

THE EFFECT OF PRIOR KNOWLEDGE ON OPEN AND CLOSED QUESTION
GENERATION

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A thesis submitted in the fulfilment for the degree of
Master of Science

University of Otago
Dunedin, New Zealand

3rd October 2019

Abstract

Given that eyewitness evidence is one of the most influential forms of courtroom evidence, and that eyewitness errors are a major contributor to wrongful conviction, it is paramount that investigators collect evidence from witnesses in a way that preserves accuracy. The best way to do this is to prioritise open questions (e.g., “*what did you see?*”) over closed questions (e.g., “*did the man hit the woman?*”). Yet despite comprehensive interview training protocols, police investigators continue to ask an inappropriately high number of closed questions during their interviews. We used a question generation paradigm to examine the ease with which lay participants generated open versus closed questions, and the role of prior knowledge on their performance. Participants ($N = 287$) were given two minutes to generate either open or closed questions for a hypothetical witness to an assault. Half of the participants were first provided with information about the crime—ostensibly from other witnesses. We expected that participants asked to generate open questions would generate fewer questions and make more errors than those asked to generate closed questions, and that exposure to prior information would make it harder to generate open—but not closed—questions. We also expected that participants provided with prior information would show evidence of using that information when asking closed questions. Each of these hypotheses was supported, suggesting that confirmation bias could play a role in question generation difficulty. These findings have important implications for the development of police protocols, and are also applicable to other professions, including healthcare and education.

Acknowledgements

I would like to say a massive thank you to everyone who has supported me throughout this process. Firstly, to my fantastic supervisor Associate Professor Rachel Zajac, thank you for your patience and guidance. You have transformed my writing style over my time in your lab and I am very appreciative of this improvement! To my family; Nicky, Stephen, Connor, and Johnny, you have no idea how much I adore and appreciate each of you. To my lab mates, my clinical psychology classmates/comrades, and my phenomenal friends, I have been so blessed to be surrounded by such good people and I truly could not have achieved this without you.

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Eyewitness evidence plays a critical role in the apprehension, prosecution, and adjudication of criminal offenders (Cutler & Penrod, 1995). While physical evidence (e.g., a fingerprint) can link a suspect to a crime scene, eyewitness evidence often links a suspect directly to the crime. For this reason, eyewitness evidence is particularly persuasive to fact-finders (Fisher & Geiselman, 1992). People consider eyewitness evidence to be reliable even when it contains major inconsistencies (Brewer & Burke, 2002), or is accompanied by alternative conflicting evidence (Maeder, Ewanation, & Monnink, 2017; Pozzulo, Lemieux, Wilson, Crescini, & Girardi, 2009; Wells, 1992). Given these findings, it is perhaps unsurprising that an estimated 77,000 US residents each year become defendants solely on the basis of testimony from a witness (Wells et al., 1998).

Unfortunately, eyewitness evidence is not only persuasive, it is also highly fallible. In fact, eyewitness error is the leading contributor to miscarriages of justice. Over three-quarters (76%) of wrongful convictions identified by the The Innocence Project—a non-profit organisation using DNA evidence to exonerate innocent people convicted of a crime—involved mistaken eyewitnesses (Innocence Project, 2017). One exoneration case involved five different eyewitnesses, all of whom were mistaken (Dwyer, Neufeld, & Scheck, 2000).

Eyewitness Memory

Why do these kinds of errors occur? The simple answer is that memory is not the recording device that many believe it to be (Simons & Chabris, 2011). Decades of eyewitness memory research have challenged the original *trace theory* of memory, which proposed that memories were simply neural traces of the original experience (Gomulicki, 1953). We now know that rather than being a fixed and unchangeable entity, memory is a reconstructive process (Lacy & Stark, 2013; Wagoner, 2017). This reconstruction occurs so that our memory fits our understanding of an event. As our understanding develops with the addition

of new information, this information can be integrated and the memory developed in line with the new thoughts (Bartlett, 1931).

For this reason, memory is remarkably malleable. It has been repeatedly demonstrated in the literature that witnesses will change their recollection to fit with information provided after the event, regardless of the accuracy of that information (Loftus, 2005; Morgan, Southwick, Steffian, Hazlett, & Loftus, 2013). This impairment of memory for past events following exposure to incorrect information—or misinformation—is known as the *misinformation effect* (Loftus, 2005). A lack of introspective awareness means individuals can fail to register that post-event influences have altered their thinking and fail to notice that their memory has been affected (Nisbett & Wilson, 1977).

The misinformation effect is thought to occur due to errors in *source monitoring*—that is, the failure to correctly identify the source of a memory (Johnson, Hashtroudi, & Lindsay, 1993). A witness to a bank robbery might report seeing the offender drive off in a red car, for example, when in actual fact they read this detail in the newspaper. The source monitoring framework (Johnson et al., 1993) suggests that the cognitive processes responsible for attributing thoughts and images to a particular source involve only the content or characteristics of the event in question, as opposed to being directly specified by distinct abstract labels. Because post-event information often bears similar characteristics to genuine memories, it is easy for people to inaccurately attribute the source of post-event information to the event itself (Lindsay, 2008). Our inability to identify the source of information means that we are likely poor judges of our own accuracy, and even the most well-intentioned witness may unconsciously recount distorted recollections (Leippe, 1980; Morgan et al., 2013; Yuille, 1980).

Post-event influences are both common and wide-ranging. Some sources of misinformation are internal. For example, expectations held by an individual about how an

event generally unfolds, or *schemas*, can influence the type of details they encode and retain. This phenomenon was demonstrated by Tuckey and Brewer (2003), who found that information from a criminal event that is not essential to an individual's crime schema (e.g., the particular escape route employed) tends to fade more readily with time than schema-relevant information. Moreover, ambiguous information—such as the offender holding their hand in their jacket pocket—tends to be interpreted in line with crime schemas (i.e., the concealment of a gun). This inferential reasoning can also distort a memory over time, introducing more schema-consistent inaccuracies. In the example given above, for example, the individual might incorrectly remember seeing the offender holding a gun (Tuckey & Brewer, 2003).

Imagination can also serve as a powerful post-event influence. It has been repeatedly demonstrated that imagining an event can increase our confidence that the event occurred—a phenomenon referred to as *imagination inflation* (Garry, Manning, Loftus, & Sherman, 1996). In addition to increasing confidence, imagining a fictitious event can induce entirely false memories (Mazzoni & Memon, 2003; Sharman, Garry, & Hunt, 2005). In fact, simply hearing others discuss their experience, then imagining that experience, can convince people that they were there (Pynoos & Nader, 1989). These types of effects increase with repeated imagining (Thomas & Loftus, 2002).

Misinformation can also be introduced externally, through a variety of sources. These sources include the media (e.g., Crombag, Wagenaar, & van Koppen, 1996) and conversations with others who saw the same event (e.g., Hope, Ost, Gabbert, Healey, & Lenton, 2008). Most pertinent to the criminal investigation process, however, is the finding that the way a witness is interviewed can exert a powerful influence on what they report, and even what they remember (Wright, Nash, & Wade, 2015).

The effects of misinformation introduced through questions posed to witnesses was

first examined by Elizabeth Loftus and her colleagues in the 1970s. These researchers demonstrated that even slight differences in the wording of an investigative question could influence eyewitness recall. Loftus (1975), for example, showed participants a film depicting a car accident and immediately afterward asked them a series of questions. Half of the participants were asked, “*did you see a broken headlight?*” while the other half were asked, “*did you see the broken headlight?*” Participants in the latter condition were significantly more likely to answer in the affirmative (i.e., to say yes). The tendency for misinformation to be incorporated into the original event memory was first demonstrated by Loftus, Miller, and Burns (1978), who showed participants images of a car stopping at a stop sign before eventually hitting a pedestrian. During later questioning, half of the participants had misleading information introduced when asked, “*did the car stop at the yield sign?*” When later asked what they had seen, participants in the yield-sign condition had difficulty discriminating between the sign they had actually seen and the sign that they had been told about. In fact, over 50% of participants in that condition incorrectly reported having seen a yield sign in the images.

Research has repeatedly demonstrated that misinformation introduced within interview questions can add false details to witnesses’ accounts, as well as change details that were originally accurately encoded (Belli, 1989; Ceci, Ross, & Toglia, 1987; Loftus, 1979; Loftus, Donders, Hoffman, & Schooler, 1989; Manning & Loftus, 1996; Okado & Stark, 2005; Tversky & Tuchin, 1989; Wagenaar & Boer, 1987; for a review, see Loftus 2005). Participants have even been led to “remember” entire events that did not happen (Loftus & Pickrell, 1995). For example, across three interviews Porter, Yuille, and Lehman (1999) attempted to implant a false memory of a stressful, but fictional, childhood event (an animal attack). By the end of the third interview, 26% of participants exhibited a comprehensive false memory and a further 40% reported at least some aspects of the false event.

We also know from the empirical literature that numerous factors make memories particularly susceptible to distortion. For example, being under the influence of alcohol (Mintzer, 2007) or drugs (Parrott & Lasky, 1998) negatively affects memory, and even the suggestion of alcohol consumption can increase vulnerability to the misinformation effect (Assefi & Garry, 2003). Other environmental factors that can increase susceptibility to misinformation include the presence of a weapon (Saunders, 2008) and having another person corroborate the event (Kassin & Kiechel, 1996). Memories of stressful events (Morgan et al., 2013) and highly emotional events (Nourkova, Bernstein, & Loftus, 2004) are also particularly susceptible to modification, as are memories for more distant events (Paterson, Kemp, & Forgas, 2009). Unfortunately, the events about which police investigators interview witnesses frequently include a combination of these factors.

Questioning Witnesses

The deleterious effects of poor interviewing are irreversible; they cannot be rectified by procedures performed correctly later on (Wise, Dauphinais, & Safer, 2007; Wogalter, Malpass, & McQuiston, 2004). For this reason, it is crucial that the contamination of eyewitness memory is actively prevented throughout the interview process. Fortunately, decades of memory research has firmly established the conditions under which witnesses should be questioned to elicit accurate evidence.

To avoid unduly shaping a witness's memory, it is important that investigators phrase their questions so these do not contain any indication of how the event unfolded (Poole & Lamb, 1998; Powell, Fisher, & Wright, 2005; Powell & Snow, 2007). Consequently, it is widely acknowledged that interviews should begin with a free recall phase, or narrative account (e.g., "*tell me everything that happened during the bank robbery*"). Here, the witness recounts any aspects of the event that they choose, at their own pace, without interruption, and using their own words (Oxburgh, Myklebust, & Grant, 2010; Powell & Snow, 2007).

But although this narrative phase tends to elicit highly accurate information (Lindberg et al., 2003), witnesses' free recall accounts rarely provide all of the information required by the interviewer (Myklebust & Bjørklund, 2006). Police investigators require witnesses to describe events in more detail than one would normally provide in a day-to-day interaction, and witnesses are often unaware of the information that is crucial to the investigation (Fisher & Schreiber 2017). Consequently, investigators frequently need to ask for more detail. Open questions (e.g., "*what was he wearing?*"), which require multiple-word responses as opposed to a simple *yes* or *no* (Fisher, 1995; Oxburgh et al., 2010; Rapley, 2001), are recommended for this purpose. Open questions still provide the witness with the flexibility to choose which aspects of an event they report based on their memory for what happened. They also place less pressure for an immediate answer, providing the witness with time to collect their thoughts, and therefore promoting elaborate memory retrieval (Wright & Powell, 2005). Sternberg et al. (1996) found that when interviewers asked open questions, responses were four times longer and three times richer in relevant detail than responses elicited via more restrictive questions.

When questions restrict the witness's range of responses (e.g., "*did that happen during the daytime or the nighttime?*" or "*did he have a gun?*"), the chances of error increase (Pipe et al., 2004; Ibabe & Sporer, 2004; Lipton, 1977). In fact, the more specific questions become, the more likely a witness is to report incorrect information (Lipton, 1977). This happens because closed questions direct an individual's attention away from searching through memories internally to focusing externally on the information inherent in the interviewer's question (Powell, Fisher, & Wright, 2005). As a result, the witness might falsely recognise the details provided within the question, or exhibit a response bias in which they acquiesce with the interviewer without reflection (Roberts & Powell, 2001).

Police Interview Protocols

When the research findings discussed above came to light, researchers began to examine police interviewing practice to assess how well it aligned with these basic questioning principles. The results of this research were concerning. During the 1980s, for example, Fisher, Geiselman, and Raymond (1987) critically analysed police interviewing techniques from interviews conducted during a one-year period, noting that there was little structure across the interviews and that police were making avoidable, systematic errors that limited the amount of information elicited. Too few open questions were asked, while far too many questions—in fact, 90% of follow up questions in this study—were closed. Questions were asked in an inflexible and apparently pre-determined order, and police frequently interrupted eyewitnesses; the average length of uninterrupted free recall was a mere 7.5 seconds (Fisher et al., 1987). Other studies conducted across the same general time period reported similar findings (Baldwin, 1993; Irving & Hilgendorf, 1980; McConville & Baldwin, 1982)

To address these types of problems, evidence-based interview training for police investigators has now been implemented around the world, including in the UK, Israel, Sweden, Norway, Australia, and New Zealand (Fisher & Schreiber, 2007). Although the interview protocols employed vary slightly across jurisdiction, they all converge on several key features of a ‘good’ interview: establishing rapport, encouraging the witness to volunteer information without prompting, asking open questions, not interrupting, avoiding leading questions, and cautioning the witness not to guess (Powell, Fisher, & Wright, 2005; Sternberg, Lamb, Davies, & Westcott, 2001; Wells et al., 2000).

Yet although interviewing protocols have become widely established, the data relating to protocol adherence are concerning. Sternberg, Lamb, Davies, and Westcott (2001), for example, evaluated the quality of investigative interviewing in the UK following the

implementation of an evidence-based interview guide. The researchers found that the interviewers rarely used open questions to elicit information, instead, relying heavily on highly suggestive closed questions (e.g., “*did he do anything with his hands?*”). In fact, almost 40% of the information that witnesses provided was elicited via suggestive questions. Similarly, Wise, Safer, and Maro (2011) compared law enforcement officers from departments in the US that had implemented eyewitness reforms with those from departments that had not. Both groups had limited knowledge of eyewitness factors and reported conducting interviews in a way that violated many of the principles of best-practice. In fact, there were no differences, in knowledge or interviewing practice, between the officers from reform departments and non-reform departments (Wise et al., 2011). Together, these findings demonstrate that evidence-based interview training may not have as large an effect on investigators’ practice as anticipated.

Even when training leads to an increase in interviewers’ knowledge, there is no guarantee of improved practice. Warren et al. (1999) assessed experienced interviewers before and after they attended a 10-day investigative interviewing training institute. While interviewers’ knowledge of the scientific basis behind interview protocols significantly increased following their training, there was no change in the way they questioned witnesses, or in the amount of accurate information that they elicited during the mock interviews. Less than 25% of information reported was elicited via open questions or free recall prompts; the recommended percentage is three times this amount (Wilson & Powell, 2001).

Taken together, these research findings indicate that while police investigators can be taught best-practice eyewitness interviewing principles, successfully converting those principles to practice presents a considerable challenge (Warren et al., 1999). Wise and colleagues (2011) stressed that the focus of research needs to be on effectively persuading police officers to implement the necessary techniques outlined in the evidence-base. To do

this, however, we first need to understand why police investigators appear to experience such difficulty adhering to best practice.

Why is ‘Good Interviewing’ so Difficult?

Police investigators commonly report that it is simply “harder” to ask open questions. There are two main ways to account for this difficulty, and these are not mutually exclusive (Wright and Powell, 2006). The first is that investigators are simply not accustomed to asking open questions. Everyday conversations in English-speaking countries commonly consist of a relatively closed style of questioning (Eades, 1996). It has also been repeatedly demonstrated that police officers with greater experience (Lafontaine & Cyr, 2016; O’Brien, Westera, & Zajac, 2019; Powell, Hughes-Scholes, Smith, & Sharman, 2014), particularly in using closed questions (Wright & Powell, 2006), struggle more with learning to ask open questions. In other words, old habits can get in the way of new ones—a phenomenon referred to as *proactive interference* (Hay & Jacoby, 1996).

The second potential reason investigators have difficulty asking open questions is that no investigator comes into an interview “blind.” That is, when interviewers sit down to question a witness, it is likely that they already have some information about what happened. This information might come from what they observed when they arrived on the scene, from other witnesses interviewed previously, or from other aspects of the investigation (e.g., medical findings or other physical evidence). Furthermore, even in cases where the investigator does not hold this information, they are likely to have a sound knowledge of the specific details required to press charges and, more specifically, to decide which particular charges apply.

If an investigator has a preconceived notion of how an event unfolded, or the specific nature of the details they require, then it stands to reason that they will find it more challenging to refrain from incorporating those details into their questions. How might these

findings translate to interviews conducted with witnesses? We propose that if an interviewer knows the specific nature of the details they require, they will find it easier to frame their questions in a closed manner. If the interviewer wants to know whether the offender was wearing a disguise, for example, it should require less cognitive effort to generate the question, “*was he wearing a disguise?*” than to generate an open question that elicits the same information (e.g., “*describe what he was wearing*”). There is also an underlying assumption among police investigators that to elicit specific information, one must ask a specific question (Wright & Powell, 2006).

We also propose that holding prior information about how the crime unfolded should amplify this effect. The basis for this hypothesis comes from the phenomenon of *confirmation bias*—the tendency to seek, perceive, interpret, and remember new evidence in ways that verify pre-existing beliefs and expectations (Nickerson, 1998). Confirmation bias is seen across a range of everyday interactions (Snyder & Swann, 1978) and disciplines (Nickerson, 1998). Within the field of police investigation, confirmation bias has been identified as a major issue (Dror, Charlton, & Peron, 2006; NAS, 2009). Investigators rarely seek evidence from witnesses that will disconfirm their hypothesis (Toglia, Read, Ross, & Lindsay, 2007). People who are testing a hypothesis tend to ask hypothesis-consistent questions, which commonly elicit hypothesis-consistent answers, therefore, strengthening the bias (Zuckerman, Knee, Hodgins, & Miyake, 1995).

Confirmation bias in a police interviewer can be dangerous, as it can lead to the contamination of evidence. Research has demonstrated that when an interview is conducted by an interviewer who harbours preconceived notions of what happened, there is an increased likelihood of false evidence from the witness (Quas et al., 2007). Moreover, these distortions can persist throughout subsequent, non-biased, interviews (Thompson, Clarke-Stewart, & Lepore, 1997).

How does confirmation bias increase the likelihood of false evidence? Existing research on interviews with suspects suggests that confirmation bias can have a strong influence on the questions that an investigator asks, which in turn influences the interviewee's responses. For example, Kassin, Goldstein, and Savitsky (2003) asked investigators to interrogate the suspects in a mock theft. Investigators were either led to believe that the suspect was guilty or innocent. Before the interview, participants selected six interview questions they wanted to ask from a list comprised of question pairs, one being neutral (e.g., "*did you know anything about the key that was hidden behind the VCR?*") and the other guilt-presumptive (e.g., "*how did you know about the key that was hidden behind the VCR?*"). Participants harbouring guilty expectations chose more guilt-presumptive questions, exerted more pressure on the suspect to confess, and were more likely to judge the suspect as guilty at the end of the interview. Alarming, these behaviours all increased when interviewing innocent suspects. (see Hill, Memon, & McGeorge, 2008, for similar findings).

The Present Study

In the present study, we extend the current literature by focusing on the influence of question type and prior information on laypeople's ability to generate interview questions. Participants in the study were asked to generate either open or closed questions for a hypothetical witness to a crime. We also manipulated what participants were told about the crime—half of the participants were given information that set an expectation of what the witness saw, while the remaining participants did not receive this information.

We measured the number of questions that each participant formulated in a 2-minute timeframe, as well as the number of errors (i.e., closed questions when the participant was asked to generate open questions, or vice versa). We predicted that participants would generate fewer open questions within the two-minute timeframe than closed questions. Similarly, we predicted that participants asked to generate open questions in the 2-minute

time frame would show a greater number of errors than those asked to generate closed questions. We also expected that prior information would make it harder for participants to generate open—but not closed—questions.

We also studied how prior information might influence the *content* of the closed questions that were correctly—and incorrectly—generated. We predicted that participants in the informed condition would be more likely than naïve participants to ask closed questions about topics contained in the prior information. Furthermore, we predicted that participants in the context condition would be more likely than naïve participants to generate their questions in a way that built on that information, as opposed to simply confirming it.

Method

Ethical Approval

Category B ethical approval for this study was obtained from the University of Otago Human Ethics Committee (approval number DP16/284).

Participants

We recruited 307 participants ($M_{age} = 21.15$ years, $SD_{age} = 3.32$, age range = 17 to 42 years, 239 females) for this study. This sample size gave us at least 95% power to detect a ‘medium-sized’ effect for the comparisons of interest ($d = 0.50$; see Cohen, 1988).

Participants were either recruited from the Year 1 and 2 University of Otago Psychology Participation Pool, or from the Psychology Department Paid Research Participation website. Students recruited from the participant pool had the opportunity to earn a small amount of course credit by completing a questionnaire based on the experiment. Members of the Dunedin community who were recruited from the website received \$15 to reimburse them for the costs of participating.

Design

We employed a 2 x 2 between-subjects design. The first factor, *question type*, related to whether participants were asked to generate open questions or closed questions. The second factor, *context*, related to whether or not participants were provided with context about the crime. Participants were quasi-randomly assigned to each of these between-subjects conditions, such that there were approximately equal numbers of participants in each of the four cells.

Experimental Procedure

Participants all took part in the experiment individually. On arrival at the laboratory, they were greeted and led to a private interview room containing a computer. Participants completed informed consent procedures before the experimental procedure began. This process involved the participant reading an information sheet regarding the experiment and signing a consent form, after being provided with the opportunity to ask any questions of the experimenter. The procedure began with a training session conducted via computer. The examiner introduced this by saying:

“This part of the experiment will take under 15 minutes. First, I’m going to get you to read some information about question types and answer some questions on the computer. When you’re finished, it will tell you to come and get me..”

The experimenter then left the room while the participant moved through the presentation at their own pace. Participants were taught about closed and open questions, and how they differ. They were then presented with a series of 20 questions and asked to identify whether each was open or closed. They were given feedback as to the accuracy of their responses. These data were not included in our data analysis.

Following the completion of the training session, the experimenter returned to the room and said:

Now I'm going to get you to do a task based on what you've just learned. You are to imagine you're a police officer. This is James, a student at the university [A photo of "James" appeared on the computer screen]. James has just witnessed a physical altercation between a male and a female on campus. You need to interview James to find out what he saw.

Participants were then given two minutes to generate questions out loud.

Approximately half of the participants ($n = 153$) were asked to generate open questions, while the remaining participants ($n = 154$) were asked to generate closed questions. The experimenter said:

You're going to use your knowledge of open and closed questions to conduct the interview. The "catch" is that we are going to limit you to one type of question. So, all of the questions that you ask James have to be [CLOSED/OPEN] questions.

Of course, James is not going to answer you. So, once you ask a question, continue to ask the next question as fast as you can. Ask as many [CLOSED/OPEN] questions as you can before I tell you to stop. If you accidentally ask an [OPEN/CLOSED] question, don't worry, just continue. Ok, do you understand what you have to do? Do you have any questions before we begin? Because once you start the task you can't ask me for further clarification.

You are to ask James [CLOSED/OPEN] questions about what he saw. Remember to keep generating questions until I say stop.

Within each of these conditions, approximately half of the participants were also given additional information about the alleged crime (*informed* condition; $n = 146$).

Specifically, these participants were told that three other witnesses had already provided the following information about the altercation:

The pair seemed to know each other. The altercation started after the male dropped a cell phone on the ground. Both parties started yelling at each other. The female tried to get the cell phone but the male pushed her away. The male then hit the female. The male yelled "I'll fucking hurt you." Then both parties hit each other and wrestled over the phone. The physical altercation ended when the female fell to the ground and began crying. The male then threw the phone on the ground and stormed away. One of the witnesses went up to the female to ask if she was ok. The female said she was fine. She had a cut to her lip that was bleeding.

This information was provided in written form, and participants were free to refer to it during the experimental task. The remaining participants were assigned to the naive condition ($n = 161$); these participants were not provided with any prior information.

The entire experimental procedure typically took between 10 and 20 minutes. At the end of the experiment, participants were thanked and fully debriefed, and the experimenter answered any questions that participants had about the experiment.

Coding and Inter-Rater Reliability

Participants' responses to the question generation task were audio-recorded and transcribed verbatim. Any identifying information was removed from the data set prior to coding. We measured the total word count of the generated questions, to allow us to control for the possibility that questions of one type were simply longer than the other. We then coded two variables: 1) the number of questions of the required type (i.e., open or closed) generated within the 2-minute time frame; and 2) the number of errors (i.e., questions of the wrong type) generated within the 2-minute time frame. Two coders independently coded a sample of the transcripts. Agreement between coders was high, as measured by Pearson's correlation coefficients of .96 for correct questions and .99 for errors. Disagreements were resolved through discussion, and the primary coder then coded the remaining transcripts.

Following this initial coding process, we examined the closed questions that participants generated either correctly (for participants in the closed question condition) or incorrectly (for participants in the open question condition). This coding involved two stages. First, questions were coded according to their *content*; that is, whether or not the question related to the prior information provided to half of the participants—regardless of whether or not participants had been assigned to that condition. Next, those questions that were identified as containing content pertaining to the prior information were coded according to the *nature* of the question; that is, whether the question simply confirmed that prior information (e.g., “*Did the female have a cut lip?*”), or whether the question assumed the prior information to be fact and elaborated on it in their questioning (e.g., “*Did the female have any other injuries besides the cut lip?*”). Again, two coders independently coded a sample of the transcripts. Agreement between coders was high, as evidenced by Cohen’s kappa coefficients of .84 for question content, and .78 for question nature. Disagreements were resolved through discussion and the primary coder then coded the remaining transcripts.

Results

Data exclusions

Data from 20 participants were excluded from our analyses for one of three reasons. First, some participants ($n = 8$) mistakenly believed that James was the male involved in the altercation, rather than the witness. Second, some participants’ responses indicated that they had not understood the task, or did not have adequate proficiency in English to complete the task ($n = 4$). Finally, data from 8 participants were excluded due to experimenter error (e.g., non-standardised instructions). The final sample for analysis comprised 287 participants ($M_{age} = 21.11$ years, $SD_{age} = 3.32$, age range = 17 to 42 years, 221 females).

Number of Questions Correctly Generated

First, we examined the number of questions that participants generated correctly during the 2-minute time frame. A planned independent-samples t -test collapsing across context revealed that participants in the open question condition correctly generated fewer questions than participants in the closed question condition, $t(285) = 4.68$, $d = 0.55$, $p < .01$. We then conducted separate planned t -tests on these data, comparing the naïve and informed conditions; we did this separately for the open and closed conditions (see Figure 1). As expected, prior information did not influence the number of closed questions generated ($M = 9.66$, $SE = .52$ and $M = 10.33$, $SE = .68$, for informed and naïve conditions respectively), $t(142) = .78$, Cohen's $d = 0.13$, $p = .44$, two-tailed. Participants in the informed condition generated fewer open questions ($M = 6.97$, $SE = .40$) than did participants in the naïve condition ($M = 8.18$, $SE = .41$), $t(141) = 2.12$, $d = 0.36$, $p < .05$, two-tailed.

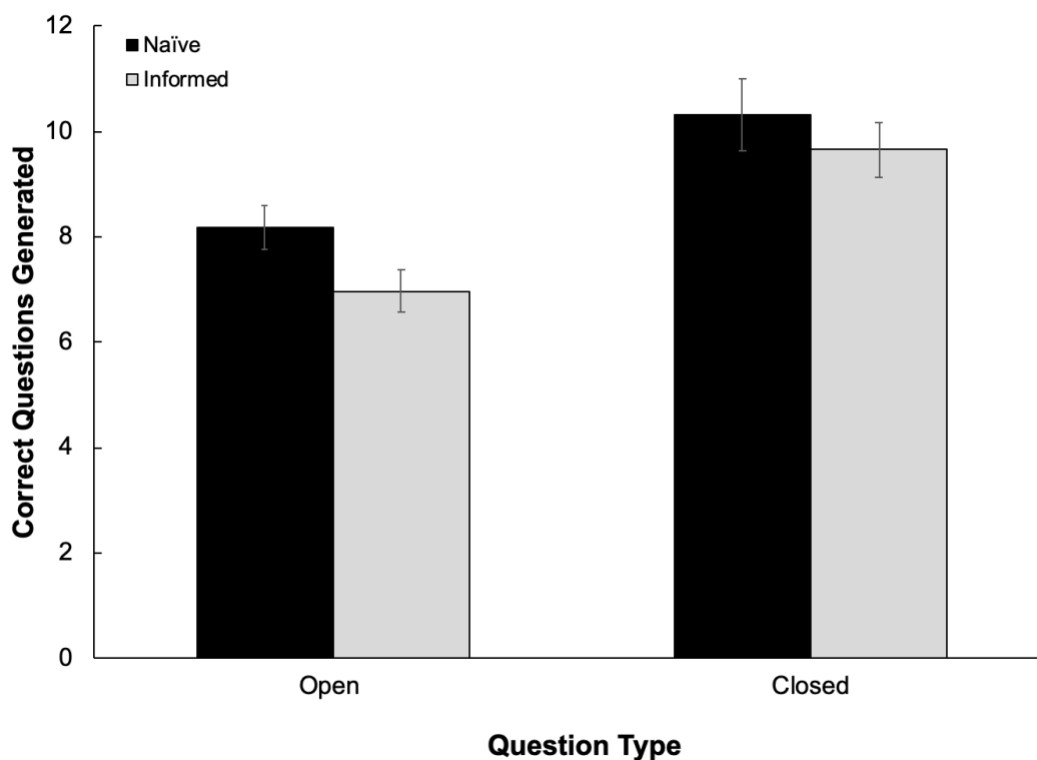


Figure 1. Number of questions correctly generated ($\pm 1SE$), shown as a function of question type (open or closed) and context (naïve or informed).

In interpreting these findings, it was important to rule out the possibility that there were differences in the length of—and therefore the time taken to utter—open and closed questions. Although the mean length of each question was similar in the open condition ($M = 8.35$, $SE = 0.20$) and closed condition ($M = 8.28$, $SE = 0.20$), $t(283) = -0.24$, $d = 0.03$, $p = .81$, two-tailed, we nonetheless re-ran our analyses with this variable as a covariate. Separate one-way ANOVAs for open and closed conditions controlling for mean question length revealed a significant effect of prior information on open question generation, $F(1,139) = 5.33$, $p < .05$, $\eta_p^2 = .04$, but not closed question generation, $F(1,140) = .01$, $p = .94$, $\eta_p^2 = .00$.

Number of Errors

Our next step was to examine the number of errors that participants made during the question generation task. An error occurred each time a participant in the open-question condition incorrectly generated a closed question, or a participant in the closed-question condition incorrectly generated an open question. These data are shown in Figure 2. A planned independent-samples t -test collapsing across context revealed that participants in the open question condition made more errors than participants in the closed question condition, $t(285) = -2.12$, $d = 0.25$, $p < .01$. Further planned t -tests revealed that prior information did not exert a significant effect on the number of errors made, regardless of question type condition (open questions, $t(141) = 0.19$, $d = 0.38$, $p = .85$, two-tailed; closed questions, $t(142) = -0.67$, $d = 0.11$, $p = .50$, two-tailed). That is, participants in the open question condition made a similar number of errors when they were given prior information ($M = 2.26$, $SE = 0.29$) as they did when they were not ($M = 2.34$, $SE = 0.28$), and the same was true of participants in the closed question condition (informed condition $M = 1.65$, $SE = 0.31$; naïve condition ($M = 1.38$, $SE = 0.24$)).

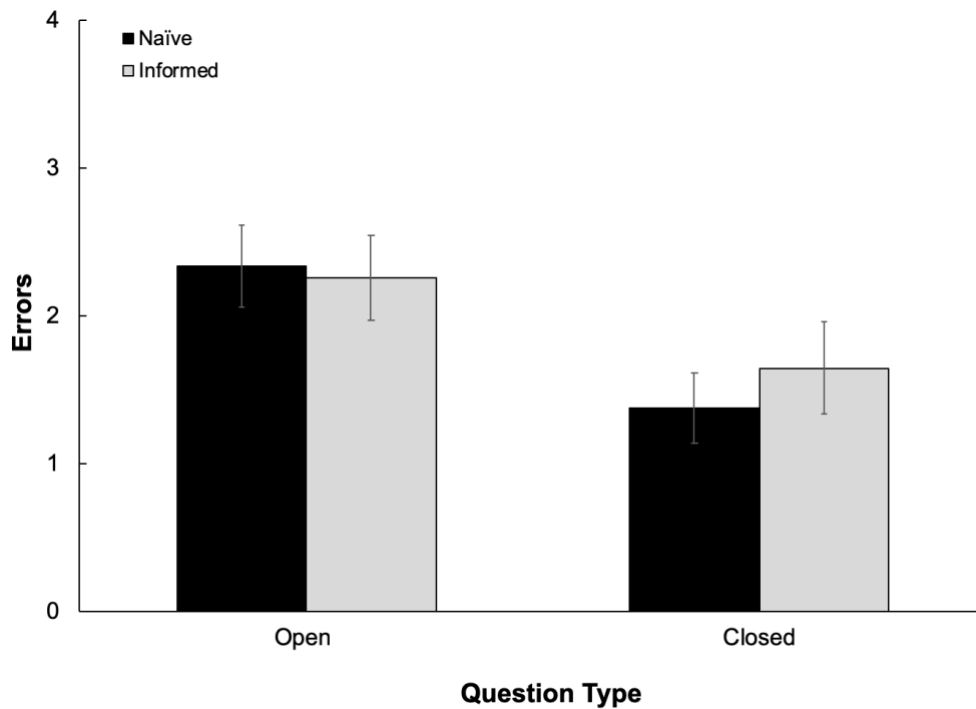


Figure 2. Number of errors ($\pm 1SE$), shown as a function of question type (open or closed) and context (naïve or informed).

Question Content

Recall that we also examined the content of the closed questions that participants generated—either correctly (for participants in the closed question conditions) or incorrectly (for participants in the open question conditions). Specifically, we wanted to know whether the prior information was influencing question content.

To answer this question, we first coded closed questions according to whether or not their content related to the prior information topics. Chi square analyses revealed that those in the prior information condition were more likely than those in the naïve condition to ask closed questions related to those topics—both correctly, $\chi^2(1, N = 1454) = 117.15, \phi = 0.09, p < .01$, and incorrectly, $\chi^2(1, N = 328) = 6.98, \phi = 0.15, p < .01$ (see Figures 3 and 4).

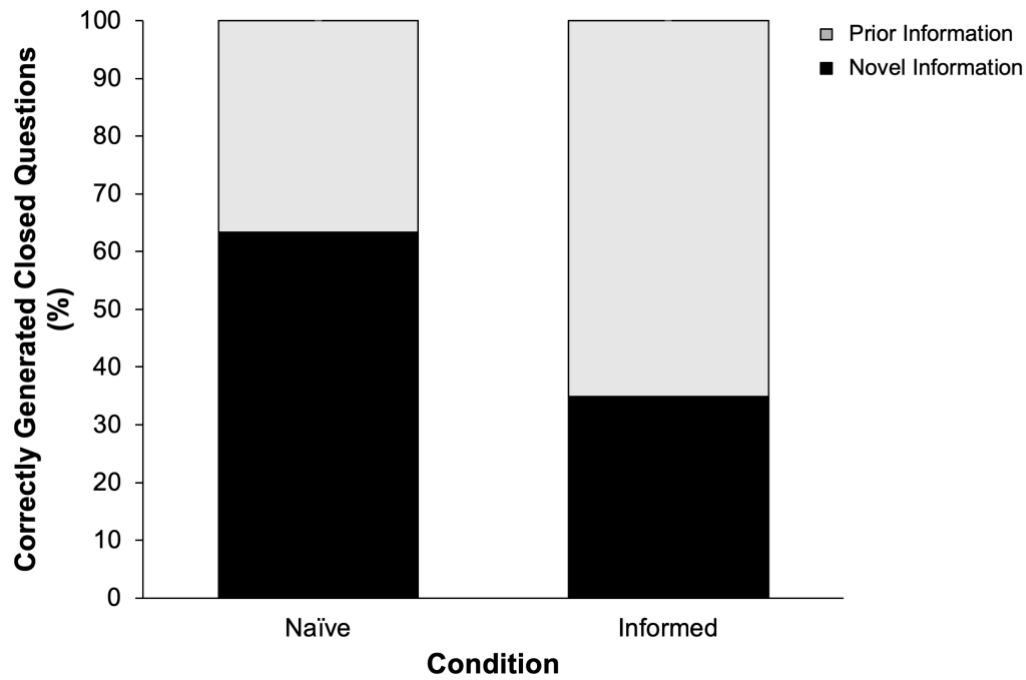


Figure 3. Percentage of correctly generated closed questions that contained prior information or novel information topics, shown as a function of context (naïve or informed).

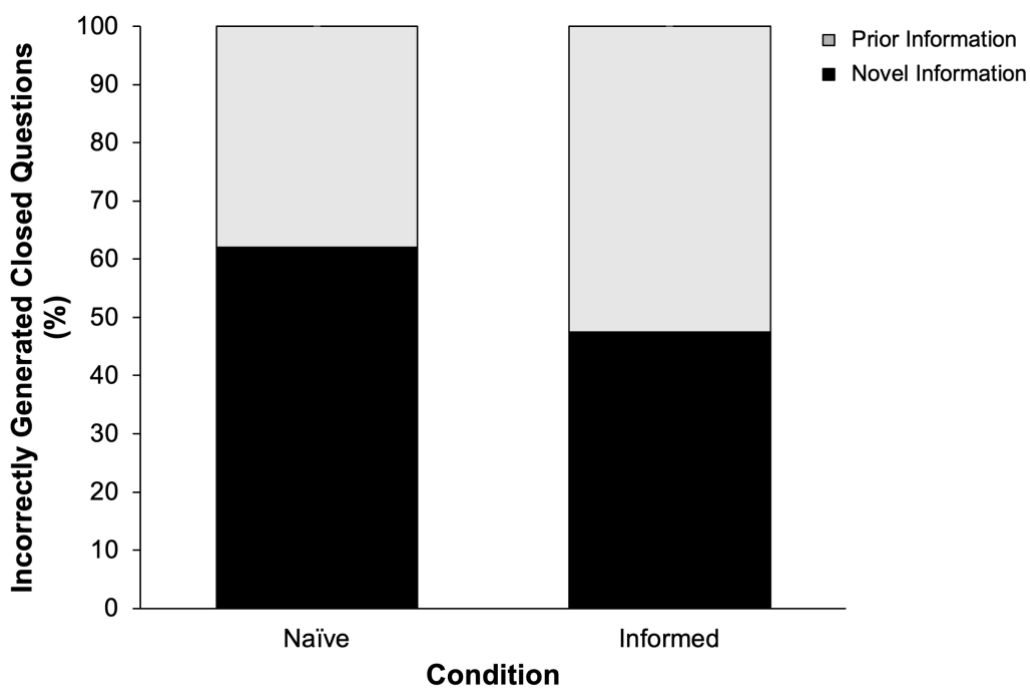


Figure 4. Percentage of incorrectly generated closed questions that contained prior information or novel information topics, shown as a function of context (naïve or informed).

We then conducted further coding on the closed questions that pertained to the prior information. Specifically, we coded these questions according to whether they were aimed at confirming the prior information (e.g., “Was her lip bleeding?”) or elaborating on it (e.g., “Did she have any other injuries besides the bleeding lip?”). Again, Chi square analyses revealed that, although participants in both prior information conditions were more likely to ask confirmatory questions than elaborative questions, informed participants were more likely than naïve participants to ask elaborative questions—both correctly, $\chi^2(1, N = 721) = 30.27, \phi = 0.20, p < .01$, and incorrectly, $\chi^2(1, N = 149) = 7.30, \phi = 0.22, p < .01$ (see Figures 5 and 6).

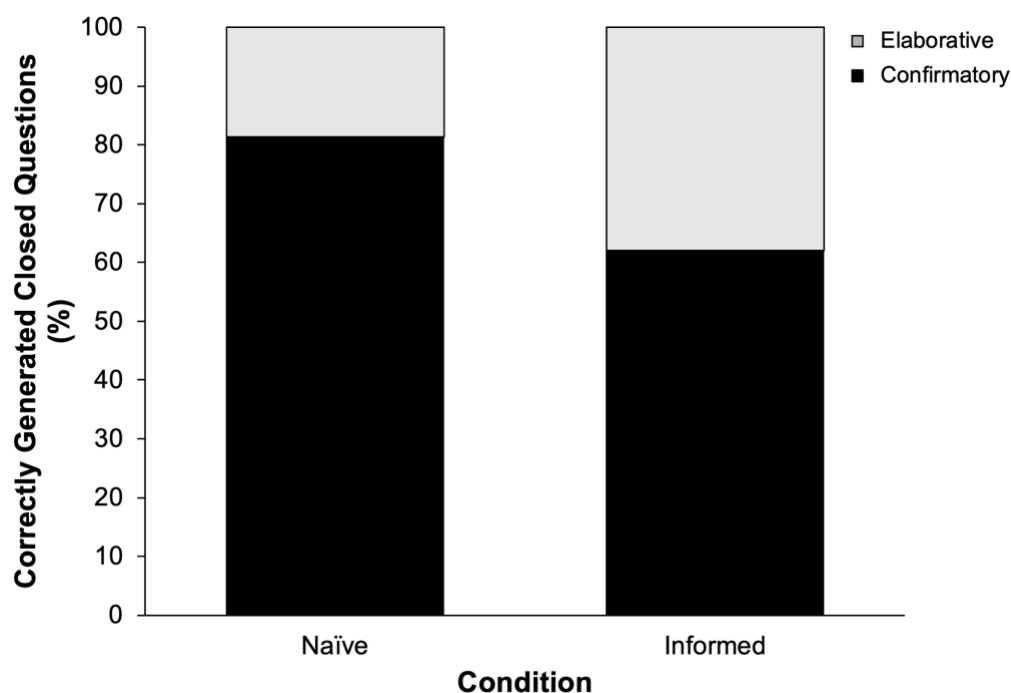


Figure 5. Percentage of correctly generated closed questions about prior information topics that were elaborative or confirmatory, shown as a function of context (naïve or informed).

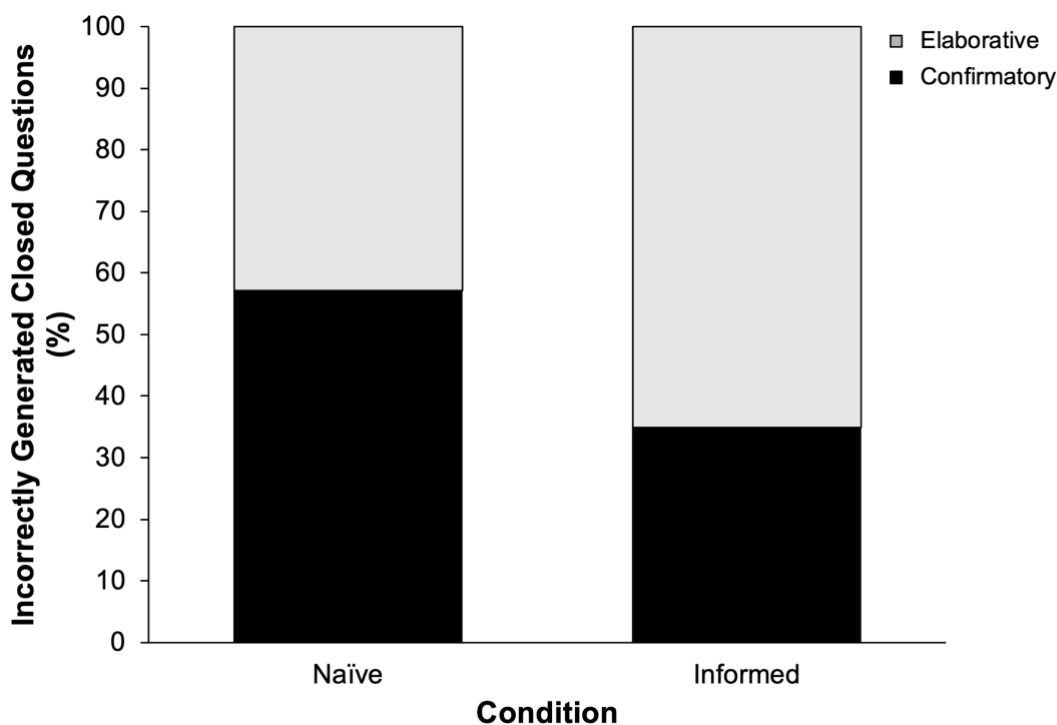


Figure 6. Percentage of incorrectly generated closed questions about prior information topics that were elaborative or confirmatory, shown as a function of context (naïve or informed).

Discussion

Despite a wealth of research showing that open questions (e.g., *What was he wearing?*) result in more accurate eyewitness evidence than closed questions (e.g., *Did he have a hat on?*), researchers and practitioners alike have acknowledged that police investigators find it difficult to prioritise open questioning during investigative interviews (Powell, 2001; Sternberg et al. 2001; Warren et al., 1999; Wise et al., 2011). To date, however, the widespread assumption that “open questions are simply harder to generate” has not been tested empirically. Here, we explicitly examined the ease with which people can generate open and closed questions, and how prior knowledge might influence this ability. Participants in the present study were given two minutes to generate either open or closed questions for a hypothetical witness to a crime. Half of the participants were provided with information about the crime that had ostensibly been provided by other witnesses; remaining

participants were provided with no such information. We calculated both the number of questions correctly generated and the number of errors made.

First, we expected that participants asked to generate open questions would generate fewer questions and make more errors than those asked to generate closed questions. Second, we predicted exposure to prior information would reduce participants' ability to generate open—but not closed—questions. Finally, we predicted that the closed questions generated—either correctly or incorrectly—by those exposed to prior information would be more likely to contain the prior information topics than those generated by those in the naïve condition, and to build on that information rather than simply confirming it. Our main findings are discussed below.

Number of Questions Correctly and Incorrectly Generated

As predicted, participants generated fewer open questions than closed questions. Participants asked to generate open questions also made more errors than those asked to generate closed questions. These findings are congruent with the widespread assumption that open questions are harder to generate than closed questions, and also align with theory. Everyday conversations in English-speaking countries typically consist of predominantly specific or closed questioning styles (Eades, 1996). Proactive interference theory predicts that this habit would interfere with participants' ability to restrict their questions to those that are open in format (Hay & Jacoby, 1996).

Another—not mutually exclusive—explanation for the observed difficulty in generating open questions is confirmation bias. Confirmation bias refers to people's tendency to seek, perceive, interpret and remember information in a way that verifies pre-existing beliefs and expectations (Nickerson, 1998). We predicted that, if confirmation bias does play a role in the challenge of asking open questions, then providing participants with prior information about the crime should make generating open questions even more difficult.

As expected, prior information did not influence the number of closed questions generated. However, when asked to generate open questions, participants in the informed condition generated fewer questions than those participants in the naïve condition. That is, being exposed to prior information appeared to make open questions harder to generate. This could occur because informed participants developed an expectation about what happened during the crime, and became biased to confirm this expectation—something that is more easily achieved with closed questions.

In terms of errors, as predicted, participants in the open condition made more errors (accidentally asking closed questions when they had been asked to generate open questions) than participants in the closed condition (accidentally asking open questions when they had been asked to generate closed questions). Contrary to our expectations, however, exposure to prior information did not influence the number of errors made, in either question condition. We note, however, that our error coding scheme was highly conservative, in that we only measured instances in which participants verbalised an entire question of the wrong type. That is, if a participant simply *began* to make an error (e.g., “Was he wearing—”) before asking a different question, this utterance would not be coded as an error. Furthermore, we could of course only code the questions that participants verbalised. That is, we could not detect situations in which participants thought of a question that would be coded as an error, but identified it before saying it aloud. It is likely that some participants could detect and inhibit an error response earlier than others, and therefore make no measurable errors (Fiehler, Ullsperger, & von Cramon, 2004; Norman & Shallice, 1986). The noise created by these factors could have also contributed to the lack of statistical significance that was observed.

While previous research has not specifically examined the respective difficulty generating open versus closed questions for eyewitnesses—or used the particular paradigm

employed in the current study—the present findings are consistent with the wider literature on interviewing. For example, police officers have reported finding asking open questions to be particularly difficult (Wright and Powell, 2006) and research has repeatedly demonstrated that officers tend to ask far more closed questions than open questions in their interviews (Fisher et al., 1987)—even after receiving training in best practice interviewing (Powell, 2001; Sternberg et al. 2001; Wise et al., 2011). Powell (2001), for example, found that after comprehensive training, still less than 25% of reported information was elicited via open questions—three times less than the recommended percentage. Sternberg et al. (2001) obtained similar concerning findings, with trained interviewers eliciting 40% of information via suggestive questions, which investigators are explicitly instructed to avoid. Indeed, even an understanding of the rationale behind asking open questions does not appear to meaningfully increase officers' ability to do so (Warren et al., 1999).

Confirmation bias has already been identified as a major problem within police investigations (Dror et al, 2006; NAS, 2009). Investigators tend to seek evidence from witnesses that will confirm their hypothesis (Toglia et al., 2007), which typically involves asking hypothesis-consistent questions, that tend to elicit hypothesis-consistent answers, thereby strengthening the bias (Zuckerman et al., 1995). Previous studies examining police interviewing of suspects has demonstrated that confirmation bias can exert a strong influence on the questions that an investigator asks, in turn influencing the interviewee's responses (Hill et al., 2008; Kassin et al., 2003).

Question Content

Further support for a confirmation bias explanation was obtained when we measured *how* prior information influenced question generation, by examining the content of the closed questions generated. First, we coded correctly and incorrectly generated closed questions according to whether or not their content related to the prior information topics. By

comparing question content with that generated by participants in the naïve condition, we were able to confirm that the themes that came through from the prior information in the generated questions were not simply topics that participants would have likely asked about anyway (i.e., violence). This was not the case: participants in the prior information condition were more likely to ask questions (both correctly and incorrectly) related to that information (e.g., *did the male drop a cell phone?*), while correspondingly generating fewer questions pertaining to topics not discussed in the prior information (e.g., *have you spoken to anybody else about what you saw?*).

Once we knew that the prior information was informing the questions that were generated, we looked at *how* the information was being used. We did this because it was possible that the provided information could have simply served as a convenient list of topics to cover, thereby acting as a prompt rather than creating a belief about what happened. Again, the findings aligned with our expectations: although participants in both conditions were more likely to ask confirmatory questions than elaborative questions overall, informed participants were more likely than naïve participants to—both correctly and incorrectly—generate closed questions that assumed the prior information.

In summary, our findings suggest that not only do people find it easier to generate closed questions than open questions, but that the prior information an individual has about the event in question directly influences the content of the closed questions that they generate. It is likely, then, that prior information creates a belief about how an event unfolded, which people use to formulate their questions.

Limitations and Future Research

As with any laboratory study of a real world phenomenon, our experiment has some limitations. The main issue pertains to the ecological validity. Perhaps the most obvious

limitation is that our participants were not police investigators. We therefore need to consider to what extent our findings can be extrapolated and applied to real world situations.

The general consensus in the literature is that, when it comes to fact-finding in a forensic setting, the differences between professionals and laypeople are relatively minor (Eisenberg et al., 2005; Kalven & Zeisel, 1966; Rassin, Eerland, & Kuijpers, 2010). Of particular relevance are two studies conducted by Ask and Granhag (2005) and Rassin (2010). Both studies examined confirmation bias in the forensic investigative setting using groups of police officers and university students as participants, then compared performance across groups. Both studies found that police officers and university students alike made judgements that conformed to their prior expectations, or to the hypothesis that was initially presented to them. Interestingly, both Ask and Granhag (2005) and Rassin (2010) found that the professional participant group were even *more* blind to alternative hypotheses than the student participants. These findings suggest that the cognitive processes involved for police officers are similar to that of university students. Therefore, if our study was reproduced using police officers as participants, the outcomes would likely be similar. In fact, if anything, we might expect police officers to be even *more* influenced by prior information than the participants in the present study.

Another limitation of our paradigm was the artificial simulation style of the mock interview that participants conducted. This meant that “James” (the eyewitness) did not respond to participants’ questions. The rationale behind this aspect of the paradigm was to provide a straightforward way of quantifying question generation without having to allow for response length and content. Some participants appeared uncomfortable with this one-way style, which clearly lacked a normal conversational flow. It is possible that participants may have been able to generate a greater number of questions during a more natural conversation style interview, in which the second party’s responses might act as prompts for further

inquiry. The proportion of open vs closed questions could also be affected. We know, for example, that interviewers ask more closed questions when young children provide fewer details in response to open questions (Sternberg, Lamb, Davies, & Westcott, 2001; Thoresen, Lonnum, Melinder, Stridbeck, & Magnussen, 2006). It would be beneficial for this limitation to be addressed in future research, although any such paradigm would make it very difficult to address the timed aspect of the study.

Implications

Limitations aside, our findings have implications for how police conduct investigative interviews. Despite extensive research having been conducted illustrating the malleable nature of memory (Bartlett, 1931; Crombag et al., 1996; Hope et al., 2008; Lacey & Stark, 2013; Leippe, 1980; Lindsay, 2008; Loftus, 2005; Mazzoni & Memon, 2003; Morgan et al., 2013; Nisbett & Wilson, 1977; Sharman et al., 2005; Tukey & Brewer, 2003; Wagoner, 2017; Yuille, 1980), the impact that questioning can have on memory (Belli, 1989; Ceci et al., 1987; Loftus 1975; Loftus 1979; Loftus et al., 1978; Loftus et al., 1989; Manning & Loftus, 1996; Okado & Stark 2005; Porter et al., 1999; Tversky & Tuchinn 1989; Wagenaar & Boer, 1987; Wright et al., 2015), and the resulting comprehensive police investigative protocols and training programmes that were developed in accordance with this evidence base (Fisher & Schreiber 2007; Powell et al., 2005; Sternberg et al., 2001; Wells et al., 2000), evidence shows that police investigators are still failing to ask open questions appropriately (Sternberg et al., 2001; Warren et al., 1999; Wilson & Powell, 2001; Wise et al., 2011). These findings have led to the argument that the current approach to training police investigators is not as effective as was anticipated (Wise et al., 2011).

How do our findings inform this issue? In the past, a strong emphasis has been placed on trainees receiving feedback on their questioning style, with this evaluation continuing into the workforce (Myklebust & Bjørklund, 2006; Wright & Powell, 2006). Our findings,

however, suggest that the influence of prior expectations on questioning style is a factor that warrants attention, because it appears to exacerbate the difficulty of asking open questions.

One possibility for addressing this issue is to make police investigators more aware of cognitive biases, and how these might affect their questioning. Critically, however, these types of biases do not tend to disappear when an individual is aware of them. For instance, people tend to believe that biases only apply to other people (the *bias blind spot*; (Pronin, Lin, & Ross, 2002; Scopelliti, 2015). Furthermore, even when individuals accept that they might be vulnerable to bias, such biases are not under conscious control (McPherson Frantz, 2006; Wilson, Centerbar, & Brekke, 2002). Even if they were, correcting for a bias requires us to know not only the direction of the bias, but also its size. In fact, in attempting to correct for bias, people sometimes introduce an entirely new one (Wilson & Brekke, 1994).

A more promising approach, then, could be to put systems in place that limit the amount of information an investigator is exposed to prior to an investigative interview. That is, instead of attempting to train investigators to not be influenced by their expectations, it could be more effective simply to stop those expectations from forming in the first place. A substantial body of research has investigated implementing such procedures in the field of forensic sciences. Examples of these procedures include *evidence line-ups*, where, instead of comparing one suspected piece of evidence with one piece of evidence from the crime scene, the examiner is presented with multiple “suspect” samples (Miller, 1987; Saks et al., 2003); and *sequential unmasking*, involving an initial examination of the evidence in isolation, prior to being exposed to any reference material (Dror et al., 2011; NIST, 2012). Obviously, these approaches are better suited to visible forms of evidence, such as bitemark or fingerprint analysis; they do not easily apply to an interview setting. However, the concept of minimising bias by managing the information that an investigator is exposed to is certainly applicable. A forensic procedure that is more relevant in an interview setting is *blind testing*,

which involves the examiner conducting their analysis without being exposed to nonessential information (see Found & Ganas, 2013; Kerkhoff et al., 2015; Mattijssen et al., 2016).

There are, however, some obstacles associated with trying to limit a police investigator's knowledge of a case. According to best-practice interview guidelines, investigators should review all available case information during pre-interview preparations, as this is thought to maximise interviewer efficiency and effective witness participation (US National Institute of Justice, 1999). Reviewing case information prior to conducting an interview can foster rapport building, enhance comprehension of provided witness responses, and assist in bringing up difficult topics such as abuse (Poole & Lamb, 1998). Essentially, while blind interviewing could have benefits in terms of question format, it could also have drawbacks.

Implementing procedures that reduce the amount of contextual information investigators are exposed to would also require considerable additional resources from police organisations, which are usually stretched to their limit. The feasibility of having a different investigator interviewing each eyewitness would be low under optimal conditions, let alone in challenging circumstances, such as a large investigation involving many witnesses, time-sensitive enquiries, or investigations being conducted in small communities.

A further complicating factor is that, even without being explicitly provided with information pertaining to a specific case, police investigators are still aware of what information needs to be proven in order for charges to be laid. For example, an offender who threatens to kill a victim will face different charges to one who does not. This knowledge could act in a similar way to case-specific contextual information in terms of influencing question generation (e.g., increasing the likelihood of asking "Did he threaten to kill you?"). If that were the case, then reducing the amount of contextual information an investigator is

exposed to would be less effective, and could also be ineffective. This empirical question warrants further investigation.

Beyond the Forensic Context

The implications of our findings are not limited to police; there are many other professions that promote the use of open questioning as best practice, yet have issues with implementation. For example, open question use is important across health care professions (Grover, 2005; Makoul, 2001; Williams, Weinman, & Dale, 1998). Disciplines of particular focus in the literature include nutritionists and dieticians (AbuSabha, 2013), and professionals working in palliative care and hospice (Lo, Quill, & Tulsky, 1999; Meier, 2014). It is also recommended that, in an effective clinical interview, clinical psychologists should ask twice as many open questions as closed questions (Miller & Rollnick, 2002), although this is not often seen in practice (Harwood & Eyberg, 2004).

Failing to ask open questions can mean that health care professionals fail to glean the primary reason that a patient is seeking care. Beckham and Frankel (1984), for example, found that in 69% of recorded doctor visits, the physician interrupted the patient during their opening statement and asked directive questions narrowing in on a specific concern. An open questioning style is also important for building rapport with patients, and failure to use open questions can create the appearance of judgement. Patients can be uncooperative and disengage from treatment if they feel they are being told what to do. Therefore, in order to facilitate change in an individual, practitioners need ask the right type of questions (Manchester, 2012).

Education is also a field in which open questions are recommended. Inquiry-based learning—which promotes students as active agents in their learning—stresses the importance of asking open questions, allowing students the opportunity to blend new knowledge into their existing knowledge (National Research Council, 2000). However,

despite understanding the importance of this approach and undergoing training, teachers frequently struggle to utilise open questions in the classroom (Foss & Kleinsasser, 1996; Inoue & Buczynski, 2011).

Conclusion

When we consider that eyewitness evidence is one of the most influential forms of evidence in the courtroom (Fisher & Geiselman, 1992), and that eyewitness error is the main cause of wrongful conviction (Innocence Project, 2017), it is paramount that we collect eyewitness evidence in a way that best preserves accuracy. The present study is the first to empirically examine the widely-believed assumption that asking open questions is ‘harder’ than asking closed questions, as well as offering some tentative insight as to why this is. Our findings that confirmation bias likely plays a key role in difficulty associated with generating open questions could guide future research and eventually inform the development of police protocols. In addition to being relevant across a wide range of professions, the findings from the present study could have flow-on effects for reducing the chances of miscarriages of justice.

References

- AbuSabha, R. (2013). Interviewing Clients and Patients: Improving the Skill of Asking Open-Ended Questions. *Journal of the Academy of Nutrition and Dietetics*, *113*(5), 624-633. doi: 10.1016/j.jand.2013.01.002.
- Ask, K., & Granhag, P. A. (2005). Motivational sources of confirmation bias in criminal investigations: The need for cognitive closure. *Journal of Investigative Psychology and Offender Profiling*, *2*(1), 43-63. doi: 10.1002/jip.19
- Assefi, S. L., & Garry, M. (2003). Absolut® memory distortions: Alcohol placebos influence the misinformation effect. *Psychological Science*, *14*(1), 77-80. doi: 10.1111/1467-9280.01422
- Baldwin, J. (1993). Police interview techniques: Establishing truth or proof?. *The British Journal of Criminology*, *33*(3), 325-352. doi: 10.1093/oxfordjournals.bjc.a048329
- Bartlett, F. C. (1932). Remembering: An experimental and social study. *Cambridge: Cambridge University Press. Philosophy*, *8*(31), 374–376. doi: 10.1017/s0031819100033143
- Beckman, H. B., & Frankel, R. M. (1984). The effect of physician behavior on the collection of data. *Annals of Internal Medicine*, *101*(5), 692-696.
- Belli, R. F. (1989). Influences of misleading postevent information: Misinformation interference and acceptance. *Journal of Experimental Psychology: General*, *118*(1), 72-85. doi: 10.1037/0096-3445.118.1.72
- Brewer, N., & Burke, A. (2002). Effects of testimonial inconsistencies and eyewitness confidence on mock-juror judgments. *Law and Human Behavior*, *26*(3), 353-364. doi: 10.1023/a:1015380522722
- Ceci, S. J., Ross, D. F., & Toglia, M. P. (1987). Suggestibility of children's memory: Psycholegal implications. *Journal of Experimental Psychology: General*, *116*(1), 38-46.
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences (2nd ed.)*. Hillsdale, NJ: Lawrence Erlbaum Associates.

- Crombag, H. F. M., Wagenaar, W. A., & van Koppen, P. J. (1996). Crashing memories and the problem of source monitoring. *Applied Cognitive Psychology, 10*, 95-104.
[https://doi.org/10.1002/\(SICI\)1099-0720\(199604\)10:2<95::AID-ACP366>3.0.CO;2-#](https://doi.org/10.1002/(SICI)1099-0720(199604)10:2<95::AID-ACP366>3.0.CO;2-#)
- Cutler, B. L., & Penrod, S. D. (1995). *Mistaken identification: The eyewitness, psychology and the law*. Cambridge University Press.
- Dror, I. E., Champod, C., Langenburg, G., Charlton, D., Hunt, H., & Rosenthal, R. (2011). Cognitive issues in fingerprint analysis: inter-and intra-expert consistency and the effect of a 'target' comparison. *Forensic Science International, 208*(1), 10-17. doi: 10.1016/j.forsciint.2010.10.013
- Dror, I. E., Charlton, D., & Péron, A. E. (2006). Contextual information renders experts vulnerable to making erroneous identifications. *Forensic Science International, 156*(1), 74-78.
doi:10.1016/j.forsciint.2005.10.017
- Dwyer, J., Neufeld, P. J., & Scheck, B. (2000). *Actual innocence: Five days to execution and other dispatches from the wrongly convicted*. New York: Doubleday Books.
- Eades, D. (1996). Legal recognition of cultural differences in communication: The case of Robyn Kina. *Language & Communication, 16*(3), 215-227. doi: 10.1016/0271-5309(96)00011-0
- Eisenberg, T., Hannaford-Agor, P. L., Hans, V. P., Waters, N. L., Munsterman, G. T., Schwab, S. J., & Wells, M. T. (2005). Judge-jury agreement in criminal cases: A partial replication of Kalven and Zeisel's The American Jury. *Journal of Empirical Legal Studies, 2*(1), 171-207.
- Fiehler, K., Ullsperger, M., & Von Cramon, D. Y. (2004). Neural correlates of error detection and error correction: is there a common neuroanatomical substrate?. *European Journal of Neuroscience, 19*(11), 3081-3087. doi: 10.1111/j.0953-816x.2004.03414.x
- Fisher, R. P. (1995). Interviewing victims and witnesses of crime. *Psychology, Public Policy, and Law, 1*(4), 732 –764. doi: 10.1037/1076-8971.1.4.732
- Fisher, R. P., & Geiselman, R. E. (1992). *Memory enhancing techniques for investigative*

interviewing: The cognitive interview. Springfield: Charles C. Thomas Publisher.

- Fisher, R. P., Geiselman, R. E., & Raymond, D. S. (1987). Critical analysis of police interview techniques. *Journal of Police Science and Administration*, *15*(3), 177-185.
- Fisher, R. P., & Schreiber, N. (2017). Interview protocols to improve eyewitness memory. *The handbook of eyewitness psychology: Volume I: Memory for events*. Psychology Press.
- Foss, D. H., & Kleinsasser, R. C. (1996). Preservice elementary teachers' views of pedagogical and mathematical content knowledge. *Teaching and Teacher Education*, *12*(4), 429-442. doi: 10.1016/0742-051x(95)00049-p
- Found, B., & Ganas, J. (2013). The management of domain irrelevant context information in forensic handwriting examination casework. *Science & Justice*, *53*(2), 154-158. doi: 10.1016/j.scijus.2012.10.004
- Garry, M., Manning, C. G., Loftus, E. F., & Sherman, S. J. (1996). Imagination inflation: Imagining a childhood event inflates confidence that it occurred. *Psychonomic Bulletin & Review*, *3*(2), 208-214. doi: 10.3758/bf03212420
- Gomulicki, B. R. (1953). The Development and Present Status of the Trace Theory of Memory. *The American Journal of the Medical Sciences*, *227*(1), 116. doi: 10.1097/00000441-195401000-00079
- Grover, S. M. (2005). Shaping effective communication skills and therapeutic relationships at work. *AAOHN Journal*, *53*(4), 177-182
- Harwood, M. D., & Eyberg, S. M. (2004). Therapist verbal behavior early in treatment: Relation to successful completion of parent–child interaction therapy. *Journal of Clinical Child and Adolescent Psychology*, *33*(3), 601-612. doi: 10.1207/s15374424jccp3303_17
- Hay, J. F., & Jacoby, L. L. (1996). Separating habit and recollection: memory slips, process dissociations, and probability matching. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*(6), 1323–1335. doi: 10.1037/0278-7393.22.6.1323

- Hill, C., Memon, A., & McGeorge, P. (2008). The role of confirmation bias in suspect interviews: A systematic evaluation. *Legal and Criminological Psychology, 13*(2), 357-371.
- Hope, L., Ost, J., Gabbert, F., Healey, S., & Lenton, E. (2008). "With a little help from my friends...": The role of co-witness relationship in susceptibility to misinformation. *Acta Psychologica, 127*, 476-484. <https://doi.org/10.1016/j.actpsy.2007.08.010>
- Ibabe, I., & Sporer, S. L. (2004). How you ask is what you get: On the influence of question form on accuracy and confidence. *Applied Cognitive Psychology, 18*, 711-726.
<https://doi.org/10.1002/acp.1025>
- Innocence Project. (2017, July 14). Courtroom Identifications: Unreliable and Suggestive. Retrieved October 04, 2017, from <https://www.innocenceproject.org/courtroom-identifications-unreliable-suggestive/>
- Inoue, N., & Buczynski, S. (2011). You asked open-ended questions, now what? Understanding the nature of stumbling blocks in teaching inquiry lessons. *The Mathematics Educator, 20*(2).
- Irving, B., & Hilgendorf, L. (1980). *Police interrogation: A case study of current practice*. London: HM Stationery Office.
- Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. *Psychological Bulletin, 114*(1), 3-24.
- Kalven, H., Zeisel, H., Callahan, T., & Ennis, P. (1966). *The American jury* (p. 498). Boston: Little, Brown.
- Kassin, S. M., Goldstein, C. C., & Savitsky, K. (2003). Behavioral confirmation in the interrogation room: On the dangers of presuming guilt. *Law and Human Behavior, 27*(2), 187-203. doi: 10.1023/a:1022599230598
- Kassin, S. M., & Kiechel, K. L. (1996). The social psychology of false confessions: Compliance, internalization, and confabulation. *Psychological Science, 7*(3), 125-128. doi: 10.1111/j.1467-9280.1996.tb00344.x

- Kerkhoff, W., Stoel, R. D., Berger, C. E. H., Mattijssen, E. J. A. T., Hermsen, R., Smits, N., & Hardy, H. J. J. (2015). Design and results of an exploratory double blind testing program in firearms examination. *Science & Justice, 55*(6), 514-519.
- Lacy, J. W., & Stark, C. E. (2013). The neuroscience of memory: implications for the courtroom. *Nature Reviews Neuroscience, 14*(9), 649–658. doi: 10.1038/nrn3563
- Lafontaine, J., & Cyr, M. (2016). A Study of the Relationship between Investigators' Personal Characteristics and Adherence to Interview Best Practices in Training. *Psychiatry, Psychology and Law, 23*(5), 782-797. doi: 10.1080/13218719.2016.1152925
- Lafontaine, J., & Cyr, M. (2017). The relation between interviewers' personal characteristics and investigative interview performance in a child sexual abuse context. *Police Practice and Research, 18*(2), 106-118. doi: 10.1080/15614263.2016.1242423
- Leippe, M. R. (1980). Effects of integrative memorial and cognitive processes on the correspondence of eyewitness accuracy and confidence. *Law and Human Behavior, 4*(4), 261–274. doi: 10.1007/bf01040618
- Lindberg, M. A., Chapman, M. T., Samscock, D., Thomas, S. W., & Lindberg, A. W. (2003). Comparisons of three different investigative interview techniques with young children. *The Journal of Genetic Psychology, 164*(1), 5-28.
- Lindsay, D. S. (2008). Source monitoring: In J. Byrne (Series Ed.) & H. L. Roediger III (Vol. Ed.), *Learning and memory: A comprehensive reference: Vol. 2. Cognitive psychology of memory* (pp. 325- 348). Oxford, England: Elsevier.
- Lipton, J. P. (1977). On the psychology of eyewitness testimony. *Journal of Applied Psychology, 62*(1), 90–95. doi: 10.1037/0021-9010.62.1.90
- Loftus, E. F. (1975). Leading questions and the eyewitness report. *Cognitive Psychology, 7*(4), 560-572. doi: 10.1016/0010-0285(75)90023-7
- Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the

malleability of memory. *Learning & Memory*, 12(4), 361-366. doi: 10.1101/lm.94705

Loftus, E. F., Donders, K., Hoffman, H. G., & Schooler, J. W. (1989). Creating new memories that are quickly accessed and confidently held. *Memory & Cognition*, 17(5), 607-616. doi: 10.3758/bf03197083

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. doi: 10.1037/0278-7393.4.1.19

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, 25(12), 720-725. doi: 10.3928/0048-5713-19951201-07

Lo, B., Quill, T., & Tulskey, J. (1999). Discussing palliative care with patients. *Annals of Internal Medicine*, 130(9), 744-749.

Maeder, E. M., Ewanation, L. A., & Monnink, J. (2017). Jurors' perceptions of evidence: The relative influence of DNA and eyewitness testimony when presented by opposing parties. *Journal of Police and Criminal Psychology*, 32(1), 33-42. doi: 10.1007/s11896-016-9194-9

Makoul, G. (2001). Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Academic Medicine*, 76(4), 390-393. doi: 10.1097/00001888-200104000-00021

Manchester, A. (2012). Shaping the flow of primary health care nursing. *Kai Tiaki: Nursing New Zealand*, 18(8), 32-46.

Manning, C. G., & Loftus, E. F. (1996). Eyewitness testimony and memory distortion. *Japanese Psychological Research*, 38(1), 5-13. doi: 10.1111/j.1468-5884.1996.tb00003.x

Mattijssen, E. J. A. T., Kerkhoff, W., Berger, C. E. H., Dror, I. E., & Stoel, R. D. (2016).

Implementing context information management in forensic casework: Minimizing contextual bias in firearms examination. *Science & Justice*, 56(2), 113-122. doi:

10.1016/j.scijus.2015.11.004

- Mazzoni, G., & Memon, A. (2003). Imagination can create false autobiographical memories. *Psychological Science, 14*(2), 186-188.
- McConville, M., & Baldwin, J. (1982). The role of interrogation in crime discovery and conviction. *British Journal of Criminology, 22*, 165-175. doi: 10.1093/oxfordjournals.bjc.a047296
- McPherson Frantz, C. (2006). I AM being fair: The bias blind spot as a stumbling block to seeing both sides. *Basic and Applied Social Psychology, 28*(2), 157-167. doi: 10.1207/s15324834basp2802_5
- Meier, D. E. (2014, December). Breaking the barriers to effective palliative care. (ONA, Interviewer) Oncology Nurse Advisor
- Miller, L. S. (1987). Procedural bias in forensic science examinations of human hair. *Law and Human Behavior, 11*(2), 157-163. doi: 10.1007/bf01040448
- Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2nd ed.). New York: Guilford.
- Mintzer, M. Z. (2007). The acute effects of alcohol on memory: A review of laboratory studies in healthy adults. *International Journal on Disability and Human Development, 6*(4), 397-404. doi: 10.1515/ijdhhd.2007.6.4.397
- Morgan, C. A., Southwick, S., Steffian, G., Hazlett, G. A., & Loftus, E. F. (2013). Misinformation can influence memory for recently experienced, highly stressful events. *International Journal of Law and Psychiatry, 36*(1), 11-17. doi: 10.1016/j.ijlp.2012.11.002
- Myklebust, T., & Bjørklund, R. A. (2006). The effect of long-term training on police officers' use of open and closed questions in field investigative interviews of children (FIIC). *Journal of Investigative Psychology and Offender Profiling, 3*(3), 165-181. doi: 10.1002/jip.52
- National Academy of Sciences. (2009). *Strengthening forensic science in the United States: A path*

forward. Washington, DC: National Academies Press.

National Institute of Justice (US). Technical Working Group for Eyewitness Evidence.

(1999). *Eyewitness evidence: A guide for law enforcement*. US Dept. of Justice, Office of Justice Programs, National Institute of Justice.

National Research Council. (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington, DC: National Academies Press.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175-220. doi:10.1037/1089-2680.2.2.17

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84(3), 231–259. doi: 10.1037/0033-295x.84.3.231

NIST. (2012). Expert working group on human factors in latent print analysis. Latent print examination and human factors: Improving the practice through a systems approach. U.S. Department of Commerce, National Institute of Standards and Technology.
<http://www.nist.gov/customcf/getpdf.cfm?pub id=910745>

Norman, D. A., & Shallice, T. (1986). Attention to action. In *Consciousness and self-regulation*, 1-18. Springer, Boston, MA.

Nourkova, V., Bernstein, D., & Loftus, E. (2004). Altering traumatic memory. *Cognition and Emotion*, 18(4), 575-585. doi:10.4324/9780203318744_altering_traumatic_memory

O'Brien, D., Westera, N., & Zajac, R. (2019). Experience and mock interview performance as predictors of post-training interviewing skill in police investigators. Manuscript under submission.

Okado, Y., & Stark, C. E. (2005). Neural activity during encoding predicts false memories created by misinformation. *Learning & Memory*, 12(1), 3-11. doi: 10.1101/lm.87605

Ono, M., Sachau, D. A., Deal, W. P., Englert, D. R., & Taylor, M. D. (2011). Cognitive ability, emotional intelligence, and the big five personality dimensions as predictors of criminal

investigator performance. *Criminal Justice and Behavior*, 38(5), 471-491. doi:

10.1177/0093854811399406

Oxburgh, G. E., Myklebust, T., & Grant, T. (2010). The question of question types in police interviews: A review of the literature from a psychological and linguistic

perspective. *International Journal of Speech, Language & the Law*, 17(1). doi:

10.1558/ijsl.v17i1.45

Parrott, A. C., & Lasky, J. (1998). Ecstasy (MDMA) effects upon mood and cognition: before, during and after a Saturday night dance. *Psychopharmacology*, 139(3), 261-268.

Paterson, H. M., Kemp, R. I., & Forgas, J. P. (2009). Co-witnesses, confederates, and conformity:

Effects of discussion and delay on eyewitness memory. *Psychiatry, Psychology and*

Law, 16(sup1), 112-124. doi: 10.1080/13218710802620380

Pipe, M. E., Lamb, M. E., Orbach, Y., & Esplin, P. W. (2004). Recent research on children's

testimony about experienced and witnessed events. *Developmental Review*, 24(4), 440-468.

doi: 10.1016/j.dr.2004.08.006

Poole, D. A., & Lamb, M. E. (1998). *Investigative interviews of children: A guide for helping professionals*. Washington, DC: American Psychological Association.

Porter, S., Yuille, J. C., & Lehman, D. R. (1999). The nature of real, implanted, and fabricated

memories for emotional childhood events: implications for the recovered memory

debate. *Law and Human Behavior*, 23(5), 517-537. doi: 10.1023/a:1022344128649

Powell, M. B., Fisher, R. P., & Wright, R. (2005). Investigative interviewing. *Psychology and Law:*

An Empirical Perspective, 11-42.

Powell, M. B., Hughes-Scholes, C. H., Smith, R., & Sharman, S. J. (2014). The relationship between investigative interviewing experience and open-ended question usage. *Police Practice and*

Research, 15, 283-292. <https://doi.org/10.1080/15614263.2012.704170>

- Powell, M. B., & Snow, P. C. (2007). Guide to questioning children during the free-narrative phase of an investigative interview. *Australian Psychologist*, *42*(1), 57-65. doi: 10.1080/00050060600976032
- Pozzulo, J. D., Lemieux, J. M., Wilson, A., Crescini, C., & Girardi, A. (2009). The influence of identification decision and DNA evidence on juror decision making. *Journal of Applied Social Psychology*, *39*(9), 2069-2088.
- Pronin, E., Lin, D. Y., & Ross, L. (2002). The bias blind spot: Perceptions of bias in self versus others. *Personality and Social Psychology Bulletin*, *28*(3), 369-381. doi: 10.1177/0146167202286008
- Quas, J. A., Malloy, L. C., Melinder, A., Goodman, G. S., D'mello, M., & Schaaf, J. (2007). Developmental differences in the effects of repeated interviews and interviewer bias on young children's event memory and false reports. *Developmental Psychology*, *43*(4), 823–837. doi: 10.1037/0012-1649.43.4.823.
- Rapley, T. J. (2001). The art (fulness) of open-ended interviewing: some considerations on analysing interviews. *Qualitative Research*, *1*(3), 303-323. doi: 10.1177/146879410100100303
- Rassin, E. (2010). Blindness to alternative scenarios in evidence evaluation. *Journal of Investigative Psychology and Offender Profiling*, *7*, 153–163. doi: 10.1002/jip.116
- Rassin, E., Eerland, A., & Kuijpers, I. (2010). Let's find the evidence: An analogue study of confirmation bias in criminal investigations. *Journal of Investigative Psychology and Offender Profiling*, *7*(3), 231-246.
- Roberts, K. P., & Powell, M. B. (2001). Describing individual incidents of sexual abuse: A review of research on the effects of multiple sources of information on children's reports. *Child Abuse & Neglect*, *25*(12), 1643-1659. doi: 10.1016/s0145-2134(01)00290-3

- Saks, M., Risinger, D., Rosenthal, R., & Thompson, W. (2003). Context effects in forensic science: A review and application of the science of science to crime laboratory practice in the United States. *Science & Justice, 43*(2), 77-90. doi:10.1016/s1355-0306(03)71747-x
- Salgado, J. F., Anderson, N., Moscoso, S., Bertua, C., De Fruyt, F., & Rolland, J. P. (2003). A meta-analytic study of general mental ability validity for different occupations in the European community. *Journal of Applied Psychology, 88*(6), 1068–1081. doi: 10.1037/0021-9010.88.6.1068
- Saunders, J. (2009). Memory impairment in the weapon focus effect. *Memory & Cognition, 37*(3), 326-335. doi: 10.3758/mc.37.3.326
- Scopelliti, I., Morewedge, C. K., McCormick, E., Min, H. L., Lebrecht, S., & Kassam, K. S. (2015). Bias blind spot: Structure, measurement, and consequences. *Management Science, 61*(10), 2468-2486.
- Sharman, S. J., Garry, M., & Hunt, M. (2005). Using source cues and familiarity cues to resist imagination inflation. *Acta Psychologica, 120*(3), 227-242. doi: 10.1016/j.actpsy.2005.04.002
- Simons, D. J., & Chabris, C. F. (2011). What people believe about how memory works: A representative survey of the US population. *PLOS One, 6*(8) doi: 10.1371/journal.pone.0022757
- Snyder, M., & Swann, W. B. (1978). Hypothesis-testing processes in social interaction. *Journal of Personality and Social Psychology, 36*(11), 1202–1212. doi: 10.1037/0022-3514.36.11.1202
- Sternberg, K. J., Lamb, M. E., Davies, G. M., & Westcott, H. L. (2001). The memorandum of good practice: Theory versus application. *Child Abuse & Neglect, 25*(5), 669-681. doi: 10.1016/s0145-2134(01)00232-0

- Sternberg, K. J., Lamb, M. E., Hershkowitz, I., Esplin, P. W., Redlich, A., & Sunshine, N. (1996). The relation between investigative utterance types and the informativeness of child witnesses. *Journal of Applied Developmental Psychology, 17*(3), 439-451.
- Thompson, W. C., Clarke-Stewart, K. A., & Lepore, S. J. (1997). What did the janitor do? Suggestive interviewing and the accuracy of children's accounts. *Law and Human Behavior, 21*(4), 405-426. doi: 10.1023/a:1024859219764
- Thomas, A. K., & Loftus, E. F. (2002). Creating bizarre false memories through imagination. *Memory & Cognition, 30*(3), 423-431. doi: 10.3758/bf03194942
- Thoresen, C., Lonnum, K., Melinder, A., Stridbeck, U., & Magnussen, S. (2006). Theory and practice in interviewing young children: A study of Norwegian police interviews 1985-2002. *Psychology, Crime and Law, 12*(6), 629-640.
<https://doi.org/10.1080/10683160500350546>.
- Toglia, M. P., Read, J. D., Foss, D. R., & Lindsay, R. C. L. (2007) (Eds.), *The handbook of eyewitness psychology, vol. I: Memory for events* (pp. 53- 80). Mahwah, NJ: Lawrence Erlbaum Associates
- Tuckey, M. R., & Brewer, N. (2003). The influence of schemas, stimulus ambiguity, and interview schedule on eyewitness memory over time. *Journal of Experimental Psychology: Applied, 9*, 101-118. <https://doi.org/10.1037/1076-898X.9.2.101>
- Tversky, B., & Tuchin, M. (1989). A reconciliation of the evidence on eyewitness testimony: Comments on McCloskey and Zaragoza. *Journal of Experimental Psychology: General, 118*(1), 86-91. doi: 10.1037/0096-3445.118.1.86
- Wagenaar, W. A., & Boer, J. P. (1987). Misleading postevent information: Testing parameterized models of integration in memory. *Acta Psychologica, 66*(3), 291-306.
- Wagoner, B. (2017). What makes memory constructive? A study in the serial reproduction of Bartlett's experiments. *Culture & Psychology, 23*(2), 186-207 doi:

10.1177/1354067x17695759

Warren, A. R., Woodall, C. E., Thomas, M., Nunno, M., Keeney, J. M., Larson, S. M., & Stadfeld, J.

A. (1999). Assessing the effectiveness of a training program for interviewing child witnesses. *Applied Developmental Science, 3*(2), 128-135.

Wells, G. L. (1992). Naked statistical evidence of liability: Is subjective probability

enough?. *Journal of Personality and Social Psychology, 62*(5), 739–752. doi: 10.1037/0022-3514.62.5.739

Wells, G. L., Malpass, R. S., Lindsay, R. C. L., Fisher, R. P., Turtle, J. W., & Fulero, S. M. (2000).

From the lab to the police station: A successful application of eyewitness research. *American Psychologist, 55*(6), 581–598. doi: 10.1037/0003-066x.55.6.581

Wells, G. L., Small, M., Penrod, S., Malpass, R. S., Fulero, S. M., & Brimacombe, C. E. (1998).

Eyewitness identification procedures: Recommendations for lineups and photospreads. *Law and Human Behavior, 22*(6), 603–647. doi: 10.1023/a:1025750605807

Williams, S., Weinman, J., & Dale, J. (1998). Doctor–patient communication and patient

satisfaction. *Family Practice, 15*(5), 480-92.

Wilson, T. D., & Brekke, N. (1994). Mental contamination and mental correction: Unwanted

influences on judgments and evaluations. *Psychological Bulletin, 116*(1), 117-142. doi: 10.1037/0033-2909.116.1.117

Wilson, T. D., Centerbar, D. B., & Brekke, N. (2002). Mental contamination and the debiasing

problem. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment*, 185-200.

Wilson, C. J., & Powell, M. B. (2001). *A guide to interviewing children: Essential skills for*

counsellors, police, lawyers and social workers. Crows Nest, New South Wales: Allen & Unwin

Wise, R. A., Daughinai, K. A., & Safer, M. A. (2007). A tripartite solution to eyewitness error. *The*

Journal of Criminal Law and Criminology, 807-871.

- Wise, R. A., Safer, M. A., & Maro, C. M. (2011). What US law enforcement officers know and believe about eyewitness factors, eyewitness interviews and identification procedures. *Applied Cognitive Psychology*, 25(3), 488-500. doi: 10.1002/acp.1717
- Wogalter, M. S., Malpass, R. S., & McQuiston, D. E. (2004). A national survey of US police on preparation and conduct of identification lineups. *Psychology, Crime and Law*, 10(1), 69-82. doi: 10.1080/10683160410001641873
- Wright, D. S., Nash, R. A., & Wade, K. A. (2015). Encouraging eyewitnesses to falsely corroborate allegations: effects of rapport-building and incriminating evidence. *Psychology, Crime, & Law*, 21, 648-660. <https://dx.doi.org/10.1080/1068316X.2015.1028543>
- Wright, R., & Powell, M. B. (2006). Investigative interviewers' perceptions of their difficulty in adhering to open-ended questions with child witnesses. *International Journal of Police Science & Management*, 8(4), 316-325. doi: 10.1350/ijps.2006.8.4.316
- Yuille, J. C. (1980). A critical examination of the psychological and practical implications of eyewitness research. *Law and Human Behavior*, 4(4), 335-345. doi: 10.1007/bf01040625
- Zuckerman, M., Knee, C. R., Hodgins, H. S., & Miyake, K. (1995). Hypothesis confirmation: The joint effect of positive test strategy and acquiescence response set. *Journal of Personality and Social Psychology*, 68(1), 52-60. doi: 10.1037/0022-3514.68.1.52

Appendix A

**RESEARCH WITHIN FORENSIC PSYCHOLOGY****INFORMATION SHEET FOR PARTICIPANTS**

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the aim of the project?

We are interested in how adults recall and describe memorable events from their childhood (e.g., a time when they received an injury). We are also interested in how easily adults are able to generate different kinds of questions. This project is being undertaken as part of the requirements for three PhDs in Psychology (those of Jacob Ingram, Andrew Mills, and Kimberley Wake) and one Masters in Psychology (that of Ellen Warhurst).

What types of participants are being sought?

We are recruiting adult participants, aged 18 years or above, via the Department of Psychology's Research Participation website. **Please note:** Participants **MUST NOT** have previously signed up for the experiments "Studies within Forensic Psychology" or "Witness Recall and Other Burning Questions".

Participants will receive reimbursement at the completion of the experiment.

What will participants be asked to do?

Should you agree to take part in this project, you will be asked to participate in **TWO SESSIONS** lasting approximately 1 hour each. Both sessions will involve being interviewed by an experienced postgraduate researcher. During the first session, you will complete several tasks, including: (a) reading a vignette and answering some questions about it; (b) being interviewed about a significant event from your childhood (e.g., a time when you received an injury that resulted in a physical scar) in as much detail as you can; and (c) watching two short film clips and participating in some brief related tasks.

The second session will take place **ONE WEEK** after the first session, at the same time and on the same day of the week. During this session, you will participate in several tasks related to the first session, as well as being asked to generating some questions, and complete a survey on a computer.

IMPORTANT DISCLAIMER: The vignette used in session one of this experiment describes an alleged sexual assault. Some people may find this distressing or upsetting. Please do not take part in this experiment if you think this may apply to you.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself.

What data or information will be collected and what use will be made of it?

The information provided by you in the tasks with the experimenter will be audio-recorded, transcribed, and coded. Your responses to the computer surveys will be recorded on the computer and analysed. The data collected will be securely stored in such a way that only those directly involved in the project will be able to gain access to it. Data obtained as a result of the research will be retained for **at least 5 years** in secure storage. Any personal information held on the participants (e.g. contact details) will be destroyed at the completion of the research even though the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity.

Can participants change their mind and withdraw from the project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself.

What if participants have any questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:

Andrew Mills
PhD Candidate
Department of Psychology
(03) 479 3989

Kimberley Wake
PhD Candidate
Department of Psychology
(03) 479 3989

Jacob Ingram
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(03) 479 3988

Dr Rachel Zajac
Associate Professor
Department of Psychology
(03) 479 3988

This study has been approved by the Department stated above. However, if you have any concerns about the ethical conduct of the research you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee Administrator (ph. 03 479-8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix B



RESEARCH WITHIN FORENSIC PSYCHOLOGY

CONSENT FORM FOR PARTICIPANTS

I have read the Information Sheet concerning this project and understand what it is about. All of my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that: -

1. My participation in the project is entirely voluntary;
2. I am free to withdraw from the project at any time without any disadvantage;
3. Personal identifying information (e.g., audio-files) will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;
4. As a part of this study, I will be exposed to a vignette detailing an alleged sexual assault. I am satisfied that this will not cause me distress;
5. Upon completion of the second session, I will be reimbursed \$30 for my time;
6. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

I agree to take part in this project.

.....
(Signature of participant)

.....
(Date)

.....
(Printed name)

.....
(Date of birth)

Gender (optional):

Appendix C

Question Types Training Exercise

[The following definitions and examples were presented]

For the purposes of this experiment, we will focus on two types of questions:

- 1) Closed Questions
- 2) Open Questions

Closed Questions are:

- Yes/No Questions (e.g., "Have you been to Mexico?")
- Forced-choice Questions (e.g., "Is the lecture in Castle 1 or Castle 2?")

In closed questions, the options for responding are very restricted and very clear from the question (e.g., "Yes"; "No"; "Castle 1"; "Castle 2")

- Closed questions elicit fixed responses.
- The person responding has very little flexibility in their responses.

Closed question examples:

- Was it dark or light outside?
- Did you finish your dinner?
- Is your car red or blue?
- Are you allergic to peanuts?
- Do you prefer ice cream or yogurt?
- Do you have a brother?

Open questions are:

- 'Wh-' or 'How' questions (e.g., "When did you learn to drive?")
- 'Tell' questions (e.g., "Tell me all about your family")
- 'Describe' questions (e.g., "Describe your house")

In open questions, the options for responding are far more broad, and not contained in the question.

- Open questions elicit detailed responses.
- The person responding has more flexibility in their responses.

Open question examples:

- Tell me what sky diving was like.
- How did you and your best friend meet?
- What is your favourite memory from childhood?
- Describe how to get to Tunnel Beach.
- When did you move to Dunedin?
- Who are you going to the concert with?

Now it's your turn...

Next, you will be shown some questions.

Your job is to indicate whether they are closed or open questions.

Ready?

[The following questions were presented in randomised order, the correct answer is specified in brackets]

1. Do you have a dog? (Closed)
2. Tell me about your holiday in Fiji? (Open)
3. What did you do over summer? (Open)
4. Is your phone an iPhone or an Android? (Closed)
5. Have you been to the library today? (Closed)
6. How do you make French toast? (Open)
7. Are you religious? (Closed)
8. Where is the best museum in the world? (Open)
9. Describe your room (Open)
10. Do you like cooking? (Closed)
11. Why do you love sports? (Open)
12. Would you like a medium or large coffee? (Closed)
13. Have you seen all of the Harry Potter movies? (Closed)
14. Are you from New Zealand or overseas? (Closed)
15. Tell me about global politics (Open)
16. What do you think you'll do when you finish university? (Open)
17. Do you like skiing? (Closed)
18. Describe a tiger (Open)
19. Do you prefer sweet or savoury foods? (Closed)
20. How do you get your full driver licence? (Open)

Appendix D

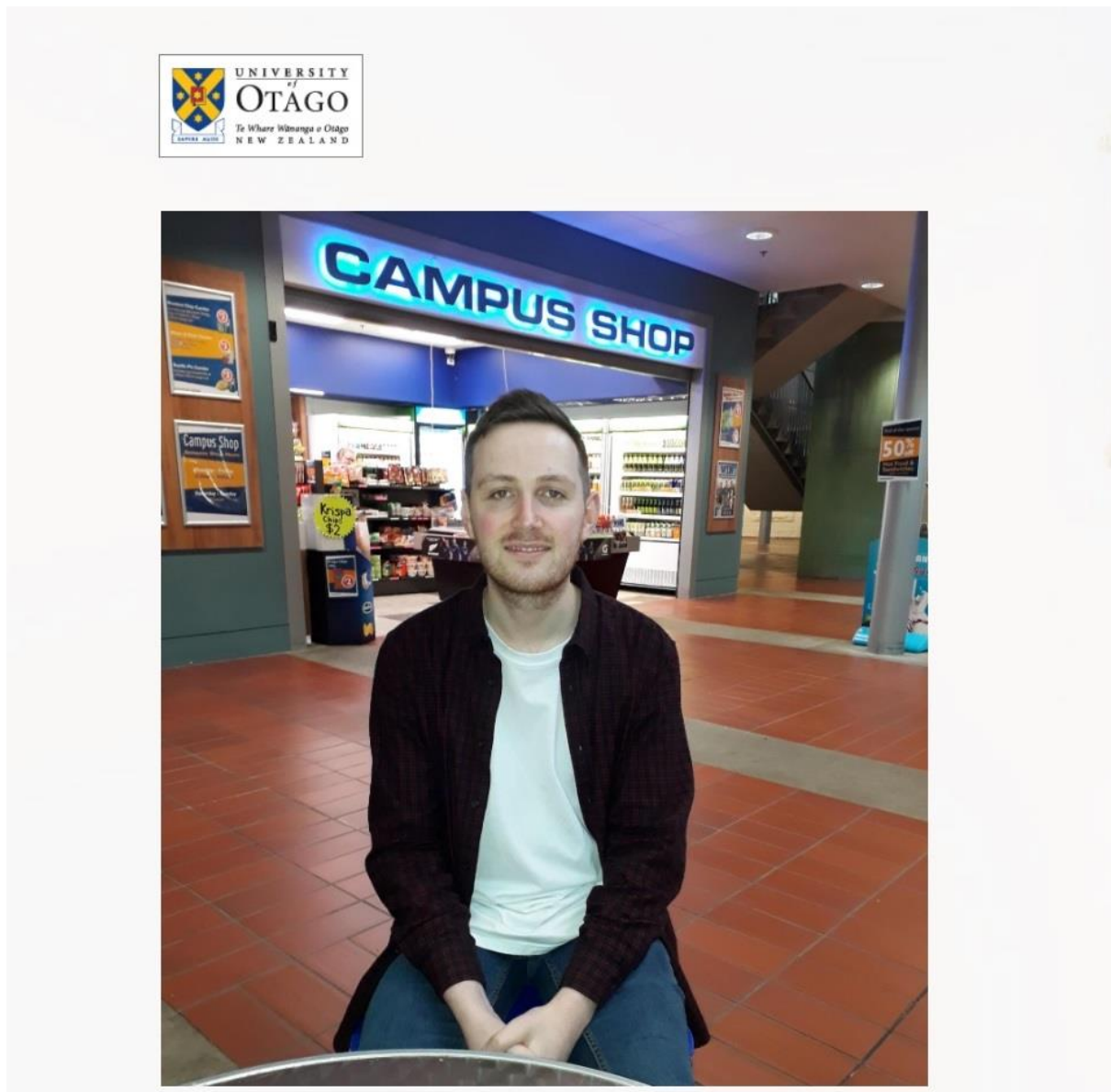


Figure 7. Screen display of hypothetical witness, James, during question generation task.

Appendix E

Coding guidelines

Transcribing:

- Questions transcribed verbatim, however:
 - o Start counting words from when the start of question is decided and holistically makes sense. **Exclude** repetitive pre-question words (e.g., *Did you.... What did you do?*)
 - o **Include** repetitive or clarifying words WITHIN question – otherwise exclusion will be too subjective (e.g., *What did the [participants, not the participants the] people in the altercation look like*)
- Cut out ‘and’ when sentences/questions are separated by a pause. Count as two different questions

Two-minute time limit:

- If the question is finished after ‘stop’ is said, see whether it contains enough information to form a complete thought before ‘stop’ – if so, count it. If not, do not count it.

Grammar:

- I have been lenient with grammar, such as if they use the wrong tense or one wrong word (e.g., *Did you SAW the male hit the female*). However, if the question does not make sense at all do not count it. Exclude participant if language is too poor.

Highlighting ink:

- Highlight in green if they self-correct (e.g., they incorrectly say a closed question and then say it was closed/a mistake). You still count these as errors but we may look at how many people explicitly realised they were making errors.
- Highlight red if you are unsure how to classify a question.

Highlighting cell background:

- Highlight yellow if unable to be used due to poor English language or a procedural error (e.g., wrong script used, non-standardised script).

Cultural politeness:

- Many people put ‘*could/can you*’ before they say describe or ask open questions. Count this as open (as per Shepherd, 2007)
- DO NOT count it as open if they say:
 - o *Do you remember..*
 - o *Can you tell me if..*
 - o *Can you explain if there..*
 - o *Can you remember..*

Conditional Questions (‘If x...’)

- Some are tricky and can be two types of questions. Do not count the conditional if the subsequent part of the question is closed. Just write the question. Count as open and closed when there are two different parts of the question. For example:
 - o *If there were, did you see any of them approach the female afterwards?*
 - o → Closed: *Did you see any of them approach the female afterwards?*
 - o *Can you describe if there were any injuries and what they were?*
 - o → Closed: *Can you describe if there were any injuries?*
 - o → Open: *[can you describe] What they were?*

Multiple questions in one question:

- Split them into open and closed parts if appropriate and count each.
 - o For example: Did you ask the female how she was doing and what did she say
 - o → Closed: *Did you ask the female how she was doing?*
 - o → Open: *What did she say?*
- If they ask a question with many parts linked with 'and', just count as one. The question needs to be able to be a 'stand-alone' question for it to be counted separately
 - o *Describe to me what the male looked like and what the female looked like and how he approached her?* → is counted as one question
 - o *What did the male look like and what did the female look like and how did he approach her?* → three questions
- It is coded as one question if they say it as one utterance and use 'or' as a joining word. You would count this as two words if the joining word is 'and' (and the two questions are different).
 - o For example: *Did you happen to video any evidence or did you manage to video any of the altercation occurring when it occurred?*

Repetition:

- If repetition is correct (i.e., in correct question category), do not count as an extra question or error.
- If repetition is incorrect (i.e., an error question), count as errors
 - o However, if repetition of same/similar question happens in the same utterance (e.g., clarification) count as one error/question.

Invalid criteria:

- Wrong script read
- Unstandardized script
- Unstandardized and influential prompts/information given
- Extremely Poor language
- If they think James is the male involved in altercation