doi.org/10.1080/741940999

Pezdek, K., & Prull, M. (1993). Fallacies in memory for conversations: Reflections on Clarence Thomas, Anita Hill, and the like. *Applied Cognitive Psychology, 7*(4), 299–310. https://doi.org/10.1002/acp.2350070404

Putnam, A. L., Sungkhasettee, V. W., & Roediger, H. L. (2016). When misinformation improves memory. *Psychological Science, 28*(1), 36–46. https://doi.org/10.1177/0956797616672268

Raye, C. L., & Johnson, M. K. (1980). Reality monitoring vs. discriminating between external sources of memories. *Bulletin of the Psychonomic Society, 15*(6), 405-408. https://doi.org/10.3758/bf03334572

Reaves, B. A. (2013). *Local police departments, 2013: Personnel, policies, and practices.* Retrieved from https://www.bjs.gov/content/pub/pdf/lpd13ppp.pdf

Ross, M., & Sicoly, F. (1979). Egocentric biases in availability and attribution. *Journal of Personality and Social Psychology, 37*(3), 322-336. https://doi.org/10.1037/0022-3514.37.3.322

Rozin, P, & Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review, 5*(4), 296-320. https://doi.org/10.1207/S15327957PSPR0504_2

Russo, R., & Grammatopoulou, N. (2003). Word length and articulatory suppression affect short-term and long-term recall tasks. *Memory & Cognition, 31*(5), 728–737. https://doi.org/10.3758/bf03196111

Samp, J. A., & Humphreys, L. R. (2007). "I said what?" Partner familiarity, resistance, and the accuracy of conversational recall. *Communication Monographs, 74*(4), 561–581. https://doi.org/10.1080/03637750701716610

Schreiber Compo, N., Hyman Gregory, A., & Fisher, R. P. (2012). Interviewing behaviors in police investigators: A field study of a current US sample. *Psychology, Crime & Law, 18*(4), 359-375. https://doi.org/10.1080/1068316x.2010.494604

Slamecka, N. J., & Graf, P. (1978). The generation effect: Delineation of a phenomenon. *Journal of Experimental Psychology: Human Learning & Memory, 4*(6), 592-604. https://doi.org/10.1037/0278-7393.4.6.592

Stafford, L., Burggraf, C. S., & Sharkey, W. F. (1987). Conversational memory: The effects of time, recall, mode, and memory expectancies on remembrances of natural conversations. *Human Communication Research, 14*(2), 203-229. https://doi.org/10.1111/j.1468-2958.1987.tb00127.x

Stafford, L., & Daly, J. A. (1984). Conversational memory: The effects of recall mode and memory expectancies on remembrances of natural conversations. *Human Communication Research, 10*(3), 379-402. https://doi.org/10.1111/j.1468-2958.1984.tb00024.x

Strayer, D. L., & Johnston, W. A. (2001). Driven to distraction: Dual-task studies of simulated driving and conversing on a cellular telephone. *Psychological Science, 12*(6), 462-466. https://doi.org/10.1111/1467-9280.00386

Tatler, B. W., & Tatler, S. L. (2013). The influence of instructions on object memory in a real-world setting. *Journal of Vision, 13*(2), 1-13. https://doi.org/10.1167/13.2.5

Technical Working Group: Eyewitness Evidence (1999). *Eyewitness evidence: A guide for law enforcement.* US Department of Justice, Office of Justice Programs, National Institute of Justice. NCJ 178240. Retrieved from: https://www.ncjrs.gov/pdffiles1/nij/178240.pdf

Wearing, A. J. (1970). On the trace strength of responses varying in correctness. *Psychonomic Science, 21*(4), 226-227. https://doi.org/10.3758/bf03332456

Wells, G. L., Memon, A., & Penrod, S. D. (2006). Eyewitness evidence. *Psychological Science in the Public Interest, 7*(2), 45-75. https://doi.org/10.1111/j.1529-1006.2006.00027.x

Appendix A: **Baseline Condition** Video Script Including the Instructions for the Witness Interview

Video 1:

"Place yourself in the shoes of a police investigator. You are about to interview someone about a crime they have just witnessed. Please gather as much information as possible from the witness about the crime, as this study will go on to inform actual criminal cases. As an investigator, you will want to obtain as many details as you can from the witness to piece together what the witness saw. You should ask the witness questions that will help to later solve the crime. A good interview typically starts with getting to know the witness and making them feel comfortable. Establishing the purpose of the interview also helps make the witness more comfortable sharing information about the crime. Make sure to take your time and also give the witness time to respond to your questions. A good interview typically starts with more open-ended questions, which are questions that require a somewhat longer answer, followed by more specific follow-up questions. Also, make sure to double check any information you might get from the police report, as a good interviewer always verifies information.

You will not be able to take notes during the interview. Please try and remember as much information as possible.

After the interview, you will fill out some forms. Once you have completed those forms, you will be asked to write a report about the interview. The report should not be summarized but should reflect exactly what was said during the interview as much as

possible, so make sure to pay attention during the interview. Participants who provide a good report will be rewarded with an extra SONA credit!

Before you start the interview, the first responding officer has written up a short report with some information about the incident. They have interviewed another witness, not the one you will be interviewing, and written up a short summary of that interview. You will read some of this report now."

Video 2 for Baseline Condition:

"Now that you have read the report, you are ready to start the witness interview. You have unlimited time to conduct the interview, but make sure to stick to the interviewer questions we will provide for you. Keep in mind that you will have to write up a report afterwards, so pay close attention. We are counting on your interviewing skills to help solve this case."

Appendix B: **Source-Focus Condition** Video Script Including the Instructions for the Witness Interview

Video 1:

"Place yourself in the shoes of a police investigator. You are about to interview someone about a crime they have just witnessed. Please gather as much information as possible from the witness about the crime, as this study will go on to inform actual criminal cases. As an investigator, you will want to obtain as many details as you can from the witness to piece together what the witness saw. You should ask the witness questions that will help to later solve the crime. A good interview typically starts with getting to know the witness and making them feel comfortable. Establishing the purpose of the interview also helps make the witness more comfortable sharing information about the crime. Make sure to take your time and also give the witness time to respond to your questions. A good interview typically starts with more open-ended questions, which are questions that require a somewhat longer answer, followed by more specific follow-up questions. Also, make sure to double check any information you might get from the police report, as a good interviewer always verifies information.

You will not be able to take notes during the interview. Please try and remember as much information as possible.

After the interview, you will fill out some forms. Once you have completed those forms, you will be asked to write a report about the interview. The report should not be summarized but should reflect exactly what was said during the interview as much as

possible, so make sure to pay attention during the interview. Participants who provide a good report will be rewarded with an extra SONA credit!

There are lots of things that good investigators pay attention to during an interview. One thing is who first brought up a fact or idea. When you are conducting the interview, in addition to what was said, please pay careful attention to who first brought up a fact or idea.

Before you start the interview, the first responding officer has written up a short report with some information about the incident. They have interviewed another witness, not the one you will be interviewing, and written up a short summary of that interview. You will read some of this report now."

Video 2:

"Now that you have read the report, you are ready to start the witness interview. You have unlimited time to conduct the interview, but make sure to stick to the interviewer questions we will provide for you. Keep in mind that you will have to write up a report afterwards, so pay close attention. **And remember: a good interviewer pays close attention to who first brought up a fact or idea, so make sure to pay attention to this.** We are counting on your interviewing skills to help solve this case."

Appendix C: **Question-Focus Condition** Video Script Including the Instructions for the Witness Interview

"Place yourself in the shoes of a police investigator. You are about to interview someone about a crime they have just witnessed. Please gather as much information as possible from the witness about the crime, as this study will go on to inform actual criminal cases. As an investigator, you will want to obtain as many details as you can from the witness to piece together what the witness saw. You should ask the witness questions that will help to later solve the crime. A good interview typically starts with getting to know the witness and making them feel comfortable. Establishing the purpose of the interview also helps make the witness more comfortable sharing information about the crime. Make sure to take your time and also give the witness time to respond to your questions. A good interview typically starts with more open-ended questions, which are questions that require a somewhat longer answer, followed by more specific follow-up questions. Also, make sure to double check any information you might get from the police report, as a good interviewer always verifies information.

You will not be able to take notes during the interview. Please try and remember as much information as possible.

After the interview, you will fill out some forms. Once you have completed those forms, you will be asked to write a report about the interview. The report should not be summarized but should reflect exactly what was said during the interview as much as

possible, so make sure to pay attention during the interview. Participants who provide a good report will be rewarded with an extra SONA credit!

There are lots of things that good investigators pay attention to during an interview. One thing is how questions are phrased (the words used to ask the witness the question). When you are conducting the interview, in addition to what was said, please pay careful attention to how you phrase your questions, including the words that you use to ask them.

Before you start the interview, the first responding officer has written up a short report with some information about the incident. They have interviewed another witness, not the one you will be interviewing, and written up a short summary of that interview. You will read some of this report now."

Video 2:

"Now that you have read the report, you are ready to start the witness interview. You have unlimited time to conduct the interview, but make sure to stick to the interviewer questions we will provide for you. Keep in mind that you will have to write up a report afterwards, so pay close attention. **And remember: a good interviewer pays close attention to how questions are phrased, so make sure to pay attention to this.** We are counting on your interviewing skills to help solve this case."

Appendix D: **Both-Focus Condition** Video Script Including the Instructions for the Witness Interview

Video 1:

"Place yourself in the shoes of a police investigator. You are about to interview someone about a crime they have just witnessed. Please gather as much information as possible from the witness about the crime, as this study will go on to inform actual criminal cases. As an investigator, you will want to obtain as many details as you can from the witness to piece together what the witness saw. You should ask the witness questions that will help to later solve the crime. A good interview typically starts with getting to know the witness and making them feel comfortable. Establishing the purpose of the interview also helps make the witness more comfortable sharing information about the crime. Make sure to take your time and also give the witness time to respond to your questions. A good interview typically starts with more open-ended questions, which are questions that require a somewhat longer answer, followed by more specific follow-up questions. Also, make sure to double check any information you might get from the police report, as a good interviewer always verifies information.

You will not be able to take notes during the interview. Please try and remember as much information as possible.

After the interview, you will fill out some forms. Once you have completed those forms, you will be asked to write a report about the interview. The report should not be summarized but should reflect exactly what was said during the interview as much as

possible, so make sure to pay attention during the interview. Participants who provide a good report will be rewarded with an extra SONA credit!

There are lots of things that good investigators pay attention to during an interview, such as who first brought up a fact or idea, and how you phrase your questions, including the words that you use to ask them. When you are conducting the interview, in addition to what was said, please pay careful attention to who first brought up a fact or idea and how your questions were phrased.

Before you start the interview, the first responding officer has written up a short report with some information about the incident. They have interviewed another witness, not the one you will be interviewing, and written up a short summary of that interview. You will read some of this report now."

Video 2:

"Now that you have read the report, you are ready to start the witness interview. You have unlimited time to conduct the interview, but make sure to stick to the interviewer questions we will provide for you. Keep in mind that you will have to write up a report afterwards, so pay close attention. **And remember: a good interviewer pays close attention to who first brought up a fact or idea and how questions were phrased, so make sure to pay attention to this.** We are counting on your interviewing skills to help solve this case."

Counterbalanced version:

Video 1:

“Place yourself in the shoes of a police investigator. You are about to interview someone about a crime they have just witnessed. Please gather as much information as possible from the witness about the crime, as this study will go on to inform actual criminal cases. As an investigator, you will want to obtain as many details as you can from the witness to piece together what the witness saw. You should ask the witness questions that will help to later solve the crime. A good interview typically starts with getting to know the witness and making them feel comfortable. Establishing the purpose of the interview also helps make the witness more comfortable sharing information about the crime. Make sure to take your time and also give the witness time to respond to your questions. A good interview typically starts with more open-ended questions, which are questions that require a somewhat longer answer, followed by more specific follow-up questions. Also, make sure to double check any information you might get from the police report, as a good interviewer always verifies information.

You will not be able to take notes during the interview. Please try and remember as much information as possible.

After the interview, you will fill out some forms. Once you have completed those forms, you will be asked to write a report about the interview. The report should not be summarized but should reflect exactly what was said during the interview as much as

possible, so make sure to pay attention during the interview. Participants who provide a good report will be rewarded with an extra SONA credit!

There are lots of things that good investigators pay attention to during an interview, such as how questions are phrased and who first brought up a fact or idea. When you are conducting the interview, in addition to what was said, please pay careful attention to how you phrase your questions, including the words that you use to ask them, and first brought up raised a fact or idea.

Before you start the interview, the first responding officer has written up a short report with some information about the incident. They have interviewed another witness, not the one you will be interviewing, and written up a short summary of that interview. You will read some of this report now."

Video 2:

"Now that you have read the report, you are ready to start the witness interview. You have unlimited time to conduct the interview, but make sure to stick to the interviewer questions we will provide for you. Keep in mind that you will have to write up a report afterwards, so pay close attention. **And remember: a good interviewer pays close attention to how questions were phrased and who first brought up a fact or idea, so make sure to pay attention to this.** We are counting on your interviewing skills to help solve this case."

Appendix E: Initial Police Report

Incident Report

Officer: Detective J. Smith **Prepared by**: Officer D. Johnson

Check applicable type of report:

Traffic accident ☐ Crime report ☑

Incident type: Robbery

Case report number: 0230525

Date of incident: [redacted]

----------(EDITED)----------

Report of witness interview

Incident number: 0230525 **Date of interview**: [redacted]

Witness: [redacted] **Interviewed by**: Detective J. Smith

DETAILS OF EVENT:

[redacted], a witness to the crime, reported seeing two White, male perpetrators. The perpetrators robbed the victim of her belongings. The victim is describe by the witness as a White female with long, brown hair. The witness did not talk to the victim after the crime, but said that another witness (who still needs to be interviewed) did. The witness describes the main perpetrator as having blond hair. The accomplice was reportedly wearing a red t-shirt and a black beanie. The witness states the perpetrators were not wearing coats. From what the witness heard, the accomplice asked for the victim's backpack and the perpetrator asked for her purse. The perpetrator also allegedly threatened that he was going to kill the victim.

Appendix F: Interview Script and Overview

Script

1. I: Hello, my name is ___ and I will be interviewing you today about the crime you witnessed. Can you state your name for the record?

   W: [states name]

2. I: Thank you. Before we start, tell me a little bit about yourself, like your major, classes, and what you like to do for fun.

   W: [responds]

3. I: We will now start the actual interview. Tell me about what happened.

   W: I was walking outside, right by a parking lot. I saw two guys appear from an enclosure with a dumpster. They snuck up on the girl and threatened her with a gun. After they stole her stuff, they quickly left and I called the police.

4. I: Did you see where the perpetrators ran off *(correct-leading)* to before you talked to the victim *(incorrect-leading)* about the crime?

   W: No I didn't see where they ran to. I also didn't talk to the victim.

5. I: Did anyone else talk to the victim?

   W: I don't know.

6. I: What was it exactly that they stole?

   W: Her backpack.

7. I: And it was the accomplice that asked for the backpack *(correct-leading)*, right?

   W: Yes, it was.

8. I: Could you describe the victim? She had brown hair *(correct-leading)*, what else?

W: She was White and had brown hair. She was about 5'5. That's about it.

9. I: Can you tell me a bit more about the main perpetrator's appearance besides the fact that he had blond *(incorrect-leading)* hair?

   W: He didn't have blond hair, it was brown. He was also White and about 5'10. He had some acne, I think. I don't think he had any tattoos.

10. I: Since he wasn't wearing a coat *(correct-leading)*, did you see anything on his shirt?

    W: Yeah there was no coat. He was wearing a shirt with a Nike logo.

11. I: Did the perpetrator wear anything on his face or head?

    W: Yes, he was wearing glasses.

12. I: So the main perpetrator only asked for money *(correct-leading)*. After that, how did he say he was going to kill the victim *(incorrect-leading)*?

    W: He did ask for the money but he didn't say he was going to kill her.

13. I: Can you describe the accomplice to me? I know he was wearing a red *(correct-leading)* shirt, what else?

    W: He was also White and as tall as the main guy. His shirt was red, yes. He didn't have any acne or tattoos.

14. I: What kind of t-shirt *(incorrect-leading)* was the accomplice wearing?

    W: He wasn't wearing a t-shirt, he was wearing a long-sleeved shirt.

15. I: Did the accomplice have a beard *(incorrect-leading)*?

    W: No, he was clean-shaven.

16. I: Were both the perpetrators clean-shaven *(correct-leading)*?

    W: Yes, both of them did not have any facial hair.

17. I: What age would you estimate the perpetrators were?

W: Early twenties.

18. I: The accomplice was wearing a beanie *(incorrect-leading)*?

W: No, he wore a baseball cap.

19. I: Also, what time did you say this happened?

W: Yesterday, around 2 pm.

20. I: Do you remember any additional information? (Repeat this question until the witness responds "no.")

W: No, that's about it.

21. I: I appreciate your cooperation in this investigation. Thank you for your time.

Overview

Content			**Source**	**Question**
Piece of Information	**Interviewer's Leading Questions**	**Witness Content/Response**		
Perpetrators' origin location		from an enclosure with a dumpster	W	OE
Location of crime		by a parking lot	W	OE
Presence of weapon		(threatened with) gun	W	OE
Police contact		witness called the police	W	OE
Fleeing of perpetrators I		did not see where the perpetrators ran off to	W	YN
Fleeing of perpetrators II	ran off* *(correct-leading)*	ran off	I	YN
Victim contact I	talked to victim after crime* *(incorrect-leading)*	did not talk to the victim after the crime	I	YN

Victim contact II		does not know if anyone else spoke to victim	W	YN
Stolen items		backpack	W	SC
Accomplice's request	asked for the backpack* *(correct-leading)*	asked for the backpack	I	YN
Victim height		5'5	W	SC
Victim hair	brown hair* *(correct-leading)*	brown hair	I	SC
Main perpetrator's hair color	blond* *(incorrect-leading)*	brown	I	SC
Perpetrators' height		5'10	W	SC
Main perpetrator's shirt logo		Nike logo	W	YN
Perpetrators' coats	no coat* *(correct-leading)*	no coat	I	YN
Main perpetrator's head/facewear		glasses*	W	YN
Main perpetrator's request	asked for money* *(correct-leading)*	asked for money	I	SC
Main perpetrator's threat	said he was going to kill the victim* *(incorrect-leading)*	did not say he was going to kill the victim	I	SC
Accomplice's shirt color	red* *(correct-leading)*	red	I	SC
Accomplice's sleeve length	t-shirt* *(incorrect-leading)*	long-sleeved shirt	I	SC
Accomplice's facial hair	beard* *(incorrect-leading)*	clean-shaven	I	YN

Main perpetrator's facial hair	clean-shaven *(correct-leading)*	clean-shaven	I	YN
Perpetrators' age		early 20s	W	SC
Accomplice's headwear	beanie* *(incorrect-leading)*	baseball cap	I	YN
Time of crime		(yesterday) at 2pm	W	SC
26	13	26	26	26

** denotes information included in the pre-interview incident report*

Appendix G: Free-Recall Report Instructions

Earlier, you interviewed someone about a crime that they witnessed. Please record verbatim (i.e., word for word) everything that was said during the interview. This includes things that you said and that the witness said. Please try and record information in transcript format, indicating specifically what was said, who said what, and how it was said during the interview. Make sure that you complete this exercise as you would if you were an actual investigator in a real crime. The study will go on to help law enforcement solve actual crimes. Good reports will be rewarded with SONA credits. If you have any questions about this task, please ask the experimenter.

Please write down EVERYTHING that was said during the interview in transcript format (i.e., word for word).

Appendix H: Cued-Recall Questionnaire

Please read these instructions carefully!

You will be asked questions about facts that were raised during the witness interview you just conducted. Every question asks about specific information about the crime. The questions refer to the information that was brought up **during the witness interview you just conducted (not about the incident report you read earlier)**. Try to be as accurate and informative as you can. If you have absolutely no idea, then please indicate you don't know the answer.

For every question you answer, you will also be asked the following things:

- Who first brought up ___ during the interview: (See examples A and B). Say the witness mentions there was a balloon. If you then ask the witness about a blue balloon, you are the first person to bring up the color, even if the witness tells you that the balloon was actually red. The first color mentioned, was mentioned by you (the interviewer). However, if you asked them what color the balloon was, and they say blue, they brought it up first. If you asked the witness to generally describe everything they saw, and they mentioned a blue balloon, they brought up the color of the balloon first. You also have the option to indicate that this information was not discussed during the interview.

- Write out the question you asked to elicit (i.e., ask about) this information: There are many different ways to ask a question, for example: "What did you see?" "Was there a balloon?" "Did you see a blue balloon?," etc. If the witness talks about the blue balloon

in response to your question, we want to know what exact question you used to get this information from the witness. Responses to general questions (e.g., "Tell me everything that happened") are still elicited by that question.

- If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said: If you brought up the information first (Question 2), select first if the the witness agreed or disagreed with what you said and then type out exactly what they said. Say you mentioned the balloon was blue, but the witness corrected you and said the balloon was red, then you can indicate this here. There is a text box to type out what the victim said exactly.

Example A:

During the interview:

Witness: "I remember seeing a balloon."

Interviewer: "What color was the balloon?"

Witness: "The balloon was red."

Question 1: What color was the balloon? [red]

Question 2: Who first brought up a balloon color? [the witness]

Question 3: Write out the question you asked to elicit this information: [What color was the balloon?]

Example B:

During the interview:

Witness: "I remember seeing a balloon."

Interviewer: "Was the balloon blue?"

Witness: "No, the balloon was red."

Question 1: What color was the balloon? [red]

Question 2: Who first brought up a balloon color? [me (interviewer)] ****although you did not bring up the correct balloon color (i.e., red), you did bring up a balloon color**

Question 3: Write out the question you asked to elicit this information: [Was the balloon blue?]

Question 4: If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said. [Incorrect (they corrected me/disagreed): No, the balloon was red]

In short, questions 1 and 3 ask about the correct information (i.e., that the balloon was red), questions 2 and 4 just ask about the first balloon color that was mentioned (i.e., the interviewer asking if the balloon was blue).

Page Break

End of Block: H. Introduction Cued-recall questionnaire2

Start of Block: Accomplice Facial Hair2

Q5 Did the **accomplice** have facial hair and if so, what facial hair?

- Yes, he had (describe the facial hair) _____
- No, he did not have facial hair
- I don't know

Q6 Who first brought up a type of facial hair (if any) during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q7 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q8 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Accomplice Facial Hair2

Start of Block: Main Perpetrator Hair Color2

Q37 What color was the main perpetrator's hair?

- ○ His hair color was: _____
- ○ I don't know

Q38 Who first brought up a hair color during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q39 Write down the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q40 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Main Perpetrator Hair Color2

Start of Block: Stolen Items2

Q45 What did the perpetrators steal from the victim?

- They stole: _____
- I don't know

Q46 Who first brought up a stolen item/stolen item(s) during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q47 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q48 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Stolen Items2

Start of Block: Accomplice Headwear2

Q53 Did the **accomplice** wear anything on his face or head and if so, what was it?

- Yes, he wore a(n): _____
- No, he did not wear anything on his face or head
- I don't know

Q54 Who first brought up an item of clothing that the **accomplice** wore on his face/head during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q55 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q56 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Accomplice Headwear2

Start of Block: Main Perpetrator Head-/Facewear2

Q65 Did the **main perpetrator** wear anything on his face or head and if so, what was it?

- Yes, he wore a(n): _____
- No, he did not wear anything on his face or head
- I don't know

Q66 Who first brought up an item of clothing that the **main perpetrator** wore on his face/head wearing on their face or head during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q67 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q68 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Main Perpetrator Head-/Facewear2

Start of Block: Accomplice Shirt2

Q69 How long were the sleeves of the **accomplice**'s shirt?

- ○ The sleeves were: _____
- ○ I don't know

Q70 Who first brought up a sleeve length during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q71 Write out the question you asked to elicit this information?

- ○ Question: _____
- ○ Do not remember

Q72 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Accomplice Shirt2

Start of Block: Fleeing of Perpetrators2

Q77 How did the perpetrators leave the scene of the crime?

- ○ The perpetrators left: _____
- ○ I don't know

Q78 Who first brought up how the perpetrators left during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q79 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q80 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Fleeing of Perpetrators2

Start of Block: Time of Day2

Q85 When did the crime take place?

- The crime took place: _____
- I don't know

Q86 Who first brought up a day/time during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q87 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q88 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Time of Day2

Start of Block: Perpetrators Height2

Q89 Approximately how tall were the perpetrators?

- ○ The perpetrators were: _____
- ○ I don't know

Q90 Who first brought up a height during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q91 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q92 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Perpetrators Height2

Start of Block: Main Perpetrator's Shirt2

Q93 Was anything printed/written on the **main perpetrator**'s shirt, and if so, what was it?

- ○ Yes, printed/written on his shirt was: _____
- ○ No, nothing was printed/written on his shirt
- ○ I don't know

Q94 Who first brought up what was printed/written (if anything) on the main perpetrator's shirt during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q95 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q96 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Main Perpetrator's Shirt2

Start of Block: Victim Hair Color2

Q97 What color was the victim's hair?

- Her hair color was: _____
- I don't know

Q98 Who first brought up a hair color during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q99 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q100 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Victim Hair Color2

Start of Block: Victim Height2

Q101 Approximately how tall was the victim?

- ○ The victim was: _____
- ○ I don't know

Q102 Who first brought up a height during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q103 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q104 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Victim Height2

Start of Block: Crime Location2

Q105 Where did the crime take place?

- ○ The location of the crime was: _____
- ○ I don't know

Q106 Who first brought up a location during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q107 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q108 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

Page Break

End of Block: Crime Location2

Start of Block: Origin of Perpetrators2

Q109 Where did the perpetrators appear from?

- The perpetrators appeared from: _____
- I don't know

Q110 Who first brought up a location during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q111 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q112 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Origin of Perpetrators2

Start of Block: Perps after

Q129 Did the witness you just interviewed see where the perpetrators ran off to?

- ○ Yes
- ○ No
- ○ I don't know

Q130 Who first brought up whether the witness saw where the perpetrators ran off to during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q131 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q132 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Perps after

Start of Block: Gun

Q133 Was a weapon used during the crime and if so, what type of weapon?

- ○ Yes, the weapon was a(n): _____
- ○ No, there was no weapon
- ○ I don't know

Q134 Who first brought up a weapon (if any) during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q135 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q136 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- correct (they agreed) _____
- incorrect (they corrected me/disagreed) _____
- Do not remember

End of Block: Gun

Start of Block: Acc shirt color

Q137 What color was the **accomplice**'s shirt?

- His shirt's color was: _____
- I don't know

Q138 Who first brought up a shirt color during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q139 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q140 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Acc shirt color

Start of Block: Perp facial hair

Q141 Did the **main perpetrator** have facial hair and if so, what facial hair?

- ○ Yes, he had (describe the facial hair) _____
- ○ No, he did not have facial hair
- ○ I don't know

Q142 Who first brought up a type of facial hair (if any) during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q143 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q144 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Perp facial hair

Start of Block: Perps age

Q145 What age were the perpetrators?

- ○ The perpetrators were: _____
- ○ I don't know

Q146 Who first brought up an age during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q147 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q148 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- correct (they agreed) _____
- incorrect (they corrected me/disagreed) _____
- Do not remember

End of Block: Perps age

Start of Block: Perps coats

Q149 Was the **main perpetrator** wearing a coat?

- ○ Yes, he was wearing a coat
- ○ No, he was not wearing a coat
- ○ I don't know

Q150 Who first brought up if the perpetrator was wearing a coat during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q151 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q152 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Perps coats

Start of Block: Acc saying

Q153 What, if anything, did the **accomplice** ask for during the crime?

- ○ He asked for: _____
- ○ He didn't ask for anything
- ○ I don't know

Q154 Who first brought up what the accomplice asked for (if anything) during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q155 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q156 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Acc saying

Start of Block: Perp saying

Q157 What, if anything, did the **main perpetrator** ask for during the crime?

- ○ He asked for: _____
- ○ He didn't ask for anything
- ○ I don't know

Q158 Who first brought up what the main perpetrator asked for (if anything) during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q159 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q160 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- correct (they agreed) _____
- incorrect (they corrected me/disagreed) _____
- Do not remember

End of Block: Perp saying

Start of Block: Victim contact

Q161 Did the witness you just interviewed talk to the victim after the crime?

- ○ Yes
- ○ No
- ○ I don't know

Q162 Who first brought up whether the witness spoke to the victim during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q163 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q164 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Victim contact

Start of Block: Perp threat

Q165 Did the **main perpetrator** threaten to kill the victim?

- ○ Yes
- ○ No
- ○ I don't know

Q166 Who first brought up whether the main perpetrator threatened the victim during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q167 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q168 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Perp threat

Start of Block: Call 911

Q169 Did the witness you just interviewed call 911 after the crime?

- ○ Yes
- ○ No
- ○ I don't know

Q170 Who first brought up whether the witness called 911 during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q171 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q172 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- correct (they agreed) _____
- incorrect (they corrected me/disagreed) _____
- Do not remember

End of Block: Call 911

Start of Block: Victim contact (DK1)

Q179 Who else, if anyone, talked to the victim.

- ○ The victim talked to: _____
- ○ No one else talked to the victim.
- ○ I don't know

Q180 Who first brought up who else spoke to the victim during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q181 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q182 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Victim contact (DK1)

Start of Block: Duration crime (NM5)

Q199 Approximately how long did the crime last?

- ○ The crime lasted: _____
- ○ I don't know

Q200 Who first brought up a duration during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q201 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q202 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Duration crime (NM5)

Start of Block: Purse (NM4)

Q195 Did the perpetrators ask for the victim's purse during the crime?

- ○ Yes
- ○ No
- ○ I don't know

Q196 Who first brought up whether the perpetrators asked for the victim's purse during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q197 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q198 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- correct (they agreed) _____
- incorrect (they corrected me/disagreed) _____
- Do not remember

End of Block: Purse (NM4)

Start of Block: Victim actions (NM3)

Q191 What, if anything, did the victim do right after the crime took place?

- ○ The victim: _____
- ○ The victim did not do anything.
- ○ I don't know

Q192 Who first brought up what (if anything) the victim did right after the crime during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q193 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q194 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Victim actions (NM3)

Start of Block: Umbrella (NM2)

Q187 Did the **accomplice** have an umbrella?

- ○ Yes
- ○ No
- ○ I don't know

Q188 Who first brought up whether the accomplice had an umbrella during the interview?

- ○ witness
- ○ me (interviewer)
- ○ was not discussed during the interview
- ○ do not remember

Q189 Write out the question you asked to elicit this information.

- ○ Question: _____
- ○ Do not remember

Q190 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- ○ correct (they agreed) _____
- ○ incorrect (they corrected me/disagreed) _____
- ○ Do not remember

End of Block: Umbrella (NM2)

Start of Block: Victim car (NM1)

Q183 What color was the victim's car?

- ○ The color was: _____
- ○ I don't know

Q184 Who first brought up a color during the interview?

- witness
- me (interviewer)
- was not discussed during the interview
- do not remember

Q185 Write out the question you asked to elicit this information.

- Question: _____
- Do not remember

Q186 If brought up first by you (the interviewer), did the witness tell you this information was correct or incorrect? Please write down what they said exactly.

- correct (they agreed) _____
- incorrect (they corrected me/disagreed) _____
- Do not remember

Appendix I: Demographic Questionnaire

1. What is your age?
    - Sliding scale from 18 to 60
2. What is your gender
    - Male
    - Female
    - Other
3. Which of the following categories best reflects your ethnic/racial identity?
    - African American
    - Asian/Pacific Island
    - Caucasian: Non-Hispanic
    - Hispanic
    - Native American
    - Other: [text box entry]
4. What is the highest level of education you have **completed**?
    - High school graduate
    - Freshman year in college
    - Sophomore year in college
    - Junior year in college
    - Senior year in college
    - Graduate school or other
5. Is English your primary/native language?
    - Yes

- No
  - ➢ If no is selected:
    a. How long have you fluently spoken English?
       - Sliding scale from 1 to 55
    b. What is your native language?
       - Spanish
       - Portuguese
       - French
       - French Creole
       - Chinese
       - Other (please indicate which language): [text box entry]

6. What is your current work status?
   - Employed full-time
   - Employed part-time
   - Unemployed
7. What is your occupation/job?
   - Student
   - Other (please indicate occupation/job): [text box entry]

Appendix J: Abridged Social Skills Inventory

Emotional Expressivity (EE)

I usually feel uncomfortable touching other people (*).

Sometimes I have trouble making my friends and family realize how angry or upset I am with them (*).

I often touch my friends when talking to them.

I rarely show my feelings or emotions (*).

Emotional Sensitivity (ES)

I can easily tell what a person's character is by watching his or her interactions with others.

I always seem to know what peoples' true feelings are no matter how hard they try to conceal them.

I can accurately tell what a persons character is upon first meeting him or her.

I can instantly spot a ''phony'' the minute I meet him or her.

Emotional Control (EC)

I am not very skilled in controlling my emotions (*).

It is very hard for me to control my emotions (*).

I am very good at maintaining a calm exterior even if I am upset.

I am rarely able to hide a strong emotion (*).

Social Expressivity (SE)

I love to socialize.

I always mingle at parties.

At parties I enjoy talking to a lot of different people.

I enjoy going to large parties and meeting new people.

Social Sensitivity (SS)

I am very sensitive of criticism.

It is very important that other people like me.

I am generally concerned about the impression I am making on others.

I am often concern|ed what others are thinking of me.

Social Control

When I am with a group of friends I am often the spokesperson for the group.

I find it very difficult to speak in front of a large group of people (*).

I am usually very good at leading group discussions.

I am often chosen to be the leader of a group.

(*) Represents a reverse scored item.

Appendix K: Basic Empathy Scale in Adults

Definition of Emotional Contagion

2. After being with a friend who is sad about something, I usually feel sad.

5. I get caught up in other people's feelings easily.

11. I often become sad when watching sad things on TV or in films.

15. I tend to feel scared when I am with friends who are afraid.

17. I often get swept up in my friends' feelings.

Definition of Cognitive Empathy

3. I can understand my friend's happiness when she/he does well at something.

6. I find it hard to know when my friends are frightened.

9. When someone is feeling 'down' I can usually understand how they feel.

10. I can usually work out when my friends are scared.

12. I can often understand how people are feeling even before they tell me.

14. I can usually work out when people are cheerful.

16. I can usually realize quickly when a friend is angry.

20. I have trouble figuring out when my friends are happy.

Definition of Emotional Disconnection

1. My friends' emotions don't affect me much.

7. I don't become sad when I see other people crying.

8. Other people's feeling don't bother me at all.

13. Seeing a person who has been angered has no effect on my feelings.

18. My friend's unhappiness doesn't make me feel anything.

19. I am not usually aware of my friends' feelings.

Appendix L: Narcissistic Personality Inventory-21

Factor 1. Leadership/Power

1. I have a natural talent for influencing people.

8. I will be a success.

10. I see myself as a good leader.

11. I am assertive.

33. I would prefer to be a leader.

Factor 2. Exhibitionism/Self-admiration

4. I know I am good because everybody keeps telling me so.

15. I like to display my body.

19. I like to look at my body.

20. I am apt to show off if I get the chance.

26. I like to be complimented.

29. I like to look at myself in the mirror.

Factor 3. Superiority/Arrogance

16. I can read people like a book.

21. I always know what I am doing.

22. I rarely depend on anyone else to get things done.

31. I can live my life in any way I want to.

35. I can make anybody believe anything.

Factor 4. Uniqueness/Entitlement

2. Modesty does not become me.

9. I am an extraordinary person.

18. I want to amount to something in the eyes of the world.

34. I am going to be a great person.

36. I am born a leader.

Appendix M: HEXACO PI-R Self-Report Form

1 I would be quite bored by a visit to an art gallery.

2 I clean my office or home quite frequently.

3 I rarely hold a grudge, even against people who have badly wronged me.

4 I feel reasonably satisfied with myself overall.

5 I would feel afraid if I had to travel in bad weather conditions.

6 If I want something from a person I dislike, I will act very nicely toward that person in order to get it.

7 I'm interested in learning about the history and politics of other countries.

8 When working, I often set ambitious goals for myself.

9 People sometimes tell me that I am too critical of others.

10 I rarely express my opinions in group meetings.

11 I sometimes can't help worrying about little things.

12 If I knew that I could never get caught, I would be willing to steal a million dollars.

13 I would like a job that requires following a routine rather than being creative.

14 I often check my work over repeatedly to find any mistakes.

15 People sometimes tell me that I'm too stubborn.

16 I avoid making "small talk" with people.

17 When I suffer from a painful experience, I need someone to make me feel comfortable.

18 Having a lot of money is not especially important to me.

19 I think that paying attention to radical ideas is a waste of time.

20 I make decisions based on the feeling of the moment rather than on careful thought.

21 People think of me as someone who has a quick temper.

22 I am energetic nearly all the time.

23 I feel like crying when I see other people crying.

24 I am an ordinary person who is no better than others.

25 I wouldn't spend my time reading a book of poetry.

26 I plan ahead and organize things, to avoid scrambling at the last minute.

27 My attitude toward people who have treated me badly is "forgive and forget."

28 I think that most people like some aspects of my personality.

29 I don't mind doing jobs that involve dangerous work.

30 I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.

31 I enjoy looking at maps of different places.

32 I often push myself very hard when trying to achieve a goal.

33 I generally accept people's faults without complaining about them.

34 In social situations, I'm usually the one who makes the first move.

35 I worry a lot less than most people do.

36 I would be tempted to buy stolen property if I were financially tight.

37 I would enjoy creating a work of art, such as a novel, a song, or a painting.

38 When working on something, I don't pay much attention to small details.

39 I am usually quite flexible in my opinions when people disagree with me.

40 I enjoy having lots of people around to talk with.

41 I can handle difficult situations without needing emotional support from anyone else.

42 I would like to live in a very expensive, high-class neighborhood.

43 I like people who have unconventional views.

44 I make a lot of mistakes because I don't think before I act.

45 I rarely feel anger, even when people treat me quite badly.

46 On most days, I feel cheerful and optimistic.

47 When someone I know well is unhappy, I can almost feel that person's pain myself.

48 I wouldn’t want people to treat me as though I were superior to them.

49 If I had the opportunity, I would like to attend a classical music concert.

50 People often joke with me about the messiness of my room or desk.

51 If someone has cheated me once, I will always feel suspicious of that person.

52 I feel that I am an unpopular person.

53 When it comes to physical danger, I am very fearful.

54 If I want something from someone, I will laugh at that person's worst jokes.

55 I would be very bored by a book about the history of science and technology.

56 Often when I set a goal, I end up quitting without having reached it.

57 I tend to be lenient in judging other people.

58 When I'm in a group of people, I'm often the one who speaks on behalf of the group.

59 I rarely, if ever, have trouble sleeping due to stress or anxiety.

60 I would never accept a bribe, even if it were very large.

61 People have often told me that I have a good imagination.

62 I always try to be accurate in my work, even at the expense of time.

63 When people tell me that I'm wrong, my first reaction is to argue with them.

64 I prefer jobs that involve active social interaction to those that involve working alone.

65 Whenever I feel worried about something, I want to share my concern with another person.

66 I would like to be seen driving around in a very expensive car.

67 I think of myself as a somewhat eccentric person.

68 I don't allow my impulses to govern my behavior.

69 Most people tend to get angry more quickly than I do.

70 People often tell me that I should try to cheer up.

71 I feel strong emotions when someone close to me is going away for a long time.

72 I think that I am entitled to more respect than the average person is.

73 Sometimes I like to just watch the wind as it blows through the trees.

74 When working, I sometimes have difficulties due to being disorganized.

75 I find it hard to fully forgive someone who has done something mean to me.

76 I sometimes feel that I am a worthless person.

77 Even in an emergency I wouldn't feel like panicking.

78 I wouldn't pretend to like someone just to get that person to do favors for me.

79 I've never really enjoyed looking through an encyclopedia.

80 I do only the minimum amount of work needed to get by.

81 Even when people make a lot of mistakes, I rarely say anything negative.

82 I tend to feel quite self-conscious when speaking in front of a group of people.

83 I get very anxious when waiting to hear about an important decision.

84 I'd be tempted to use counterfeit money, if I were sure I could get away with it.

85 I don't think of myself as the artistic or creative type.

86 People often call me a perfectionist.

87 I find it hard to compromise with people when I really think I'm right.

88 The first thing that I always do in a new place is to make friends.

89 I rarely discuss my problems with other people.

90 I would get a lot of pleasure from owning expensive luxury goods.

91 I find it boring to discuss philosophy.

92 I prefer to do whatever comes to mind, rather than stick to a plan.

93 I find it hard to keep my temper when people insult me.

94 Most people are more upbeat and dynamic than I generally am.

95 I remain unemotional even in situations where most people get very sentimental.

96 I want people to know that I am an important person of high status.

97 I have sympathy for people who are less fortunate than I am.

98 I try to give generously to those in need.

99 It wouldn’t bother me to harm someone I didn’t like.

100 People see me as a hard-hearted person.

Appendix N: Need for Cognition Scale

1. I prefer complex to simple problems.

2. I like to have the responsibility of handling a situation that requires a lot of thinking.

3. Thinking is not my idea of fun.**

4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.**

5. I try to anticipate and avoid situations where there is a likely chance I will have to think in

depth about something.**

6. I find satisfaction in deliberating hard and for long hours.

7. I only think as hard as I have to.**

8. I prefer to think about small daily projects to long term ones.**

9. I like tasks that require little thought once I've learned them.**

10. The idea of relying on thought to make my way to the top appeals to me.

11. I really enjoy a task that involves coming up with new solutions to problems.

12. Learning new ways to think doesn't excite me very much.**

13. I prefer my life to be filled with puzzles I must solve.

14. The notion of thinking abstractly is appealing to me.

15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat

important but does not require much thought.

16. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.**

17. It’s enough for me that something gets the job done; I don’t care how or why it works.**

18. I usually end up deliberating about issues even when they do not affect me personally.

Note: **=reverse scored item.

Appendix O: Need for Closure Scale

1. I think that having clear rules and order at work is essential for success. (Facet I)

2. Even after I've made up my mind about something, I am always eager to consider a different opinion. (reverse scored, Facet 5)

3. I don't like situations that are uncertain. (Facet 4)

4. I dislike questions which could be answered in many different ways. (Facet 5)

5. I like to have friends who are unpredictable. (reverse scored, Facet 2)

6. I find that a well-ordered life with regular hours suits my temperament. (Facet 1)

7. When dining out, I like to go to places where I have been before so that I know what to expect. (Facet 2)

8. I feel uncomfortable when I don't understand why an event occurred in my life. (Facet 4)

9. I feel irritated when one person disagrees with what everyone else in a group believes. (Facet 5)

10. I hate to change my plans at the last minute. (Facet 1)

11. I don't like to go into a situation without knowing what I can expect from it. (Facet 2)

12. When I go shopping, I have difficulty deciding exactly what it is that I want. (reverse scored, Facet 3)

13. When faced with a problem I usually see the one best solution very quickly. (Facet 3)

14. When I am confused about an important issue, I feel very upset. (Facet 4)

15. I tend to put off making important decisions until the last possible moment (reverse scored, Facet 3)

16. I usually make important decisions quickly and confidently. (Facet 3)

17. I would describe myself as indecisive. (reverse scored, Facet 3)

18. I think it is fun to change my plans at the last minute. (reverse scored, Facet 2)

19. I enjoy the uncertainty of going into a new situation without knowing what might happen. (reverse scored, Facet 2)

20. My personal space is usually messy and disorganized. (reverse scored, Facet 1)

21. In most social conflicts, I can easily see which side is right and which is wrong. (Facet 4)

22. I tend to struggle with most decisions. (reverse scored, Facet 3)

23. I believe that orderliness and organization are among the most important characteristics of a good student. (Facet 1)

24. When considering most conflict situations, I can usually see how both sides could be right. (reverse scored, Facet 5)

25. I don't like to be with people who are capable of unexpected actions. (Facet 2)

26. I prefer to socialize with familiar friends because I know what to expect from them. (Facet 2)

27. I think that I would learn best in a class that lacksclearly stated objectives and requirements. (reverse scored, Facet 1)

28. When thinking about a problem, I consider as many different opinions on the issue as possible. (reverse scored, Facet 5)

29. I like to know what people are thinking all the time. (Facet 4)

30. I dislike it when a person's statement could mean many different things. (Facet 4)

31. It's annoying to listen to someone who cannot seem to make up his or her mind. (Facet 4)

32. I find that establishing a consistent routine enables me to enjoy life more. (Facet 1)

33. I enjoy having a clear and structured mode of life. (Facet 1)

34. I prefer interacting with people whose opinions are very different from my own. (reverse scored, Facet 5)

35. I like to have a place for everything and everything in its place. (Facet 1)

36. I feel uncomfortable when someone's meaning or intention is unclear to me. (Facet 4)

37. When trying to solve a problem I often see so many possible options that it's confusing. (reverse scored, Facet 3)

38. I always see so many possible solutions to problems I face. (reverse scored, Facet 5)

39. I'd rather know bad news than stay in a state of uncertainty. (Facet 4)

40. I do not usually consult many different opinions before forming my own view. (Facet 5)

41. I dislike unpredictable situations. (Facet 2)

42. I dislike the routine aspects of my work (studies). (reverse scored, Facet 1)

Note. Facet 1 = Preference for Order; Facet 2 = Preference for Predictability; Facet 3 = Decisiveness; Facet 4 = Discomfort With Ambiguity; Facet 5 = Closed-Mindedness.

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PUBLICATIONS AND PRESENTATIONS

Mindthoff, A., Wolfs, A., Evans, J. R., Schreiber Compo, N., Polanco, K., & Goldstein, N. E. (2021, June 7-11). Examining the effect of alcohol-intoxication on individuals' comprehension of Miranda rights. Virtual 10th Annual Forensic Science Symposium, Miami, FL.

Wolfs, A. C. F., & Goldfarb, D. (2020, September). *Analyzing and improving memory for content, source, and questions* [Conference presentation]. Canadian Forensic Psychology Virtual Conference.

Wolfs, A. C. F., & Goldfarb, D. (2020, May). *Differences in interviewer memory for content, source, and question format of a witness interview* [Conference poster]. Association for Psychological Science (APS) Convention, Chicago, IL, United States.

Wolfs, A. C. F., & Goldfarb, D. (2020, March). *Keeping what, who, and how straight in a forensic interview* [Conference presentation]. American Psychology and Law Society (AP-LS) Conference, New Orleans, Louisiana, United States.

Wolfs, A. C. F., Hyman Gregory, A., Goldfarb, D., & Schreiber Compo, N. (2020, March). *A questionnaire of current witness interviewing practices in the US* [Conference presentation]. American Psychology and Law Society (AP-LS) Conference, New Orleans, Louisiana, United States.

Hess, K.L., Wolfs, A., Granitur, C., McLaney, S., Goldfarb, D., Evans, J.R., Bailey, F. (2020, March). *Exploring judicial biases in student loan discharge decisions* [Conference presentation]. American Psychology and Law Society (AP-LS) Conference, New Orleans, Louisiana, United States.

Sneyd, D. E., Wolfs, A. C. F., Reinoso, L., Vallano, J. P., & Schreiber Compo, N. (2020, March). *Rapport maintenance and its influence on adult witness recall* [Conference

presentation]. American Psychology and Law Society (AP-LS) Conference, New Orleans, Louisiana, United States.

Reinoso, L., Wolfs, A. C. F., Sneyd, D. E., Vallano, J. P., & Schreiber Compo, N. (2019, October). *Rapport: Its impact on the misinformation effect in adult eyewitnesses* [Conference poster]. FIU McNair Scholars Research Conference, Miami, FL, United States.

Wolfs, A. C. F., Sneyd, D. E., Vallano, J. P., & Schreiber Compo, N. (2019, March). *An experimental examination of rapport-building and maintenance on cooperative adult witness recall* [Conference paper]. American Psychology and Law Society (AP-LS) Conference, Portland, Oregon, United States.

Mindthoff, A., Evans, J. R., Schreiber Compo, N., Wolfs, A., Hagsand, A. V., & Goldstein, N. E. (2019, March). *The effects of alcohol on individuals' Miranda rights comprehension* [Conference presentation]. American Psychology and Law Society (AP-LS) Conference, Portland, Oregon, United States.

Wolfs, A. C. F., Sneyd, D. E., Schreiber Compo, N., Vallano, J. P., Briggs, A., Slapinski, K., Kuzminski, C., & Reynolds, S. (2018, March). *Does rapport increase suggestibility resistance for adult eyewitnesses?* [Conference poster]. American Psychology and Law Society (AP-LS) Conference, Memphis, Tennessee, United States.

Sauerland, M., Wolfs, A. C. F., Crans, S., & Verschuere, B. (2017). Testing a potential alternative to traditional identification procedures: Reaction time-based concealed information test does not work for lineups with cooperative witnesses. *Psychological Research, 83*(6), 1210-1222. https://doi.org/10.1007/s00426-017-0948-5

Hagsand, A. V., Schreiber Compo, N., Evans, J. R., Wolfs, A., & Jafary, A. M. (2017, May). *Reliability of handheld versus benchtop measurement instruments used to assess breath alcohol concentration* [Conference paper]. Forensic Science Symposium of the International Forensic Research Institute Symposium (IFRI), Miami, Florida, United States.

Hagsand, A. V., Schreiber Compo, N., Fernandez, M., Bittencourt, L., Wolfs, A., Jafary, A. M. & Evans, J. R. (2017, May). *Which interviewing approach is most efficient when asking intoxicated witnesses questions about a crime?* [Conference paper]. Forensic Science Symposium of the International Forensic Research Institute Symposium (IFRI), Miami, Florida, United States.

Hagsand, A., Wolfs, A., Schreiber Compo, N., Diamond, O., Jafary, A., & Evans, R. (2017, March). *The effect of alcohol, and investigative interviewing approach on witness recall of an interactive event* [Conference presentation]. American Psychology and Law Society (AP-LS) Conference, Seattle, Washington, United States.