Facing away from the interviewer: Evidence of little effect on eyewitnesses' memory performance and perceptions of rapport

Alena Nash
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Aston University
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Thesis summary

Averting one's gaze is generally found to improve cognitive performance by reducing environmental distraction. Witnesses are sometimes advised to close their eyes or avert their gaze from the interviewer's face to help them concentrate on remembering, but to my knowledge no research has explored the latter approach in an investigative interviewing context. Therefore, in a series of five experiments, this thesis investigated eyewitness recall under various gaze direction conditions. Experiments 1-4 employed the same procedure whereby participants witnessed a video-recorded incident and were consequently interviewed following a short delay. In Experiment 1, participants either faced the interviewer or faced away during the interview. In Experiment 2, alongside this manipulation of witness's gaze direction, the interviewer's gaze direction was also manipulated - the interviewer either faced the witness or faced away during the interview. In Experiment 3, in addition to the manipulation of witness's gaze direction, rapport-building was included as another variable (rapport vs. no rapport). As minimal benefits of facing away by the witness were found across these experiments, in Experiment 4, this technique was compared to witness eye-closure. Both techniques affected memory performance similarly, with benefit to correct responding in free recall only. To summarise and assess the cumulative effects of witness gaze direction, a series of mini meta-analyses was conducted on data across Experiments 1-4. These analyses showed small and non-significant effects of witness gaze direction overall, but there were some benefits in closed questioning when rapport-building was included as a moderator. Finally, in Experiment 5, witness gaze direction and eye-closure were explored using a picture memory task (with different levels of difficulty). No differences between the two techniques were found. Taken together, these findings show minimal evidence for benefits of facing away and warrant caution against overestimating the likely effects of eyewitness gaze aversion in effective interviewing.

Key words: eyewitness memory; investigative interviewing; gaze aversion; rapport-building; eye-closure

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Chapter 1: General introduction

Eyewitness interviews are complex social interactions between witnesses and interviewers, aimed at eliciting the most complete and accurate memory report possible (Powell, Fisher, & Wright, 2005). In conventional investigative interviews, the witness sits face-to-face with the interviewer throughout the whole interview. However, research from the broader cognitive psychology literature shows that simultaneously being watched by and watching another person requires cognitive resources, which can in turn lead to poorer task performance relative to, for example, performance in situations involving unreciprocated gaze (Buchanan et al., 2014; Horwitz & McCaffrey, 2008). It is therefore plausible that the conventional face-to-face setup of investigative interviews might sometimes disrupt witnesses' memory performance. As one solution to this problem, witnesses are often advised to avert their gaze from the interviewer's face to help them concentrate on remembering, either by closing their eyes or by looking at a blank wall (e.g., Fisher & Geiselman, 1992; Milne, 2004). Several studies have examined the effectiveness of the former approach, but to my knowledge none have explored the latter approach in an eyewitness-interviewing context. In this thesis, I investigate the possibility that fully facing away from their interviewer might help witnesses, for example by alleviating the visual information they need to process, or by making them less conscious of the interviewer's gaze. In five experiments, I predicted that witnesses who physically face away from their interviewer would recall more detail and with greater accuracy, compared with witnesses who face their interviewer.

1.1   The Cognitive Interview

Investigative interviews can be conducted at various stages of the investigative process, and they are most critical especially when there might be little physical evidence or no other witnesses. Interviews that are conducted properly are crucial at advancing the investigation, but those conducted poorly can have the opposite effect, contaminating the investigation

(Powell et al., 2005). It is the interviewer's responsibility to obtain both the highest quantity and quality of information possible, and various procedures have been created to help interviewers achieve this (e.g., Brandon, Wells, & Seale, 2017).

Currently, one of the most popular interviewing protocols that is widely recommended is the Cognitive Interview (CI; Geiselman et al., 1984). The CI combines memory aides and communication skills to enhance accuracy and completeness of eyewitness reports, and it is primarily used with cooperative witnesses (Westera & Powell, 2016). In England and Wales, police officers are offered PEACE interview training (PEACE stands for Planning and Preparation, Engage and Explain, Account, Closure and Evaluation), which incorporates the CI as the primary interviewing method (Kebbell, Milne, & Wagstaff, 1999). The CI is recognised in other countries in Europe and in USA, but the training is not currently offered to police officers on a regular basis (Geiselman & Fisher, 2014).

1.1.1 How it works

The original CI procedure developed by Geiselman et al. (1984) included four components: report everything, context reinstatement, change perspective and change order. All of these techniques were designed to enhance retrieval of information among witnesses. Later, Fisher & Geiselman (1992) developed the Enhanced Cognitive Interview, which included further procedures to account for social and communication aspects of the interview such as rapport-building, witness-compatible questioning, mental imagery, transferring of control to the witness (Paulo, Albuquerque, & Bull, 2013). Additionally, before finishing the interview, the interviewer should always provide a summary and closure to ensure that the witness is left feeling comfortable.

The CI focuses on maximizing retrieval of information, and its components can be said to account for the some of the main reasons why witnesses might not report details about an event during an interview (see Hope, 2018 for a resource on this topic). Firstly, witnesses may not report certain details due to a cognitive or memory problem. For example, this could be because they have simply forgotten details about an event or they think that what they are remembering is incorrect or not important.

The original core components of the CI were designed to combat retrieval difficulties relating to memory or cognitive reasons. Asking the witness to report everything instructs them to report any information even if it seems irrelevant. Often, witnesses make a judgement that the information they are remembering is not important or central to the crime and choose to not disclose it (Hope, 2018). Therefore, asking them to report everything should encourage them to tell the interviewer more information even if they do not believe it to be important. Additionally, as memories often overlap, asking the witness to report everything might help to trigger memories of events that the witness could not remember initially, helping with the problem of forgetting. Next, context reinstatement asks the witness to mentally travel back to the context of the occurred event, simultaneously thinking about their physiological and emotional states. The witness is encouraged to take the time to picture the event in their mind and immerse themselves back in it. For this part of the interview, the witness can often be asked to close their eyes or look toward a blank wall (Paulo et al., 2013). This procedure aims to create some retrieval cues, facilitating remembering of additional information that was not reported during free recall. Similarly, the change perspective and change order instruction instructions are used to trigger details that were not remembered during the initial report. The former involves asking the witness to recall the same events but from a different perspective, for example another witness's, and the latter asks that the witness recall the same event in a different order, for example in reverse order. Both techniques are meant to provide new retrieval cues in order to remember information that might have been missed. Overall, these original components of the CI were designed to tackle the problem of not reporting details about event due to reasons related to memory such as forgetting. These techniques achieve this mainly by providing the witness with an opportunity for new retrieval cues and by encouraging them to mentally travel back to the event and imagine it.

Other reasons for why witnesses might not report details about an event are due to the social context of the interview (Hope, 2018). For example, the witness may be mistrustful of the interviewer, they could be feeling uncomfortable or they could have negative feelings

towards the interviewer, therefore not wanting to help the interviewer by disclosing any information. The Enhanced CI was designed to tackle some of the social reasons for not reporting information. One of the main techniques for this is rapport-building. For a successful CI, the interviewer should always develop a trusting and friendly relationship with the witness, ensuring that they listen to the witness and make them feel comfortable during the interview (Abbe & Brandon, 2014). Building a rapport with the witness would help to tackle social reasons for not reporting information such as the examples above. In fact, rapport-building has often been found to enhance witness recall during an interview (e.g., Vallano & Schreiber Compo, 2011; see Section 1.2.1 for a more extensive review of this technique). Listening to the witness and making them feel comfortable can also be achieved through asking witness-compatible questions. The interviewer should ensure that they ask appropriate questions (e.g., not misleading, asking questions at the right time) and that their questions are asked in a way that can be easily understood by the witness. Finally, transferring of control to the witness involves letting the witness know that the interviewer will not ask many questions and the witness should report the information in whatever way they feel most comfortable (i.e., at their own pace, in any order). This is designed to make the witness feel comfortable with the interviewing process. This technique can also tackle some of the memory problems discussed previously as it encourages the witness to report everything that they can remember without feeling pressured by the interviewer to talk about something specific. Overall, these techniques are designed to maximise retrieval by addressing the social aspects of the interview.

1.1.2   Effectiveness of the CI

Indeed, the majority of research tends to find the CI to be beneficial to witness recall (see Geiselman & Fisher, 2014 for an overview). Particularly, research generally shows that participants interviewed using the CI can provide more valid and accurate information compared to a standard structured interview (Paulo et al., 2013). In one of the early studies by Fisher, Geiselman, and Amador (1989), the authors trained seven experienced Miami police detectives to use the CI to interview witnesses and victims and compared their

performance to untrained detectives. Both groups had equivalent performance before the training, but detectives who were trained in the CI were able to elicit 63% more information compared to their untrained counterparts. Similar benefits have been found in another early field evaluation (Clifford & George, 1996). Here, experienced police officers were either trained in enhanced CI, conversation management, a combination of both or received no training. Conversation management is an alternative technique which aims to equip interviewers with skills needed to effectively find out facts through open communication, but it does not involve any cognitive components or mnemonics like the CI. It was found that those in the CI condition reduced the number of questions they were asking (compared to other groups), instead using more open questions and fewer closed questions, but they were able to obtain more information per question than officers in any of the other groups. The authors suggest that these benefits were due to improved listening skills, asking better questions and transferring control to the witness. Therefore, it appears that training police officers in using the CI can lead to some real-life improvements in witness recall.

These benefits of the CI also uphold across a variety of situations and populations. For example, Stein and Memon (2006) tested out the effectiveness of it with witnesses in Brazil who were not college educated. Participants were recruited from a university cleaning service and were interviewed about a video they watched. Overall, the authors found that using the CI led to more details about the video than a standard interview. There were also more correct details, specifically details relating to actions and persons in the video, but there were no differences in errors or confabulations. Conducting the CI with children has also generally been found to lead to more correct information compared to a control interview (Holliday & Albon, 2004; Larsson & Lamb, 2009). In one study, children witnessed a staged event and then were interviewed about it either with techniques based on the CI or standard interview procedures (Saywitz, Geiselman, & Bornstein, 1992). It was found that the number of correct details reported by the witnesses increased by 26% for the former condition in 7-8 and 10-11 year olds without affecting the number of incorrect details. Furthermore, in experiment 2, these findings were replicated with 8-9 and 11-12 year olds. Not only this, but

the CI has also been found to be beneficial to children's recall after a long retention interval (Larsson, Granhag, & Spjut, 2003). In their study, the authors found that children recalled significantly more correct details when interviewed with the CI both seven days and six months after witnessing an event with no difference in incorrect information and confabulation, compared to children interviewed with a standard interview. In addition, those interviewed with the CI after six months reported almost the same amount of correct information as children interviewed with a standard interview after seven days. Therefore, the benefits of the CI seem robust enough to be observed in other populations such as children and also over longer periods of time.

However, the CI has not consistently been found to benefit memory performance when misinformation is involved or reports of incorrect details. In some studies, using the CI to interview a witness has been found to reduce the amount of misinformation reported (e.g., Holliday & Albon, 2004). However, Holliday et al. (2012) found that although older adults were less susceptible to misinformation intrusions when interviewed with a modified CI, compared to a control interview, there was no such difference in younger adults. Indeed, findings are not always consistent. For example, Centofanti and Reece (2006) found no difference in the misinformation effect between the CI and structured interview – in other words, the CI did not help to protect participants against misinformation. Further to this, Lapaglia, Wilford, Rivard, Chan, and Fisher (2014) found that, after initially being interviewed with a CI and later misinformed, their participants recalled more misleading details at the end of the experiment than those participants who did not receive the CI initially. To quantify and summarise the overall effects of the CI, Kohnken, Milne, Memon, and Bull (1999) conducted a meta-analysis of 42 studies looking at the effects of CI. The authors found a large significant effect of CI in increasing the number of correctly recalled details. However, with this increase, there was also a small but significant increase in incorrectly recalled details. More recently, this meta-analysis was updated by Memon, Meissner, and Fraser (2010), this time including 57 studies. Similarly to Kohnken et al. (1999), the authors found a large effect of CI for correct details and again a small increase in incorrect details.

Overall, the CI is currently a widely recommended and used investigative interviewing protocol, particularly within PEACE training in England and Wales. The majority of research shows it to be effective at eliciting accurate information from child and adult witnesses. However, there have also been some reports of increased errors and at times misinformation.

Despite these overall benefits of the CI to the accuracy of witness reports, one of the major downsides of the procedure is that it is relatively long and time consuming. Various studies conducted by Dando and colleagues (Dando, Wilcock, & Milne, 2009a; Dando, Wilcock, Milne, & Henry, 2009b; Dando, Wilcock, Behnkle, & Milne, 2011) suggest that police officers often find the CI to be time consuming and complex. This might pose a particular problem for a real-life police interview, where interviewers already require a high level of conscious decision making in formulating their questions and there is often little time for the interview to take place (Griffiths, Milne, & Cherryman, 2011). Indeed, when asked in a survey, 37% of police officers generally had concerns that the CI takes too long, particularly to be used with older witnesses (Wright & Holliday, 2005).

1.1.3 Modified Cognitive Interview

One response to these concerns that the CI is too time consuming has been the development of a modified procedure. A modified CI follows the same protocol as the regular CI but it omits certain components, usually to address the issues of interview complexity and length. Generally, all components of the CI are found to be of equal benefit, but the combination of report everything and context reinstatement results in increased correct recall compared to other techniques (Milne & Bull, 2002). There is generally a consensus among officers that some components of the CI are more useful than others (Brown, Lloyd-Jones, & Robinson, 2008; Davis, McMahon, & Greenwood, 2005; Kebbell et al., 1999). Particularly, rapport-building, report everything and encouraging concentration are some of the components reported to be more useful than others (such as change order, change perspective, imagery). The latter components are reported to be used less frequently, particularly change order and change perspective are recently considered prone to eliciting

errors such as lower overall accuracy and increased confabulation (Dando, Ormerod, Wilcock, & Milne, 2011). In addition, officers frequently report to not have the time to conduct the full CI.

Despite omission of certain components, the modified CI procedure is generally still found to be beneficial to witness recall. In their study, Davis et al.'s (2005) participants were interviewed, following a simulated crime video, using one of three conditions. The first group received the full enhanced CI, the second group received a modified CI which followed the same procedure as the first group but change order and change perspective were replaced with additional free recall opportunities, and the final group received a structured interview. The authors found that the modified CI significantly reduced the length of the interview, but it was still as effective as the full CI in terms of recall. In addition, both were more effective than a structured interview. Similar findings have been obtained with other studies. Not including change order and change perspective shows no difference in reports of correct or incorrect details compared to a regular CI (Dando et al., 2009a; Dando et al., 2011). Further, in both of these studies, participants who were interviewed using the modified CI produced less confabulation and were more accurate overall. In fact, using context reinstatement alone can be advantageous to correct recall and overall accuracy compared to no context reinstatement (Dando et al., 2009b). The authors suggest that the modified procedures may be more suitable for less serious crimes or for frontline investigators as these procedures were also significantly shorter. Therefore, omitting two components can lead to a shorter interview that does not compromise on effectiveness.

Results tend to be similar when applying the modified version in the field also. For example, when interviewed by French military police officers, witnesses in the modified CI condition were able to produce the highest amount of forensically relevant details, compared to a standard police interview and a structured interview (Colomb, Ginet, Wright, Demarchi, & Sadler, 2013). Moreover, police officers in this study reported to have high levels of self-efficacy when they were trained to use the modified CI and the structured interview

procedures. So it appears that employing a modified CI may be advantageous to both the witness and the interviewer.

Overall, research has looked into various ways to address the concerns of length and complexity with the full CI procedure. Mainly, omitting the change order and change perspective components has been found to have no detrimental effect to witness recall. Instead, the interviews can be of significantly shorter length without compromising on quality. In some cases, a modified CI procedure has even found to reduce misinformation. This shorter procedure has been recommended for less serious crimes or frontline investigators who often may not have the time or opportunity to conduct a full CI.

1.1.4 Use of CI in practice

The full CI can be seen as too time consuming and complex to conduct, especially for frontline investigators or generally when time or resources are limited (Dando, Wilcock, & Milne, 2008). Modified procedures have been proposed that address some of these issues, making the interviewing process shorter and less demanding with fewer components. However, the most important concern is whether the CI (full or modified) is well-implemented in practice. Although the modified CI may be shorter but still beneficial to recall when participants or police officers are asked to use them as part of a study, it should still be explored whether real-life police officers actually use these techniques in their day-to-day interviews.

On the one hand, there is some evidence to show that CI techniques are implemented in police interviews after training. For example, MacDonald, Snook, and Milne (2017) looked at what effects PEACE training would have on witness interviews by Canadian police. Actual police interviews before and after the training took place were examined. Results showed that those interviewers who received training demonstrated a higher percentage of engage and explain behaviours (such as explaining the expectations, establishing the witness's needs, asking about the witness's understanding of the interviewing process), fewer leading questions and more open-ended questions than interviewers who did not receive the training. In addition, the mean proportion of closure

behaviours such as summarising the interview was also higher for trained interviewers. Therefore, the authors suggest that it is possible to transfer some knowledge from learning into practice, and interviewers seem to be using the trained techniques in their future interviews.

However, this is not always the case. Often, research does not show an association between interviewers' knowledge of interviewing procedures and actual interview performance (Powell et al., 2005). Providing interviewers with training seems to give them information about how interviews should be conducted, but it does not always alter how they actually conduct interviews in practice (Powell, 2002). For example, in one study, Australian police officers participated in 5-hour training about using open-ended questions (Powell, Hughes-Scholes, Smith, & Sharman, 2012). In three experiments, of approximately 80 questions asked, the proportion of open-ended questions asked after training was low (around 0.30), but the main finding was that there was a negative relationship between these open questions and the estimated total number of interviews conducted before training. In other words, more experienced officers seemed more resistant to changing their habits. On the other hand, a survey of less experienced officers (mean of 22 months of service) also suggests that they do not always use all components from the training (Dando et al., 2008). Nearly half of the 216 participants reported that they did not feel that their training left them very well equipped with skills to conduct interviews. At the same time, 40% of the police officers reported that they almost always felt pressured to complete interviews more quickly than they would like, mostly due to lack of time, a high workload or pressure from senior officers. As a result, police officers reported some components of the CI to be less frequently used in practice such as mental context reinstatement, witness compatible questioning, and no guessing.

Overall, it seems that although police officers are able to acquire knowledge about how a good interview should be conducted in theory, when conducting these interviews in practice, a lot of the learnt techniques are not implemented. This is generally reported to be due to the pressure to conduct the interview as soon as possible without the needed time or

resources. Therefore, quick and easy techniques are needed that might be used instead of the CI, for example for less serious crimes. Any technique that might be able to increase witness recall without using a lot of additional resources from the police would be a beneficial one.

1.2   Quick solutions

1.2.1   Rapport-building

One possibility for such technique is rapport-building. Rapport-building is a standard recommendation for all investigative interviews, and one of the components of the enhanced CI that is often preferred by real-world investigators (Dando et al., 2008). Building a rapport with the witness is supposed to assist with some of the social reasons for not reporting information during an interview, as discussed earlier. For example, the witness may feel like they do not trust the interviewer enough to disclose sensitive information or they may believe that the interviewer will not help the witness or take them seriously (Hope, 2018). Building a rapport in these cases might help to reassure the witness and encourage them to report more information. Indeed, most guidelines recommend rapport-building when interviewing adult and child witnesses as well as suspects (e.g., Benia, Hauck-Filho, Dillenburg, & Stein, 2015; Meissner, Kelly, & Woestehoff, 2015). It has been found to be beneficial to recall alone, without other CI components, therefore making it a possible alternative, if police officers lack time or resources.

Definitions of rapport can often vary and lack clarity due to different studies often using their own definitions of what rapport is (Saywitz, Larson, Hobbs, & Wells, 2015). However, it can generally be referred to as the relationship between interviewer and interviewee, which is meant to communicate mutual attention, positivity and coordination through mutual interest, friendliness and responsiveness (Tickle-Degnen & Rosenthal, 1990; Abbe & Brandon, 2013). For example, from their in-depth interviews with high-stakes interviewers about their rapport-building techniques, Goodman-Delahunty and Howes (2016)

found that various social influence strategies were applied to the interviewees, with liking and reciprocity among the most frequently reported ones, which were mainly achieved through humour and establishing similarity. Similarly, police officers who earn the most respect and cooperation are described as courteous, fair, honest and respectful, which in turn reduces the interviewee's experience of threat and increases their willingness to cooperate and tell the interviewer what they know (MacDonald, Keeping, Snook, & Luther, 2017; Powell, 2000). When looking at non-verbal behaviour, naturally occurring behaviours from the interviewer that do not appear to be scripted tend to engage children to a greater extent (Johnston, Brubacher, Powell, & Fuller-Tyszkiewicz, 2019). Appearing natural and confident, however, often comes with experience.

Indeed, most officers in the UK and US believe rapport-building to be an important part of achieving a successful interview, and they report to use it during the majority of their witness questioning (Dando et al., 2008; Vallano & Schreiber Compo, 2015). In one study by Hirn Mueller, Schreiber Compo, Molina, Bryon, and Pimentel (2015), US law enforcement interviewers specifically showed their ability to discriminate between productive interviewing techniques that are more effective at gathering accurate information and counterproductive techniques. Furthermore, they reported to use the productive ones more often in their own practice. Police officers suggest that rapport-building facilitates communication and, when interviewed about what they believe makes a good interviewer, they emphasise personal attributes such as being relaxed, friendly and empathetic over behaviours that can be learnt such as knowledge of legislation (Collins, Doherty-Sneddon, & Doherty, 2014; Wright & Powell, 2007).

In reality, however, studies often find real investigative interviews to be different from what is self-reported. For example, Clarke and Milne (2001) examined 75 actual witness interviews in the UK and found that only 7% of them contained rapport that was professionally conducted. In contrast, nearly half of the interviews (47%) did not contain rapport-building at all and, although over 90% of officers stated that rapport was important, there was no evidence of it during actual interviews. Moreover, even when rapport is built

initially, it is often not maintained throughout the interview with many opportunities frequently missed (Walsh & Bull, 2012). Similarly, in the US, Schreiber Compo, Hyman Gregory, and Fisher (2012) looked at real audio-taped witness interviews. They found that investigators did not frequently employ positive interviewing techniques with fewer than two attempts at rapport-building per interview. In contrast, the interviewers used many negative techniques such as interrupting and intimidating/insulting the witness. The authors suppose that this may be because interviewers are often more focused on their own cognitive needs (e.g., trying to keep up with the questions) and therefore do not take the time to conduct the interview the way it should be.

1.2.2.1 Research behind rapport-building

Despite rapport-building being present in most interviewing guidelines and reportedly being valued among interviewers, there is surprisingly little research to test out its beneficial claims. Research that has been conducted tends to show that when rapport is built with the witness, it has some benefits, although this is not always consistent (see Vallano & Schreiber Compo, 2015 for a review). One of the first studies was conducted by Collins, Lincoln, and Frank (2002) who compared recall in rapport, neutral and abrupt conditions. Features such as body language, tone of voice and placement of furniture were manipulated between these conditions to create different levels of rapport. For example, in the rapport condition, the interviewer adopted a more relaxed posture and tone of voice compared to a harsher tone and general disinterest in the abrupt condition. They found that participants in the rapport condition reported more correct information about the event without an associated increase in incorrect details, compared to the abrupt and neutral conditions. More recently, in a study by Vallano and Schreiber Compo (2011), participants watched a crime video, some participants were then presented with misinformation, and subsequently all were interviewed about the video. Participants who participated in rapport-building before questioning were able to provide a higher percentage of accurate information during the interview, compared to participants who did not experience rapport-building. In addition, participants in the former condition provided a lower percentage of inaccurate and misinformation details. Similarly,

looking at closed questioning only, Nash, Nash, Morris, and Smith (2016) found rapport-building to increase the number of correct responses and decrease the number of incorrect. Furthermore, Holmberg and Madsen (2014) find humanitarian rapport interviews, which were characterised by showing personal interest, creating a personal conversation, expressing positive attitude and helpfulness, and showing cooperativeness, to lead to reports of larger amounts of information, both central and peripheral details, compared to dominant non-rapport interviews both one week and six months later. However, this time, there was no difference in reports of false information.

Indeed, findings in rapport literature are not always consistent. For example, Kieckhaefer, Vallano, and Schreiber Compo (2013) built high or low rapport with participants, either before or after presenting them with post-event misinformation about an event they witnessed. The authors found that when rapport was built prior to misinformation presentation, participants in the high rapport condition reported more accurate information than those in low rapport. However, there was no difference in memory performance between the rapport conditions when it was built after misinformation presentation. Other research does not find rapport-building to be an effective technique to witness memory performance. Most recently, Sauerland, Brackmann, and Otgaar (2018) explored the effects of none, minimal and extensive rapport-building in children, adolescents and adults. The study manipulated rapport levels by varying aspects of the interview such as seating arrangement, introduction, rapport-building questions and justification for audio recording. The authors found only one significant interaction whereby adolescents reported more accurate details in the extensive rapport condition compared to no rapport. However, no other main effects or interactions were found across all ages.

Research on rapport-building in children is similarly sparse despite wide recommendations (e.g., Hershkowitz, 2011; see Benia et al., 2015 for a review of the National Institute for Child Health and Human Development (NICHD) investigative interview protocol). In a systematic review of the effects of rapport-building on children's reports, only three studies were found (Saywitz et al., 2015). Overall, these studies suggested that

speaking to children using open-ended questions before recall and practising retelling a past event can lead to higher number details reported in later questioning. In one of the studies in particular, children were interviewed about a staged event with either open-ended or direct rapport, either one week or one month after the event (Roberts, Lamb, & Sternberg, 2004). It was found that those children in the open-ended rapport condition produced more accurate reports, but younger children in particular also provided more errors (although their overall accuracy was not affected by this). The authors of the systematic review suggest that their work highlights how little is known about rapport-building in children despite it being a recommendation in most interviewing manuals.

Some positive findings additionally extend to more high-risk interviews such as those with suspects (see Meissner, Kelly, & Woestehoff, 2015 for a review; Alison & Alison, 2017), including interviews with convicted terrorists (Alison, Alison, Noone, Elntib, & Christiansen, 2013). Similarly, rape victims report rapport-building to create a more comfortable pace, making the interview more interviewee led (Patterson, 2011). This, in turn, meant that in the study by Patterson (2011) participants who experienced rapport-building were more comfortable sharing their stories and disclosing more information than those who did not have a rapport, leading to a higher rate of prosecution.

Overall, rapport-building is a quick and relatively easy technique (when compared to the full CI) that is already recommended for use in investigative interviewing. Interviewers find it to be beneficial in practice, but there is still surprisingly little research exploring effects of rapport-building. Although findings that are present can be inconsistent, there is some evidence that rapport-building can be used alone or potentially in combination with other techniques to enhance recall in adult and child participants.

1.2.2 Eye-closure

Another quick technique that has been recommended to be used during the CI and that can also be used alone to improve the quality of witness reports during investigative interviews is witness eye-closure. Although it is not a component of the CI in itself, it is often suggested that witnesses can be asked to close their eyes while they are recalling information (e.g.,

Fisher & Geiselman, 1992; Milne, 2004). Recently, this technique's effectiveness has been tested separately from the CI, and there is some evidence to suggest that eye-closure can be used to enhance recall. Similarly to rapport-building, asking the witness to close their eyes is a less time consuming instruction that can be used by police officers who might not have time or resources to conduct the full CI.

1.2.2.1 Mechanisms behind eye-closure

Witness eye-closure is a technique that helps to address some of the cognitive or memory related reasons for not reporting information, similarly to the original components of the CI described in Section 1.1.1. To explain how eye-closure can help recall, it is suggested that memory retrieval and environment monitoring are processes that compete for the same cognitive resources as they usually need to be carried out at the same time (Glenberg, Schroeder & Robertson, 1998). Closing eyes, in this case, should help to direct cognitive resources (such as attention) to the task of memory retrieval and away from monitoring the environment.

Generally, facilitative effects of eye-closure might be explained with two theoretical accounts, both of which receive support from empirical studies. Firstly, the general cognitive load hypothesis suggests that closing or averting the eyes frees up general cognitive resources due to no longer having to monitor environmental cues. In other words, not having to focus on what is happening around them should help the witness to concentrate more fully on remembering. Therefore, witnesses' memory performance should be enhanced overall, irrespective of modality (auditory or visual). On the other hand, the modality-specific interference hypothesis suggests that closing or averting the eyes allows people to better visualise the to-be-recalled material, and therefore leads to better performance on visual tasks in particular. According to this hypothesis, participants should be better able to form a mental image of the event and therefore better able to recall visual details. The former hypothesis is supported by findings that show improvements in performance that extend to auditory materials, rather than only to visual materials (Glenberg et al., 1998; Perfect et al., 2008), whereas the latter is supported by findings showing that closing the eyes enhances

performance on a visual task to a greater extent than for an auditory task (e.g., Vredeveldt, Hitch, & Baddeley, 2011; Vredeveldt & Penrod. 2013).

1.2.2.2 Research on (witness) eye-closure

Supporting these theoretical benefits, research does generally show that closing eyes often leads to improvements in recall (e.g., Einstein, Earles, & Collins, 2002; Vredeveldt & Perfect, 2014; Vredeveldt, Tredoux, Kempen, & Nortje, 2015). The first study to investigate eye-closure within the investigative interviewing field looked at it as an addition to meditation (Wagstaff et al., 2004). Participants were asked to recall details of Princess Diana's funeral, and the authors found that participants who had their eyes closed during the interview were able to recall more correct details about the event in free recall. However, there was no benefit in closed questioning. Later, Perfect et al. (2008) conducted five experiments to investigate the effects of eye-closure on witness recall. In these experiments, participants witnessed an event (in the form of a video or a staged live event), and they were later interviewed about it either with their eyes open or closed with free recall and closed questions. Across five experiments, the authors found instructed eye-closure to be beneficial to correct recall of both auditory and visual details (with the exception of one experiment finding a greater benefit for visual details only) with both video and a staged live event. Additionally, this increase in correct recall was not associated with an increase in incorrect recall with all experiments reporting either no effect of eye-closure or a reduction in incorrect details (with the exception of one experiment where eye-closure increased incorrect recall of auditory details). So research on witness eye-closure shows an encouraging start, demonstrating some enhancements to the amounts of remembered information.

However, other results from lab studies have not always been straightforward. For example, Vredeveldt, Baddeley, and Hitch (2013) examined eye-closure in repeated interviews, whereby participants were questioned immediately after witnessing an event (free recall) and then again one week later (free and cued recall). The authors found that only eye-closure during the second interview enhanced free recall and responses to questions, but not

during the first interview. These findings are inconsistent with the ones above where benefits of eye-closure can be seen immediately after witnessing an event.

If closing eyes directs cognitive resources to recall rather than monitoring of the environment, then this might be a particularly useful technique in a setting with many distractors. Perfect, Andrade, and Eagan (2011) investigated this idea by questioning participants either in presence of auditory distraction or in a quiet room, with or without eye-closure. They found that there was no effect of eye-closure in the quiet room, but eye-closure reduced erroneous recall for both visual and auditory details in the noisy condition. This finding might be particularly useful in real-world interviews where the witness might encounter numerous distractors (e.g., new people or settings). Testing this idea in a more realistic setting, Vredeveldt and Penrod (2013) compared eye-closure when witnesses were interviewed inside in a quiet setting or outside in the street after witnessing a staged event. Unlike the previous study, the authors found no significant effects in cued recall. In free recall, overall, participants who closed their eyes tended to report more information and also more correct details. However, when looking at the interaction of eye-closure and location of the interview, eye-closure enhanced correct responding in free recall but only for those participants who were interviewed inside. Therefore, witness eye-closure can be a beneficial technique for recall in settings with many distractors, but this effect is not always consistent.

In addition to distraction in the environment, witness eye-closure research has also looked at employing more realistic materials. For example, Vredeveldt, Baddeley, and Hitch (2012) investigated eye-closure during an interview, following a videotaped violent event (depicting blood and injuries). Overall, there was only one main effect of eye-closure whereby it increased the number of correct coarse-grain responses compared to participants who kept their eyes open. Coarse-grain responses are ones that provide concise general information about a detail (e.g., the shirt was grey), compared to fine-grain responses which provide a more detailed account (e.g., the shirt was dark grey with a black logo). However, eye-closure was found to interact with modality, producing more correct and fewer incorrect responses to questions about visual aspects of the video. In another study, Vredeveldt et al.

(2015) trained South African police officers in the facial identification unit to use eye-closure in their regular interviews of serious crimes such as robbery, rape and murder. It was found that although the overall amount of information did not significantly differ, those witnesses who were interviewed with eye-closure reported more forensically relevant details than those in the control condition. So using eye-closure when interviewing witnesses of realistic or real crimes does show some benefit, but it is not always consistent.

Looking at eye-closure research in children, it is currently limited. In one study, Mastroberardino, Natali, and Candel (2012) tested six and 11 year old children on their memory of an emotional clip from "Jurassic Park". It was found that closing eyes during the interview helped children remember more correct details and fewer incorrect responses in cued recall. There was no such effect for free recall, which is said to be due to children generally not speaking as much and having a tendency to confabulate. However, a later study by Natali, Marucci and Mastroberardino (2012), which looked at immediate and delayed recall in children, found significant effects of eye-closure in free recall, increasing the amount of correct information reported and decreasing the amount of incorrect both immediately after the event and one week later. The authors found similar beneficial findings with cued recall corroborating previous results of Mastroberardino et al. (2012). On the other hand, Kyriakidou, Blades, and Carroll (2014) found that in one of their experiments, children provided more details overall and more correct details in free recall and in response to cued questions about visual details when they had their eyes closed. However, in the second experiment, there were no effects of eye-closure in free recall or cued questioning. Therefore, again, it seems that eye-closure can have some benefits to children's recall, but it is not always consistent and the number of studies is currently limited.

In order to have a better overview of the seemingly inconsistent findings across the previous studies of witness eye-closure, these findings are summarised in Tables 1 and 2. Overall, the majority of studies that measured correct free recall show beneficial effects of eye-closure (with two experiments showing some inconsistencies). However, for incorrect

free recall, the findings are very inconsistent with only one study finding an overall benefit of eye-closure and two studies finding a detrimental effect of eye-closure on incorrect recall.

Unlike Table 1 where some studies either did not look at free recall at all or only looked at correct recall, most studies included here did explore the effects of witness eye-closure in cued recall (shown in Table 2). Overall, there is some benefit of eye-closure in the majority of experiments, with only a few experiments not finding a significant effect on memory performance at all. There are no instances of detrimental effects of eye-closure on recall in any of the experiments. Frequently, some effects will not reach significance even if the effect is truly present, which could be due to low power or random variation. Therefore, at first glance, eye-closure seems to be having some beneficial effect (although not always consistent) on cued recall in most instances.

However, looking further into the significant findings, there are several studies that do not show a significant effect of eye-closure overall, but rather a benefit to certain types of details. For example, Vredeveldt et al. (2015) found that eye-closure increased the number of precise responses in cued recall, but not imprecise; some studies such as Vredeveldt and Penrod (2013) and Vredeveldt et al. (2012) find an increase in fine-grained details (rather than overall) and their results are also further split by modality; Vredeveldt et al. (2011) combined conditions of eye-closure and looking at a blank screen when reporting their beneficial effects. Therefore, there seems to be some inconsistency in how witness recall is measured and reported with some studies choosing to explore the overall correct or incorrect responses and some choosing to break these down further. As a result, it might be difficult to understand exactly what effect witness eye-closure is having on witness reports.

In sum, there seem to be some inconsistencies, particularly in free recall findings, and the way that effects of witness eye-closure are measured and reported, particularly with some studies reporting overall benefits and some reporting benefits only for specific type of detail in cued recall. However, these benefits (even if inconsistent) are still useful in practice, especially as witness eye-closure does not seem to have much associated cost to memory performance.

Table 1

Summary of findings from studies exploring the effects of witness eye-closure on free recall during investigative interviews (green cells indicate a beneficial effect of eye-closure, orange cells indicate no effect or mixed results, red cells indicate a detrimental effect of eye-closure on recall)

Study	Participants	Event type	Free recall	
			Correct	**Incorrect**
Kyriakidou et al. (2014)	Children	Video or Staged events	Expt 1, increased; Expt 2, no effect	Expt 1, no effect; in Expt 2, decreased
Mastroberardino et al. (2012)	Children	Video	No effect	No effect
Nash et al. (2016)	Adults	Video		
Natali et al. (2012)	Children	Video	Increased immediately after and a week later	Decreased immediately after and a week later
Perfect et al. (2008)	Adults	Video or Staged events	Expt 3 and Expt 5, increased	Expt 3, no overall effect, but interaction - increased aud, no effect for vis, Expt 5, no effect
Perfect et al. (2011)	Adults	Staged event		
Vredeveldt & Penrod (2013)	Adults	Staged event	Increased when interviewed inside (not outside)	
Vredeveldt & Sauer (2015)	Adults	Violent + Non-violent videos		
Vredeveldt et al. (2015)	Adults	Field study (serious crimes)	No effects overall, but decreased non-relevant details	
Vredeveldt, Baddeley, & Hitch (2012)	Adults	Video		
Vredeveldt, Baddeley, & Hitch (2013)	Adults	Video	No effect immediately after; one week later, increased	No effect overall; in some conditions, increased one week later
Vredeveldt, Hitch, & Baddeley (2011)	Adults	Video		
Vredeveldt, Tredoux, Kempen, & Nortje (2015)	Adults	Video	Increased	No effect

Table 2

Summary of findings from studies exploring the effects of witness eye-closure on cued recall during investigative interviews (green cells indicate a beneficial effect of eye-closure, orange cells indicate no effect or mixed results, red cells indicate a detrimental effect of eye-closure on recall)

			Cued recall	
Study	Adult/Child	Materials	Correct	Incorrect
Kyriakidou et al. (2014)	Children	Video or Staged events	Expt 1, increased visual; Expt 2, no effect	Expt 1, not reported; Expt 2, no effect
Mastroberardino et al. (2012)	Children	Video	Increased	Decreased
Nash et al. (2016)	Adult	Video	Expt 1, increased; Expt 2, increased	Expt 1, no effects; decreased
Natali et al. (2012)	Children	Video	Increased immediately after and a week later	Decreased immediately after and a week later
Perfect et al. (2008)	Adult	Video or Staged events	Expt 1, increased; Expt 2, no effect; Expt 4, increased	Expt 1, decreased; Expt 2, no effect; Expt 4 decreased
Perfect et al. (2011)	Adult	Staged event	No effect	Less errors
Vredeveldt & Penrod (2013)	Adult	Staged event	No effects except increased of fine-grained visual	
Vredeveldt & Sauer (2015)	Adult	Violent+Non-violent videos	Increased accuracy in all 3 expts	
Vredeveldt et al. (2015)	Adult	Field study (serious crimes)		
Vredeveldt, Baddeley, & Hitch (2012)	Adult	Video	No overall effect, increased fine-grain visual and both coarse grain	No overall effect, decreased visual
Vredeveldt, Baddeley, & Hitch (2013)	Adult	Video	No effect immediately after; one week later, increased	No effect immediately after; one week later, decreased
Vredeveldt, Hitch, & Baddeley (2011)	Adult	Video	Both EC and blank screen conditions increased	Both EC and blank screen conditions decreased
Vredeveldt, Tredoux, Kempen, & Nortje (2015)	Adult	Video	Increased precise responses	No effect

In addition, eye-closure also does not appear to inflate participants' confidence in their responses or affect their ability to discriminate accurate response from inaccurate ones, which is an important implication if witness reports are presented in court (Vredeveldt & Sauer, 2015). On the whole, more research specifically exploring different types of details in cued and free recall would help to understand the exact benefits of eye-closure more reliably. Furthermore, summarising these findings in a review and meta-analysis would help to quantify the effects of witness eye-closure with more certainty.

Overall, witness eye-closure is a quick and relatively easy technique that could be used by police officers when they have limited time or resources to conduct a full CI. Although research on eye-closure is fairly limited so far, the technique appears to have some benefit to recall in most cases without a cost to recall. Research should continue to explore the effects of eye-closure in witness interviewing to ensure that recommendations to use the eye-closure technique are supported empirically (Kyriakidou et al., 2014). However, one issue that has come up when using eye-closure is that closing eyes in front of strangers can be an uncomfortable experience which could prevent people from using this technique in real life (Fisher & Geiselman, 1992; Doherty-Sneddon, Bonner, & Bruce, 2001; Nash et al., 2016).

1.3   Social presence during interviews

Even without eye-closure, having someone else present in the room can be distracting and, at times, uncomfortable when performing a complex task (Eastvold, Belanger, & Vanderploeg, 2012). In conventional investigative interviews, the witness sits face-to-face with the interviewer throughout the whole interview. However, research from the broader cognitive psychology literature shows that simultaneously being watched by and watching another person requires cognitive resources, which can in turn lead to poorer task performance relative to, for example, performance in situations involving unreciprocated

gaze (Buchanan et al., 2014; Horwitz & McCaffrey, 2008). It is therefore plausible that the conventional face-to-face setup of investigative interviews might sometimes disrupt witnesses' memory performance. There are several reasons why the conventional face-to-face format of investigative interviews could be detrimental to witnesses' memory performance, and these reasons will be discussed in the following sections.

1.3.1 Problem of being watched by someone

Firstly, the social experience of being watched could impact memory recall. Various research studies—involving both child and adult participants—have demonstrated that experiencing another person's visual gaze can rapidly increase one's physiological arousal (see Hamilton, 2015 for a review; Conty & Grezes, 2011), and that in these circumstances people tend to become more self-aware, and more conscious of the social presence around them (Myllyneva & Hietanen, 2015; 2016). Specifically, heart rate and skin conductance responses tend to be larger, indicating increased affective arousal, when directly watched (compared to an averted gaze), and this is only to be present when participants believe that the observer can see them rather than remaining behind a screen (Myllyneva & Hietanen, 2015). Additionally, direct gaze has been found to increase facial temperature, suggesting a higher level of physiological arousal, and is generally seen as more intrusive compared to an averted gaze (Ioannou et al., 2014).

The mere presence of another person can lead to changes in behaviour. Social facilitation theory, proposed by Allport in 1924, suggests that the presence of others facilitates performance on a task. This suggestion was supported by studies showing an improvement in performance in various tasks such as motor tasks, simple multiplication, word association task and others when participants were observed, compared to performing these tasks alone (Zajonc, 1965). However, later this was not always found to be the case, with some studies observing negative effects of another person's presence on task performance. These conflicting findings are generally said to be due to the fact that the presence of others can lead to physiological arousal (Zajonc & Sales, 1966). It was suggested that performance of well-learned tasks should be facilitated by this arousal from

the presence of another person, whilst acquisition of new tasks should be impaired (Zajonc, 1965). For example, if participants were able to practise recalling a list of words alone first, another person's presence during final recall should facilitate participants' performance. However, if participants were asked to begin recalling in the presence of another person straight away, their recall would be negatively impacted. It might therefore be reasonable to apply this theory in the eyewitness context where novel and complex information has to be recalled without any practice first.

In the investigative interviewing context, the interviewer would not only be present but they would also be watching the witness, potentially evaluating their performance. Being watched and often evaluated by a person, in particular an expert (such as a police officer), can have detrimental effects on task performance (Horwitz & McCaffrey, 2008; Yantz & McCaffrey, 2008). Research on the effects of presence of a third-party observer show a negative relationship with performance on cognitive tasks (Eastvold et al., 2012). In a meta-analysis including 62 studies, Eastvold et al. (2012) found being that observed was specifically detrimental to performance on tasks of attention, learning/memory and delayed recall. In addition, presence of third-party observers has been found to have a negative effect on participants' results of neuropsychological testing (Gavett, Lynch, & McCaffrey, 2005). In one study, memory and motor skills specifically were assessed in a neuropsychological test. Half of participants were observed by a third-party observer and half were not, and in addition half of participants were given an adaptation period in order to get used to the third-party observer's presence. Overall, participants in the observed group recalled fewer words on the memory task than those who were not observed. Moreover, they did not benefit from an adaptation period, unlike the unobserved group. Similar findings can be seen in studies exploring working memory (e.g., Belletier et al., 2015). For example, participants memorised letters either in the presence of the experimenter or alone (Belletier & Camos, 2018). In experiment one, there was no effect of presence. However, in experiment two, participants were additionally asked to repeat some syllables during the trials (to prevent rehearsal and force participants to use attention) and this time, participants recalled fewer letters in the

presence of the experimenter than those who were alone. It is suggested that social presence captures our attention and takes it away from the main task.

In other studies, being watched or evaluated by another person has been shown to negatively affect performance on tasks assessing attention, concentration, and delayed recall, and on tasks assessing executive function such as the verbal fluency task (Eastvold et al., 2012; Kehrer, Sanchez, Habif, Rosenbaum, & Townes, 2000; Horwitz & McCaffrey, 2008).

Even in non-social study paradigms, research shows that visual facial stimuli depicting direct gaze can attract attention away from other objects in the environment (e.g., Conty, Tijus, Hugueville, Coelho, & George, 2006; Conty, N'Diaye, Tijus, & George, 2007; Conty, Gimmig, Belletier, George, & Huguet, 2010; Lyyra, Astikainen, & Hietanen, 2017). For example, in their study, Lyyra et al. (2017) showed that a face, presented among three other similar faces, that changes from an averted to a direct gaze between trials is detected more efficiently than one changing from direct to averted. Additionally, responses to a direct gaze are found to be faster and produce greater and longer lasting brain activity (Conty et al., 2007). These studies suggest that direct gaze attracts our attention to a greater extent than a face with an averted gaze. For example, in a study involving tracked eye-movement, Mares, Smith, Johnson, and Senju (2016) found that participants attended more quickly to pictures of faces with a direct gaze, than to either faces with an averted gaze or to buildings. Additionally, no significant difference in saccadic eye movement was found between the latter two types of image, thus implying that it is direct gaze specifically that draws attention, rather than facial stimuli per se. Similarly, when asked to detect peripheral targets presented alongside photos of faces, participants responded more slowly when seeing faces with a direct gaze than faces with an averted gaze or eyes closed, confirming the negative impact of direct gaze on task performance (Senju & Hasegawa, 2005).

This special attraction of faces can therefore often negatively affect people's performance on other tasks carried out simultaneously. Direct gaze is an important piece of information that engages a lot of resources early in the processing (Conty et al., 2007). For

instance, in one study, participants had to focus on an image of a face either directly gazing back at them, with an averted gaze or eyes closed (Senju & Hasegawa, 2005). It was found that participants had a delayed response in detecting peripheral targets in the former condition compared to the other two. However, when the peripheral target was presented with a short time gap after the facial stimulus (rather than at the same time), this effect was not found. It is suggested that direct gaze requires more attentional load, leaving fewer cognitive resources for other tasks. Faces and detection of gaze direction convey a large amount of information about the other person (e.g., emotional state, intention) and can lead to complex social cognitive processes (George & Conty, 2008). Following this, Kajimura and Nomura (2016) found a delayed response on a verb generation task when watching a movie of faces (like images but blinking and breathing in a natural manner) with their eyes directed towards the participants, compared to their eyes averted. However, this effect was only present when the specific task demands were high suggesting that these processes share domain-general cognitive resources. Additionally, direct gaze seems to disrupt performance on other cognitive tasks such as the Stroop test (Conty et al., 2010) and learning/delayed recall (Helminen, Pasanen, & Hietanen, 2016) when compared to closed eyes or an averted gaze from an observer.

Therefore, it might be reasonable to propose that another person's presence or gaze would have similar negative effects on witnesses' memory performance during an interview. Recalling information about an event is a complex and novel task that requires attention and concentration, especially in a real-world investigative interview, so according to previous research, the interviewer's presence or gaze could potentially disrupt performance. To my knowledge, there has only been one study that has explored other people's presence in this context. In this study, participants viewed a staged crime event and were later interviewed either alone with the interviewer or with either one or two additional passive observers (Wagstaff et al., 2008). Generally, the authors found that as the number of observers increased, witnesses gave fewer correct responses to closed questions. However, the

interviewer was not considered to be an observer so the effects of their presence were not explored.

In sum, research in other fields shows that the presence or gaze of another person can negatively affect performance on various cognitive tasks. This seems to be mainly due to another person's presence or gaze capturing one's attention, taking away cognitive resources from the task at hand. An investigative interview is one situation where the witness is always observed and in presence of the interviewer, but it has not been previously explored whether this might have a negative effect on witness memory performance. Wagstaff et al. (2008) found that presence of additional observers impaired participants' correct recall, but the role of interviewer's presence was not considered. If the interviewer's presence or gaze are harmful to witness recall then it is something that should be explored further and recommendations should be made for practice.

1.3.2 Problem of watching someone

Face-to-face interactions involve not only the experience of being watched, but also the need to monitor the other person's facial cues. For instance, taking part in a conversation (e.g., during an investigative interview) requires monitoring of visual communication signals such as facial expression (Doherty-Sneddon & Phelps, 2005). As Meskin and Singer (1974) say about faces, "it is probably the single most complex and engaging stimulus in the human environment" (p. 65). Facial monitoring typically exerts a cognitive load, requiring additional processing resources and can thus act as a distraction from the task at hand (Doherty-Sneddon & Phelps, 2005). In Section 1.3.1, I described how the presence of another person can have negative effects on task performance, usually by capturing one's attention. This effect can often be involuntary as another person's presence or gaze draws our attention away from the task at hand even if we attempt to continue concentrating on the said task. In the current section, I will explore the flip-side to this in a social interaction whereby observing another person can also have negative effects on performance. Observing another person is a common part of a social interaction, such as an investigative interview, and therefore it is

important to understand whether this observation of the interviewer might be harming witness performance in this setting.

Distraction resulting from facial monitoring is usually explained with the cognitive load model. Keeping up with another person's facial expressions requires a certain amount of cognitive effort (Doherty-Sneddon, Bonner, Longbotham, Phelps, & Warnock, 2004). As the total amount of cognitive resources available to us is limited, if another task needs to be carried out at the same time such as facial monitoring, fewer cognitive resources will be accessible to this task. For example, Doherty-Sneddon, Bonner, and Bruce (2001) found that, when asked to describe abstract shapes, children's performance was best when they looked at the floor and worst when they had to look at the experimenter's face. In another line of research, asking participants to gaze at the interviewer has been used as a way of detecting deception. The idea is that lying is a difficult task that results in an increased cognitive load (Granhag & Vrij, 2015), which is also the case for facial monitoring. Therefore, asking participants to maintain eye contact with the interviewer can be used to interfere with the task of lying by increasing the overall cognitive load (Lawrence et al., 2017). In this study, children were asked to provide either a truthful account of a school event or to convince the interviewer of an event that did not happen, while maintaining eye contact or not receiving any gazing instructions. The authors found that when asked to gaze at the interviewer, truth-tellers provided significantly more details than lie-tellers compared to the no instruction condition. Therefore, it seems that facial monitoring can be cognitively demanding on its own, and this can interfere with performance on a concurrent task.

There is indication from an early study by Beattie (1981) that answering questions while continuously maintaining eye contact can become difficult. When participants had to look at the experimenter, they began their speech quickly but then had to retrace their steps back, and they also produced a number of inappropriate words before finally reaching the right one. Other studies show similar detrimental effects of facial monitoring. For example, research with visuospatial tasks shows a detriment of maintaining eye contact or gazing at another person. In one study, participants were asked to follow a pathway through an

imaginary matrix under various gaze conditions (Markson & Paterson, 2009). Only eye contact during the task disrupted task performance compared to looking at a blank screen (or another stimulus) or closing the eyes. However, looking at an image of the experimenter's face (upright or inverted) did not have such effects, suggesting that it may be the human interaction that constitutes the cognitive load rather than just the face itself. Buchanan et al. (2014) confirmed and extended these findings, this time using an imaginary 3D matrix. They found that maintaining eye contact led to the poorest performance, followed by the mutual gaze condition (looking at each other's face without making eye contact), and the best performance was for conditions in which gaze was not reciprocated at all or the eyes were closed. Furthermore, visual signals from another person are processed automatically even when attention should be paid to something else (Langdon & Bruce, 2000). People are often unable to ignore irrelevant gestures or head orientations even when they are incongruent and detrimental to the main task they are asked to perform.

1.3.3   Natural gaze aversion

As one way to cope with the distraction of facial monitoring whilst completing another task, people often avert their gaze without instruction and this tends to correlate with difficulty of the task (e.g., Glenberg, Schroeder, & Robertson, 1998; Doherty-Sneddon & Phelps, 2005). It has been suggested that we avert our gaze during certain parts of the task or social interaction to avoid processing of unnecessary visual information in the environment and this way we attempt to facilitate our performance on the main task at hand (Doherty-Sneddon, Bruce, Bonner, Longbotham, & Doyle, 2002). For example, Abeles and Yuval-Greenberg (2017) asked participants to complete a mental arithmetic task while looking at slow and fast moving stimuli on the screen. Eye movements were recorded, and the authors found that participants averted their gaze more frequently and for longer periods of time when the irrelevant stimulus moved faster rather than slower, suggesting a higher level of difficulty. Furthermore, these gaze aversions were correlated with the average difficulty of the arithmetic task at hand. The authors concluded that during a non-visual task, gaze can be averted from visually salient objects in the environment in order to focus on the main task,

particularly when it is already difficult. Similarly, in various studies conducted by Doherty-Sneddon and colleagues, they have found children to naturally avert their gaze from the experimenter when answering verbal reasoning and arithmetic questions, and they do so more frequently in response to more difficult questions (Doherty-Sneddon et al., 2002; Doherty-Sneddon & Phelps, 2005). This effect is similarly found in children with autism spectrum disorders (Doherty-Sneddon, Riby, & Whittle, 2012).

In terms of gaze aversion during memory tasks, the research is currently less abundant than that for other tasks such as arithmetic and reasoning questions and visuospatial tasks. As part of their series of experiments, a study by Glenberg et al. (1998) found that participants naturally avert their gaze when faced with a difficult remembering task. In the first experiment, participants were asked some autobiographical questions that varied in difficulty, and frequency of their gaze aversion was recorded. The second experiment tested the same idea but using general knowledge questions instead. In both, the authors found that people naturally averted their gaze more when answering questions, and they did so more frequently as the questions became more difficult. It is generally suggested that perceptual and memory systems both share the same cognitive resources, and therefore in order to free up space for remembering, monitoring of the environment should be suppressed (Smith & Vela, 2001). These findings are also supported by neuroimaging research. For example, some fMRI findings show brain network connectivity that supports recollection when distracting stimuli are ignored (by closing eyes), and this connectivity declines in presence of distraction, which is associated with poorer recollection (Wais, Rubens, Boccanfuso & Gazzaley, 2010). Within the investigative interviewing context, viewing complex visual information can also negatively affect recall (e.g., Perfect, Andrade, & Syrett, 2012), therefore suggesting that gaze aversion might be a helpful technique in this setting also. However, this technique has not yet been explored in investigative interviews.

1.3.4 Different perspective

Unlike studies on natural gaze aversion, some research suggests that gazing away does not have much functionality, and distraction avoidance is not enough to explain why we often

shift our gaze when asked questions (Ehrlichman, Micic, Sousa, & Zhu, 2007). In this study, the authors found that eye movement rates were lower for low-retrieval tasks (e.g., indicating when they hear a specific pattern of letters) compared to high-retrieval (e.g., retrieving words of similar meaning to a given word) when recalling long-term memories. This could be taken as evidence of gaze aversion for more difficult tasks, however, similar differences in eye movements were also found between these conditions when participants had their eyes closed. If the eye movements were a way to disengage from the environment to cope with the high cognitive load of the questions, then there should not be any difference when the eyes are closed.

Supporting this idea is the fact that people tend to shift their gaze while answering questions even when the other person is not visible or in complete darkness (Ehrlichman & Barrett, 1983). Moreover, the face of the person asking questions, a stimulus that is thought to be highly complex, does not seem to matter here at all. For example, in his early study, Ehrlichman (1981) asked questions regarding verbal-linguistic and visuospatial details with some participants having the interviewer's face either visible or not visible (showing a grey oval instead) on the screen in front of them. In addition, for half of the task, participants were also instructed to maintain their gaze on the screen and for the other half they were allowed free eye movements. Unlike the other gaze aversion studies mentioned earlier, no interference was found during the continuous gaze condition here. In fact, for some features (e.g., length of pause), the absence of the interviewer's face was actually more disruptive. Generally, participants tended to produce high rates of eye movement when thinking and speaking, irrespective of the stimulus on the screen. It is suggested that people look away when speaking not because of the interference of the interviewer's face but because they are planning what to say next. Therefore, it may be the case of cognitive load but not to do with the visual distraction of the face. As another theory, Ehrlichman and Micic (2012) suggest that these non-visual eye movements do not have a particular function and the authors speculate that these movements developed from already existing neural systems whereby people scan the environment when searching for something and this stops once they focus

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on the found object. It is suggested that this could be similar when searching for a memory – scanning first and stop once find the particular memory – but it does not necessarily aid remembering.

1.3.5 Gaze aversion as a solution

On the whole, research suggests that observing another person can be distracting while completing another task as it results in increased cognitive load, leaving fewer resources to complete the task at hand. Furthermore, facial monitoring is frequently an automatic process that is difficult to suppress. As a way to cope with this, people are often found to avert their gaze from the other person, for example during a conversation, to control their environmental input and to able to direct cognitive resources to the main task. Other research studies propose that these gaze aversions occur even when another person is not visible or the eyes are closed, suggesting that people might be looking away when they are thinking about what to say or do next. Overall, there are some contradicting accounts of the gaze aversion effect. However, even if people look away to facilitate their thinking process rather than to disengage from the visual environment, instructing the witness to avert their gaze, therefore, may still potentially aid recall.

Witness gaze aversion is a technique that could help to solve both the problem of the witness being observed by and also observing the interviewer. Averting one's gaze is generally found to facilitate performance on several visuospatial cognitive tasks, by disengaging from the environment and directing focus toward the task (e.g., Buchanan et al., 2014; Doherty-Sneddon et al., 2001; Markson & Paterson, 2009; see also Lenoble, Janssen, & El Haj, 2019). Glenberg (1997) suggested that our cognition is normally "clamped" to the environment to process what is going on around us so in order to engage in other cognitive activities, we need to disengage from the environment. It has been proposed that averting one's gaze might be easier than cognitively suppressing the environment (Glenberg et al., 1998).

Indeed, there are several theoretical models that help to understand the potential uses of the gaze aversion technique. For example, models of executive functioning can help to explain why focused attention may be beneficial for remembering. According to this framework, short-term memory is often divided into three components: phonological loop, visuospatial sketchpad and the central executive (Baddeley, 2003). The former two components are said to be responsible for processing and storing of auditory and visual information respectively, and it is the latter allows us to combine simultaneous processing and storage. The central executive has a limited attentional capacity and is assumed to control behaviour. Executive control allows us to select some information from the environment while simultaneously inhibit other information, switch between tasks, manipulate information stored in temporary locations, coordinate separate task performance and divide attention between two simultaneous competing tasks (Baddeley, 2002; Hester & Garavan, 2005).

The theory of executive functioning suggests that the central executive is limited in attentional capacity so, if we are to perform two tasks simultaneously such as remembering details about an event and keeping up with the interviewer's presence, there may not be enough attentional capacity left to do both. This means that the witness would have to continuously switch between the two tasks, potentially limiting performance. This framework helps to understand why focused attention should help witness memory during interviews as it suggests that witnesses no longer have to keep switching between two processes or dividing attention between two processes, focusing solely on their main task of remembering instead. This explanation goes in support with the idea described previously, suggesting that disengaging from the environment should benefit witness recall.

Furthermore, one of the hypotheses that helps to explain the witness eye-closure effect on recall (the modality-specific hypothesis, see Section 1.2.2.1) suggests that disengaging specifically from the visual environment should facilitate visualisation of witnessed events (e.g., Vredeveldt et al., 2011). Particularly, visualisation might be beneficial

for cuing memory. For example, associative network models of memory describe memory as a number of nodes connected with links (Yates & Nasby, 1993). Propositions are represented by nodes which can stand on their own as units of knowledge or can be combined into groups to represent different events. When nodes are linked together, they become associative structures and form networks. One event like this becomes associated with other events if activated at the same time, and links between nodes form at the time of encoding. Internal or external sources of stimuli can activate particular nodes such visual images or visualization. The degree of activation varies depending on how related different nodes are – the more related, the more likely they are to be activated together.

From this theoretical framework, it might be suggested that allowing the witness to visualise the witnessed event more easily, for example by removing much of visual information from their environment by asking them to gaze away from the interviewer, should facilitate better cuing of memories. Being able to visualise parts of the scene might prompt other details to be reported that the witness might not think of during the interview otherwise as, according to the associative networks models of memory, related details about an event should be activated at the same time.

Indeed, witnesses are often advised to avert their gaze from the interviewer's face to help them concentrate on remembering, either by closing their eyes or by looking at a blank wall (e.g., Milne, 2004). For example, in their manual, Fisher and Geiselman suggest that "[eyewitnesses] will be reluctant to close their eyes, especially if proper rapport has not yet been established by the [interviewer]. In that case, the [interviewer] can suggest that the [eyewitness] keep her eyes open, but focus on a solid visual field, like a blank wall" (Fisher & Geiselman, 1992, p. 134). Several studies have examined the effectiveness of the eye-closure approach, but to my knowledge none have explored the approach of asking the witness to look away in an eyewitness-interviewing context. Gaze aversion is a technique that might be able to tackle both cognitive/memory related and social reasons for not reporting information during an interview. As discussed in Section 1.1.1, similarly to the

original components of the CI, gaze aversion might help to tackle some of the cognitive reasons for not reporting information and facilitate remembering by allowing the witness to picture the event more easily and mentally travel back to it. Simultaneously, gaze aversion might reduce the witness's awareness of the other person's (i.e., the interviewer) social presence, which has been found to be distracting on various tasks.

In sum, some research suggests that gaze aversion could be a useful tool in helping to focus more on the task at hand, but there are also other findings that show no evident functionality of gaze. Gaze aversion is often recommended as an alternative for witness eye-closure, but clearly, more research is needed to explore its effect in recall. The gaze aversion research has been applied to school classrooms and identifying ways for children to maximise their cognitive performance (Phelps, Doherty-Sneddon, & Warnock, 2006), but this technique could also be beneficial in the legal domain, particularly in helping witnesses remember. Being interviewed by a police officer is a demanding cognitive and social situation, and a relatively quick and easy technique such as gaze aversion might be expected to improve witness recall, if it does indeed serve its purpose in this context.

1.3.6   Remote interviews

Removing the interviewer's presence to an extent has already been implemented in research and interviewing practice. One type of such interview is a remote interview. These are investigative interviews conducted using videoconference tools such as Skype. There are currently only a few studies exploring the applicability and usefulness of remote interviews. In studies that compared face-to-face investigative interviews with equivalent interviews conducted via videoconference, participants sometimes reported that they felt better able to concentrate, and more comfortable with looking away, when the interviewer was not physically in front of them, even though this did not clearly benefit interview outcomes (Kuivaniemi-Smith, Nash, Brodie, Mahoney, & Rynn, 2014; Nash, Houston, Ryan, & Woodger, 2014). In similar work with children, video-mediated interviews reduced the amount of incorrect information and misinformation being reported, relative to face-to-face

interviews (e.g. Doherty-Sneddon & McAuley, 2000). Whereas research has begun to explore the effectiveness of interviews conducted via videoconference or even using avatars in virtual environments (Nash et al., 2014; Taylor & Dando, 2018), in current practice at least one other person would normally be physically present with the witness during an investigative interview. At the moment, remote interviews are generally only used in civil hearings or when it is not possible for the witness to be present in person (Justice.gov.uk, 2017) and face-to-face interviews are preferred.

Another technique that has recently been developed is the Self-Administered Interview (SAI; Gabbert, Hope, & Fisher, 2009; see Hope, Gabbert, & Fisher, 2011 for a review). The SAI is a tool designed for the witness to use on their own in order to reduce the time between witnessing an event and the interview. The SAI consists of several sections that explain the tool, prompt the witness to report everything and use context reinstatement, provide a detailed description of the perpetrator, generate a sketch of the scene and other questions (e.g., time of day, any other people present at the time). Studies that have tested the effectiveness of the SAI so far have found positive results. Witnesses who complete the SAI immediately after witnessing an event tend to recall more correct details one week later compared to those who did not complete one (Gabbert et al., 2009; Gawrylowicz, Memon, & Scoboria, 2014). In addition, the SAI procedure has been associated with better resistance to misinformation when questioned after a delay of one week (Gabbert, Hope, Fisher, & Jamieson, 2012).

Overall, some alternatives to face-to-face interviews have already begun to be researched in order to save time and resources for the police. Recent development and implementation of techniques such as remote interviews and the SAI highlight the need for solutions that are quick and easy and also the fact that social presence of the interviewer may not be an essential component for effective recall. However, these techniques, particularly the SAI, were not designed to act as replacements for face-to-face interviews but as an addition to them.

As well as potential benefits, there may be various potential downsides of remote interviews or interviews that remove the interviewer's presence to some extent. Intuitively, it might seem that not having the interviewer present or visible to the witness could have a negative impact on their relationship and rapport. For example, during a conversation, people are often found to (subconsciously) mimic non-verbal behaviours of the other person, and this mimicry is said to be associated with liking, affiliation and cooperation (Abbe & Brandon, 2014). Furthermore, deliberate mimicry has also been associated with pro-social behaviour and compliance. Therefore, non-verbal mimicry is something that can (often unintentionally) improve the relationship between two people during an interaction, and not being able to see the other person during an interaction could potentially impede this effect. In fact, one study finds eye contact in particular to enhance mimicry of hand actions (Wang, Newport, & Hamilton, 2011). Further to this, another important aspect of building a rapport with a witness is showing attentiveness to their responses with various verbal and non-verbal techniques such as nodding, attentive posture, and evident encouragement (Johnston et al., 2019). Some of these, particularly non-verbal, techniques might not be visible during a remote or gaze aversion interview, for example people tend to look at the other person nearly twice as much while listening comparing to talking, demonstrating their attention (Argyle & Dean, 1965). This, in turn, could discourage the witness and make them feel unsure about whether they are being listened to and how they are doing with the interview. Generally, being able to observe another person during a conversation allows us to pick up on subtle communication cues and adjust our own behaviour accordingly, and some of this interaction would inevitably be missing from remote or gaze aversion interviews, potentially leaving participants feeling that they are not fully in communication (Argyle & Dean, 1965).

Furthermore, eye contact is an important part of a conversation and being unable to make eye contact for long periods of time might go against social norms. Normally, people look away when they begin talking in order to concentrate their attention on what they are planning to say but also to signal to the other person that they are about to begin speaking (Vertegaal, Slagter, van der Veer, & Nijholt, 2001). When people get to the end of their

utterance, their next action will often depend on the actions of the other person. Therefore, it is usually necessary to look at the other person at this point to seek more information about what is expected next. In addition, by looking at the other person towards the end of speaking, we can signal that it is now their turn to respond. In a group conversation, being able to see the other people's gaze behaviour becomes even more important as it often indicates who is being addressed and therefore expected to respond. For example, in a study by Vertegaal et al. (2001), the authors found that when someone is listening to an individual as part of a group conversation, there is an 88% chance that the person they are gazing at is the person they are listening to. Likewise, when someone is speaking to an individual in a group, there is a 77% chance that they are gazing at the person they are addressing. These gaze behaviours are an important part of a conversation and often lets the participants know what is expected of them and when. Being unable to gaze at the other person and observe their gaze, therefore, can go against social norms and perhaps lead to discomfort in witnesses during a remote or a gaze aversion interview.

However, one of the main reasons for asking the witness to gaze away from the interviewer when remembering details about an event is to help them no longer pay attention to the interviewer and their communication cues. It could be argued that not being able to fully keep up with the interviewer's actions might create discomfort in witnesses rather than facilitate concentration on remembering, but some previous studies in witness eye-closure suggest otherwise. For example, in two experiments we conducted previously, participants who closed their eyes for the duration of the interview did not report to feel less comfortable than participants who kept their eyes open (Nash et al., 2016). However, in that study, building a rapport with participants did help to make them feel more comfortable with the eye-closure procedure.

Overall, there are two sides to the gaze aversion and remote interviewing techniques to consider when applying into practice. On the one hand, eye contact can be an important part of an interaction and not being able to observe another individual could deprive the witness of potential communication cues, breaking social norms. On the other hand, no

longer keeping up with the interviewer's facial expressions and actions should allow the witness to concentrate more fully on the main task of remembering details about an event, as explained in previous sections of this chapter. Previous research on witness eye-closure that does find a benefit to recall and emerging research on remote interviews provide some encouragement that the reduced interaction with the interviewer for the duration of the interview should not have a detrimental effect to recall. Furthermore, gaze aversion is a technique that is already frequently recommended in interview manuals, particularly as an alternative to witness eye-closure, but it has not been empirically tested in this setting. Therefore, testing out its effectiveness will help to answer these questions of whether gazing away from the interviewer would bring benefit or not.

1.4   Chapter summary

Overall, well-conducted investigative interviews are able to significantly advance the investigation, providing crucial evidence from eyewitness reports, but those interviews that are conducted poorly have the potential of contaminating the evidence. Therefore, procedures have been developed to enhance the quality of investigative interviews. For example, the Cognitive Interview is a well-established and recommended procedure for interviewing cooperative witnesses (Geiselman & Fisher, 2014). Particularly, in England and Wales, all police officers receive interview training as part of PEACE training, which incorporates the CI. The CI is designed to address cognitive and social reasons for not reporting information by witnesses, for example forgetting or feeling like the information may not be seen as important by the interviewer. Generally, the CI is effective at enhancing the amount and accuracy of witness memory reports, but sometimes this comes with an associated increase in incorrect recall or misinformation. Although a modified procedure has been developed that omits some components, there are still concerns among police officers that the CI can be too long and time consuming. Therefore, they frequently report to neglect using certain components so relatively quick and easy alternatives are needed.

Rapport-building is one technique that has been used alone to enhance witness recall by addressing some of the social reasons for not reporting information. Indeed, police officers agree that it is a beneficial technique in practice, but they do not always utilise it to the full extent in their interviews. Research generally shows positive effects of rapport-building to witness recall, but it is not always consistent and more research is needed, especially since rapport-building is already widely recommended in most interviewing manuals. Another quick and easy technique that can be used on its own is witness eye-closure. Eye-closure is designed to address cognitive or memory related reasons for not reporting information such as forgetting. On the whole, research shows this technique to be beneficial to recall but, at times, again inconsistent. However, there does not seem to be an apparent cost to recall when asking the witness to close their eyes. One possible downside to witness eye-closure is that it can be uncomfortable to close eyes in front of an unfamiliar person.

Indeed, social presence of another person can be distracting and detrimental when performing another task. On the one hand, another person's presence or gaze captures one's attention, taking away resources from the task at hand. This has been found to be the case with various cognitive tasks such as ones assessing attention or working memory where participants are observed while completing a task. The same could be happening in investigative interviews whereby the presence of the interviewer might be negatively affecting witness recall. However, this has not yet been explored in this field. On the other hand, observing another person is similarly distracting, as shown by research in other fields mainly in visuospatial and other cognitive tasks. Therefore, people are frequently found to avert their gaze naturally while performing a task to control their environmental input and facilitate performance on the main task.

Gaze aversion can thus be used as a solution to tackle the potential detrimental effects of both being observed by and observing someone else in the investigative interviewing setting. Gaze aversion has been implemented in other tasks such as visuospatial tasks and in classrooms, where benefits have been observed. Therefore, it is

reasonable to hypothesise that gaze aversion would be a similarly useful technique when interviewing a witness. Similarly to rapport-building and eye-closure, gaze aversion is a quick and easy technique that does not require additional resources from the police, but it is a technique that has not yet been tested in this setting and there may be potential downsides when implementing it in practice (e.g., relationship with the interviewer might be compromised), which need to be explored further.

To complement the literature on eye-closure, it is important to gather empirical evidence regarding alternative forms of gaze aversion technique that might be used in investigative interviews. Cognitive Interview training resources recommend that if witnesses are reluctant to close their eyes, they might instead be asked to focus on a blank wall, floor or somewhere else that is free of distraction, (e.g., Fisher & Geiselman, 1992, Milne 2004). However, research is currently lacking on whether these alternatives are indeed beneficial techniques within the investigative context. In this thesis, I was interested in the extent to which a strong interpretation of this advice would benefit witnesses' performance, namely, asking the witness to fully face away from the interviewer and face a blank wall, creating the kind of dynamic recommended in early forms of hypnotic interviews and psychoanalysis, whereby the interviewer (or therapist) sits behind the interviewee (patient), rather than in front of them (Freud, 1913/2001). Not only direct gaze but the whole face can be distracting (Buchanan et al., 2014) so facing away rather than simply gazing away was chosen to minimise distraction from the interviewer's face. In addition, fully facing away from the interviewer might also allow participants to feel less aware of the interviewer's presence and observation. Therefore, in five experiments, I investigated the effects of this technique by simply manipulating the direction in which the witness was facing (i.e., Facing the interviewer vs. Facing away) and measuring their recall.

1.5   Outline of experiments

Over five experiments, I investigated the effectiveness of facing away from the interviewer at enhancing witness recall. Overall, I expected that facing away would enhance recall, compared to the control face-to-face condition.

Experiment 1

I began exploring the efficacy of the facing away technique by conducting an experiment that simply compared participants' memory performance whilst either facing the interviewer or facing away during a mock investigative interview. Participants were asked to provide a free recall of the video event and they also answered some closed questions. This was used as an initial test that the benefits of gaze aversion could be replicated within the investigative interviewing setting. Against my predictions, I found no difference between the two conditions.

Experiment 2

Following the null findings of Experiment 1, I set out to address some possible reasons for why this might have been the case. The procedure and materials remained the same as in Experiment 1 with the following additions. Firstly, in Experiment 2, a larger sample size was used to ensure that I was able to detect any smaller effects of facing away, if those indeed were present. This is particularly important recently with a larger emphasis on high-quality research findings and replication, especially within psychology. Secondly, in addition to the manipulation of witness face direction, I also manipulated interviewer gaze direction in a similar manner (i.e., facing the witness vs. facing away) as this could be an explanation for why I did not find an effect witness facing away in the previous experiment. In Experiment 1, the witness was observed by the interviewer throughout the whole experiment, and being watched while completing a task can have detrimental effects on performance. Lastly, I built rapport with all participants to create more comfortable baseline conditions, in which they may be more willing to engage in the different experimental manipulations.

Despite these additions in Experiment 2, overall there was evidence of minimal benefit of facing away to witness recall with some positive effects in closed questioning only.

Experiment 3

I hypothesised that these slightly more promising results of Experiment 2 could be attributed to the rapport-building that was carried out with all participants. Therefore, in Experiment 3, I aimed to investigate this hypothesis by manipulating witness gaze direction alongside rapport-building. Additionally, as the general procedure and materials again remained the same, Experiment 3 was also an opportunity to see whether my findings from the previous experiments could be replicated.

This time, I did not find either witness gaze direction or rapport-building to have an effect on recall separately or in combination with each other.

Experiment 4

Gaze aversion is recommended as an alternative to eye-closure if the witness does not feel comfortable closing their eyes. However, Experiments 1-3 have so far suggested that gaze aversion in the form of facing away from the interviewer might not be a suitable alternative. In Experiment 4, I set out to determine with more confidence whether the two techniques are comparable by directly comparing facing away with witness eye-closure. Findings from this experiment would have great practical implications as, at the moment, gaze aversion is often recommended as an alternative to witness eye-closure (when the latter is not possible) with the assumption that similar benefits to recall can be obtained.

This time, the same general procedure and materials were used in a mixed design. Overall, there was evidence of minimal benefit of facing away from the interviewer and eye-closure, with both techniques enhancing correct details to a similar extent during free recall only.

Experiment 5

Based on results of Experiment 4 and previous literature, in the final experiment, I explored the role of task difficulty in the effectiveness of facing away and eye-closure techniques. I predicted that facing away and eye-closure might be more beneficial in difficult tasks, compared to the control face-to-face interview, and I investigated this hypothesis with easy and difficult levels of a picture memory task.

Overall, there was no benefit of either facing away or eye-closure to participants'

performance on the picture memory task, regardless of the task difficulty.

Chapter 2: Investigating the effects of witness gaze direction on memory performance

2.1 Method

2.1.1 Participants and design. Based on previous studies in witness eye-closure (particularly Perfect et al., 2008) which have found large effect sizes (e.g., $d = 0.98$ for correct recall), I began with a small study designed to detect effect sizes of that size. So a total of 42 Aston University undergraduate students (37 females, 5 males; age range 18 - 24; $M = 19.62$, $SD = 1.36$) took part and received research credits for their time. The study employed a between-subjects design with witness gaze direction (Facing interviewer vs. Facing away) as the sole independent variable.

2.1.2 Materials.

Video. Participants in this experiment saw a film-clip lasting 2 min 13 sec, previously used in Nash, Ryan, Houston, and Woodger (2014). The clip depicted a non-violent car theft whereby a man parks his car on the street, and it is later broken into and stolen by another male. The clip contained no auditory information except for general background noise.

Measures. All participants completed the Situational Self-Awareness Scale (Govern & Marsch, 2001), which involves rating nine statements (1 = Strongly disagree, 7 = Strongly agree) concerning how the participant feels at the present time (e.g., "Right now, I am keenly aware of everything in my environment"). The scale includes three statements assessing private self-awareness ($\alpha = .70$ in Govern & Marsch, 2001), three assessing public self-awareness ($\alpha = .82$), and three assessing awareness of surroundings ($\alpha = .72$). Participants' feelings of self-awareness might be affected by the presence of the interviewer so the situational self-awareness scores would be used to illuminate my findings on the effects of facing or facing away from the interviewer.

Additionally, participants completed the Brief Social Phobia Scale (Davidson et al., 1991). Individuals with high levels of social phobia often believe social situations to be

dangerous for potentially making them act in an unacceptable way (Clark & Wells, 1995). This could affect how participants act and feel in a strange social situation such as the current experiment, especially due to some being asked to take an unconventional position during the interview. Therefore, I wanted to ensure that participants' levels of social phobia were similar across conditions. In this scale, they were asked to provide ratings of the fear (0 = None, 4 = Extreme) and avoidance (0 = None, 4 = Always) they would experience in seven social situations (e.g., "Speaking in public or in front of others"). Moreover, participants considered how they feel in a situation that involves contact with other people or when they are thinking about such a situation. They then rated the severity of four different kinds of physiological reactions they might experience (e.g., "blushing"; 0 = None, 4 = Extreme). The overall internal consistency for the scale was good (α = .86 in Davidson et al., 1991).

Participants also completed the self-report measure of rapport developed by Vallano & Schreiber Compo (2011) and previously used in the literature on rapport in investigative interviews. The measure included nine items about the interviewer (e.g. "friendly"; α = .81) and 18 about their interaction with the interviewer (e.g., "cooperative"; α = .54 – I later discuss and remedy the low reliability of this scale). For each item, they made ratings on 7-point scales (see Vallano & Schreiber Compo, 2011, for full details of each scale and its scale anchors, but in general 1 = low on the particular characteristic, 7 = High on the particular characteristic).

2.1.3   Procedure. The study received a favourable ethical opinion from Aston University Life and Human Sciences Ethics Committee. All participants were tested individually in a quiet laboratory in a single session. The same interviewer conducted all of the interviews, and participants were told that the study concerned how witnesses remember events that they have observed.

After consenting to take part, participants were simply asked to watch the video-clip. Immediately following this, all were asked to complete the filler for 10 minutes, which involved 20 arithmetic questions (e.g., working out percentages).

Next, the free recall interview stage began. All participants were seated across a desk from the interviewer, while they received a standardised set of verbal instructions based on the Cognitive Interview (Milne, 2004). The interviewer asked that participants report everything they could remember without missing any detail out, no matter how unimportant they thought it might be. The interviewer emphasised that the information could be given in any order, and participants were told to avoid guessing, if they could not remember certain details. The interviewer also explained that participants were free to recall at their own pace.

After these initial instructions, the experimental manipulation was implemented. All participants were randomly allocated to one of two conditions prior to the experiment, resulting in an equal number in each condition. Participants in the "Facing away" condition were asked to turn their chair 180° to face a blank wall, whereas those in the "Facing interviewer" condition received no additional instruction about where to face, and therefore all remained facing the interviewer. Participants in the latter condition were not asked to maintain eye contact with the interviewer throughout the interview as this is not something that would be done in real life, and any technique proposed to improve performance (in this case, facing away), in practice, should be beneficial above what people are naturally already doing. All participants were told that these interview arrangements were in place to help them concentrate on remembering, and that the interviewer would remain quiet and take a few notes whilst the participant spoke, without any interruption. Participants were told to let the interviewer know when they could not remember any more and were given opportunity to ask questions. Then, the interviewer prompted participants to start speaking by asking them to tell everything that they can remember about the event.

Once participants had exhausted their free recall reports, they were next asked the same set of 10 closed questions about visual aspects of the theft film. During the closed questioning, the witness remained in the same facing position as they had been for free

recall, and if any participants in the "Facing away" condition began to turn around, they were asked to stay facing the wall. All participants were reminded to avoid guessing and say "don't know", if that was the case. Again, the interviewer did not interrupt the participant's answers or provide any feedback on the answers, but instead simply wrote them down. The free recall and closed questions were audio-recorded in order to allow for transcription and coding.

Once the interview stage was over, all participants completed the Situational Self-Awareness Scale, The Brief Social Phobia Scale and the rapport measure in that order, as well as being asked to speculate about the aims of the study. All of these measures were presented and completed on a computer whilst the experimenter was outside the laboratory, allowing participants to provide honest answers. Finally, the experimenter returned and participants were debriefed.

2.1.4   Data coding. After all data were collected, free recall responses were transcribed verbatim and coded blind to condition. This process involved using an exhaustive coding template, listing over 150 details that might be mentioned from the crime film, against which correct and incorrect details were scored and counted. A detail reported by each participant was scored as correct if it was present in the film and described correctly, and it was scored as incorrect if it was either described incorrectly or not present in the video. In cases where participants changed their mind about a particular detail, only their final responses were coded, and any details expressed with uncertainty were nevertheless still coded. Any subjective details were ignored (e.g., "you're not supposed to park there").

For each closed question, prior to the start of data collection, answers which would accepted as correct responses were established. Responses to each question were coded as either correct, incorrect or "don't know". If the participant changed their mind, again only their final response was coded, and if they expressed uncertainty about their answer (e.g., "I think he wore a blue shirt"), this was nevertheless coded as their answer (i.e. "he wore a blue shirt") rather than as "don't know".

A total of 21 randomly selected transcripts were scored by an independent coder who was also blind to the experimental conditions. Inter-rater reliability was good for free recall

correct details (r = .98) and incorrect details (r = .85). Similarly, the reliability was perfect for closed questions, with an overall agreement of 100%. Therefore, the first coder's scores were retained for analyses.

2.2 Results

To answer our main research questions, I looked at participants' responses during free recall and closed questions in turn, and compared the number of details recalled between the two witness gaze direction conditions.

2.2.1 Free Recall. Overall, participants' correct free recall ranged between 15 and 51 details, with a mean of 32.64. Firstly, a series of independent samples t-tests were conducted to compare the number of details recalled during free recall between the two witness gaze direction conditions (Facing interviewer vs. Facing away). As represented in the upper part of Table 1, the tests showed no significant difference in the number of correct details, $t(40)$ = -0.77, p = .45, d = -0.24, 95% CI on d [-0.84, 0.37], or incorrect details, $t(40)$ = -0.32, p = .75, d = -0.10 [-0.70, 0.51]. Overall accuracy[1] was calculated by dividing the number of correct details by the number of correct and incorrect details added together (Smeets, Candel, & Merckelbach, 2004). A t-test showed no significant difference between the witness gaze direction conditions, $t(40)$ = -0.17, p = .86, d = -0.05 [-0.80, 0.91]. As the z-score for skewness exceeded ±2.58 (Field, 2009), a non-parametric Mann-Whitney test was used to confirm these non-significant results on overall accuracy. This showed no significant difference between conditions, U = 207.00, p = .73.

[1] This measure tends to be relatively high as participants do not usually report many incorrect details during free recall and it should therefore be considered alongside other dependent variables (see Vredeveldt & Penrod, 2013). Rates of overall accuracy found in all experiments were generally similar to those found in previous literature (e.g., Gabbert et al., 2009; 2012)

Table 3

Mean number of details reported according to witness gaze direction condition in Experiment 1 (standard deviations in parentheses)

Question type	Response type	Condition	
		Facing interviewer	**Facing away**
Free recall	Correct	33.71 (9.53)	31.57 (8.54)
	Incorrect	1.90 (1.55)	1.76 (1.34)
	Overall accuracy	0.95 (0.04)	0.95 (0.05)
Closed questions (out of 10)	Correct	6.33 (1.71)	5.76 (1.92)
	Incorrect	1.29 (1.01)	1.81 (1.60)
	Don't Know	2.38 (1.20)	2.43 (1.33)
	Overall accuracy	0.82 (0.14)	0.76 (0.20)

In summary, contrary to my predictions, neither the quantity nor the accuracy of details reported during free recall seemed to be influenced by whether the witness was facing the interviewer or facing away.

2.2.2 Closed Questions. Similarly to the free recall analyses above, a series of independent samples t-tests were conducted to compare the number of closed question responses between the two witness gaze direction conditions. As the lower part of Table 1 shows, there was no significant difference for correct responses, $t(40) = -1.02$, $p = .32$, $d = -0.31$ [-0.92, 0.29], or incorrect responses, $t(40) = 1.27$, $p = .21$, $d = 0.40$ [-0.47, 1.26]. For incorrect responses, due to a non-normal distribution, a Mann-Whitney test was used to confirm these results, which again showed no significant difference between conditions, $U = 185.50$, $p = .36$. There was similarly no significant difference for "Don't know" responses, $t(40) = 0.12$, $p = .90$, $d = 0.04$ [-0.57, 0.64].

The overall accuracy of participants' closed question responses was again calculated by dividing the number of correct responses by the number of correct and incorrect responses given by each participant added together. These scores show how accurate participants were whenever they chose to answer a question (rather than saying "Don't know"). An independent samples t-test on the overall accuracy scores again showed no

significant differences between conditions, $t(40) = -1.18$, $p = .25$, $d = -0.36$ [-0.97, 0.25]. To summarise, similarly to the free recall results, there was no significant difference in responses to closed questions based on whether the witness faced the interviewer or faced away.

2.2.3 Additional Analyses.

2.2.3.1 Rapport. One possible concern with asking a witness to face away from the interviewer is that the witness might feel uncomfortable doing so (although in a field study of this technique, real eyewitnesses followed instructions and kept their eyes closed during 97% of their descriptions, Vredeveldt et al., 2015). To explore this issue, I looked at participants' responses to the rapport measure. Firstly, the scores for two negatively worded items regarding the interviewer were reverse scored. Then, summing the nine interviewer items, with a resulting maximum possible score of 63, an independent samples t-test showed no significant difference between the "Facing interviewer" ($M = 42.38$, $SD = 8.71$) and "Facing away" ($M = 43.67$, $SD = 6.34$) conditions, $t(40) = 0.55$, $p = .59$, $d = 0.17$ [-0.44, 0.77].

For the interaction part of the measure, firstly scores for the nine negatively worded items were reverse scored. Then, rapport ratings on all 18 items scale items[2] were again summed to produce a single score for each participant (maximum possible score = 126), and this score was used for the analysis. An independent samples t-test showed no significant difference in the ratings of interaction between the "Facing interviewer" ($M = 87.38$, $SD = 10.21$) and "Facing away" ($M = 88.71$, $SD = 6.42$) conditions, $t(40) = 0.51$, $p = .62$, $d = 0.16$.

Overall, there was no statistically significant difference in participants' ratings of the interviewer or their interaction, according to whether they faced the interviewer or faced away.

[2] In Experiment 3, to increase the reliability of this interaction scale, I collected only seven of the 18 items, following analysis used by Vallano and Schreiber Compo (2011) who originated this measure. When I retrospectively analysed the Experiment 1 data using only those same seven items rather than the full set of 18, the reliability of the subscale was considerably better (α = .85), yet the results were unchanged.

2.2.3.2 Brief Social Phobia Scale. Here, to ensure that there were no differences in the pre-existing trait of social phobia between the witness gaze direction conditions, I looked at the Brief Social Phobia scale items.

For the following analysis, the scores for fear, avoidance and physiological reactions were summed to produce one total score for each participant. To see whether there was any difference in the levels of social phobia between the two witness gaze direction conditions (Facing interviewer vs. Facing away), I carried out an independent samples t-test (see Table 2 for all following analyses). This showed no significant difference, $t(40) = 0.03$, $p = .98$, $d = 0.01$ [-0.60, 0.61]. Therefore, I can be confident that participants in the two experimental groups were similar on their levels of trait social phobia and I should not expect extraneous effects from this variable.

2.2.3.3 Situational Self-Awareness. For the following analyses, to help us better understand the effects of gaze, I examined to extent to which the witness gaze direction manipulation affected how participants felt at the time of the interview, particularly regarding their self-awareness and awareness of their surroundings.

The scores for each subscale on the Situational Self-Awareness Scale (private self-awareness, public self-awareness and awareness of surroundings) were summed to produce three total scores for each participant. To test whether there was any difference in the state self-awareness between the two witness gaze direction conditions, three independent sample t-tests were conducted. The tests revealed no significant differences for private self-awareness, $t(40) = -1.84$, $p = .07$, $d = 0.57$ [-0.05, 1.18], public self-awareness, $t(40) = -0.49$. $p = .63$, $d = 0.15$ [-0.46, 0.76], or awareness of surroundings, $t(40) = -0.51$, $p = .61$, $d = 0.16$ [-0.45, 0.76].

Table 4

Mean scores for social phobia and situational self-awareness across the witness gaze direction conditions in Experiment 1 (standard deviations in parentheses)

Measure		Condition	
		Facing interviewer	**Facing away**
Social Phobia		25.52 (11.15)	25.62 (9.56)
Situational Self-Awareness	Private	9.29 (2.97)	10.95 (2.91)
	Public	9.33 (3.80)	9.90 (3.81)
	Surroundings	12.48 (2.79)	13.00 (3.77)

2.3   Discussion

The present experiment was, to my knowledge, the first to examine the effects of witness gaze direction on memory recall in the investigative interview setting. Against my predictions, I did not find any benefit of facing away to memory performance in free recall or closed questioning.

These findings are surprising in light of previous research on gaze aversion, which tends to reveal benefits of gazing away while performing cognitive tasks (e.g., Markson & Paterson, 2009). Previous studies have mostly used tasks focusing on visuospatial aspects of performance with only a few focusing on memory (e.g., Glenberg et al., 1998). There has been some application of the gaze aversion technique in practice with some research looking at how children might benefit from gazing away from the teacher during learning (Doherty-Sneddon et al., 2002), but, to my knowledge, no previous study has attempted to test gaze aversion within the investigative interviewing setting. Research within this field has mainly focused on witness eye-closure instead. Whereas the current study is the first to ask witnesses to fully face away from the interviewer, one might expect that doing so would have similar beneficial effects as those seen with gaze aversion in other domains and witness eye-closure studies, especially since it is recommended for the Cognitive Interview (e.g., Fisher & Geiselman, 1992; Milne, 2004).

The null findings of the current experiment could be understood to imply that facing away during an investigative interview is less beneficial than is closing the eyes or gaze

aversion with other tasks, but direct comparisons are warranted before reaching this conclusion with any confidence. Additionally, this is only one study investigating these effects and therefore replication is crucial to ensure that the results I found are reliable and that effects are not missed that might truly be there. In an attempt to understand the null findings further, I suggest some possible explanations for why facing away from the interviewer did not benefit recall in Experiment 1 before it can be discounted as a beneficial technique for investigative interviewing.

Firstly, one reason why I might not have found an effect of facing away could be due to the relatively small sample size and therefore low power to detect any small or medium sized effects in the experiment. As explained in the method section, the sample size was chosen to detect large effect sizes, based on those found in the previous literature on witness eye-closure (e.g., Perfect et al., 2008). However, perhaps this was an overestimation of the facing away effect and a better powered study would be more suitable to detect any possible smaller effects.

Secondly, although in the current experiment some participants were asked to face away from the interviewer in an attempt to alleviate some of the environmental and attentional constraints, the interviewer always remained facing the witness. As explained in Chapter 1, we know that being watched while completing a cognitive task can hinder performance (e.g., Eastvold et al., 2012; Wagstaff et al., 2008). Therefore, this feeling of being observed could be negating any benefit of asking the witness to face away from the interviewer.

In conclusion, against my predictions, I did not find memory benefit of asking the witness to face away from the interviewer during an investigative interview. However, these are very early findings and there are still questions remaining to be answered in order to understand the null findings further.

Chapter 3: Investigating the effects of witness and interviewer gaze direction on witness memory performance

Given the results of previous studies on gaze aversion (e.g., Buchanan et al., 2014) and eye-closure (e.g., Nash et al., 2016; Perfect et al., 2008; Vredeveldt, Baddeley, & Hitch, 2013), it is surprising to find no indication that facing away enhanced participants' memory performance in Experiment 1. To improve robustness of my conclusions, in Experiment 2 I set out to replicate the witness gaze direction manipulation in a better powered study.

Furthermore, I took deliberate steps to test some possible explanations of why I might not have found an effect of witness gaze direction. Firstly, I manipulated where the interviewer was facing. Participants in Experiment 1 (whether they faced the interviewer or faced away) were observed by the interviewer throughout the whole interview, and we know that being watched while completing a cognitive task can hinder performance (e.g., Eastvold et al., 2012; Wagstaff et al., 2008). Therefore, observation and potential evaluation from the interviewer could be negating any beneficial effects of facing away by the witness. Secondly, I built a rapport with all participants. Rapport-building is a standard recommendation for all investigative interviews (e.g., Vallano & Schreiber Compo, 2015), and because rapport-building can make people feel more comfortable with closing their eyes in front of an interviewer (Nash et al., 2016), I anticipated that participants might experience a greater benefit of facing away if they first built a better rapport with the interviewer.

3.1   Power

As gaze aversion and eye-closure have similar theoretical backgrounds and the former is often recommended as an alternative for the latter in practice, the sample size of Experiment 1 was originally based on the large effects found in previous key research on eye-closure (particularly, Perfect et al., 2008). I expected that gaze aversion and eye-closure would have a comparable effect on recall, but perhaps this was an overestimation of the effect of facing

away and it needs a more thorough investigation. This is particularly important recently with concerns over the validity and reproducibility of some findings across various fields of research (Ioannidis, 2005). Within psychology specifically, there has been a larger emphasis on high-quality research findings and replication as large effects have not always been replicated (Open Science Collaboration, 2015). As part of 100 replications conducted of studies published in three psychology journals, only 36% of replications found significant results (compared to 97% significant results in the original studies). This is mainly said to be due to p-hacking, whereby certain research practices such as excluding subjects, not disclosing experiments that yielded non-significant findings, stopping data collection as soon as results are significant inflate the Type I error rate (i.e., false positive results; Lindsay, 2015) making some studies' results difficult to reproduce. Likewise, publication bias means that a lot of the time null results are not easily published, therefore leading to a misrepresentation of the size of an effect in the literature. Therefore, the sample size for exploring the effects of facing away should not be based on large effects from previous research, but instead a full power analysis should be conducted. Additionally, having low power reduces the likelihood that a significant result reflects a true effect (Button et al., 2013).

Furthermore, reproducible findings are specifically crucial in applied research such as eyewitness interviewing as the benefits of these techniques should be evident and consistent enough for them to be implemented in practice. For example, if interviewers were to ask witnesses to face away while recalling an event, they would need to be sure that this technique improves memory performance in most interviews and not just on rare occasions.

The null findings from Experiment 1 could mean that there is no effect of facing away on recall, but it could also mean that I was not able to detect a true effect that was there. Generally, p-values can vary widely with repeated experiments, but conducting a high-powered study decreases the chance of overlooking true effects and increases the chance that significant findings represent a true effect (Lindsay, 2015; Nuzzo, 2016). Both are crucial

in order to assess the importance of effect sizes more accurately (Button et al., 2013). Low power can be a particular problem in experiments with many conditions and outcomes as a large percentage of findings may not be accurate (Krzywinski & Altman, 2013).

So for the current experiment, I conducted a full a priori power analysis. This was done according to an expectation of a medium effect size ($d = 0.50$) as small effects may not be as useful in practice where a technique should be reliably effective in order to be used in real police interviews.

3.2   Interviewer gaze direction

A major addition in Experiment 2 was manipulation of interviewer gaze direction alongside witness gaze direction. Participants in Experiment 1 (whether they faced the interviewer or faced away) were observed by the interviewer throughout the whole interview and being watched while completing a cognitive task is generally found to hinder performance as explained in Section 1.3.1 (e.g., Eastvold et al., 2012; Wagstaff et al., 2008). These potentially negative effects of interviewer's observation could be negating any positive effects of asking the witness to face away. Participants may be more distracted away from recalling the event when they are aware of the interviewer's gaze as it requires more processing resources (than if the interviewer averted their gaze; Conty et al., 2007), especially when participants are in a socially unconventional situation (such as facing away themselves). So in Experiment 2 I also manipulated the interviewer's gaze direction as this is a plausible explanation for why I did not find an effect of witness facing away in Experiment 1. This manipulation mimicked the witness gaze direction manipulation with the interviewer facing half of the participants and facing away from the other half by turning her chair around to the wall.

Aside from manipulating interviewer gaze direction as a means of understanding why facing away by the witness did not lead to beneficial effects on memory performance in Experiment 1, exploring the effects of where the interviewer faces would also be novel and

interesting in itself. Looking away from the witness may seem intuitive in moments when the witness may need all of their internal resources to focus on remembering. However, it might also deprive the witness of important communication cues from the interviewer. As discussed at the end of Chapter 1, not being able to observe the interviewer could have an impact on the relationship between the witness and the interviewer, for example from being unable to show interviewer attentiveness to the witness, and it might also be uncomfortable from breaking of social norms.

To my knowledge, this is not something that has been researched. Just like asking the witness to face away from the interviewer, having the interviewer face away from the witness could be a quick and easy technique to enhance recall. As explained in Section 1.3.1, being observed and potentially evaluated by another person whilst performing a task can be detrimental to performance. Removing this observation has been shown to improve performance on other tasks such as working memory (Belletier et al., 2015; Belletier & Camos, 2018). Having the interviewer face away from the witness, therefore, could be expected to improve recall.

3.3 Rapport-building

As a last addition, I decided to take more deliberate steps to build rapport with all participants. Rapport-building is a standard recommendation for all investigative interviews, and one of the components of the Cognitive Interview that is often preferred by real-world investigators (Dando, Wilcock & Milne, 2008; see Section 1.2.1 for a more extensive review of rapport-building). Indeed, most officers in the UK and US believe rapport-building to be an important part of achieving a successful interview, and they report to use it during the majority of their witness questioning (Dando et al., 2008; Vallano & Schreiber Compo, 2015). In reality, however, studies often find real investigative interviews to be different from what is self-reported. For example, Clarke and Milne (2001) examined 75 actual witness interviews in the UK and found that only 7% of them contained rapport that was professionally conducted. In contrast, nearly half of the interviews (47%) did not contain rapport-building at

all and, although over 90% of officers stated that rapport was important, there was no evidence of it during actual interviews. Moreover, even when rapport is built initially, it is often not maintained throughout the interview with many opportunities frequently missed (Walsh & Bull, 2012). Similarly, in the US, Schreiber Compo, Hyman Gregory, and Fisher (2012) looked at real audio-taped witness interviews. They found that investigators did not frequently employ positive interviewing techniques with fewer than two attempts at rapport-building per interview.

Nevertheless, research does show that when rapport is built with the witness, it has some benefits, although this is not always consistent (see Vallano & Schreiber Compo, 2015 for a review; Collins et al., 2002; Nash et al., 2016). Furthermore, rapport has been found to decrease the number of incorrect details and, in some cases, protect against misinformation (Vallano & Schreiber Compo, 2011; Kieckhaefer et al., 2013). The results are similar with child participants, whereby they tend to produce more accurate overall reports and are better able to resist misleading information (Roberts et al., 2004). The positive findings additionally extend to more high-risk interviews such as those with suspects (see Meissner et al., 2015 for a review; Alison & Alison, 2017), including interviews with convicted terrorists (Alison et al., 2013).

Therefore, rapport-building appears to be a beneficial interviewing tool that can be used alone or potentially in combination with other techniques to enhance witness recall. In our previous research on witness eye-closure, we found participants to feel more comfortable with closing their eyes when rapport was built compared to no-rapport (Nash et al., 2016). Rapport-building could help to counteract some of the possible negative impacts of not being able to observe the interviewer by reassuring them and making them feel more comfortable before the recall part of the interview begins. Therefore, I anticipate that building a rapport in Experiment 2 could similarly make participants feel more comfortable with facing away, potentially improving the quality of memory reports.

3.4   Aims of current experiment

Firstly, in the current experiment, I aimed to collect a larger data set in order to be able to detect any medium effect sizes of witness facing away (if those are indeed present). Conducting a well-powered study in an attempt to replicate Experiment 1 would allow for more robust conclusions to be made about the presence and size of any effects. So for witness facing direction, I might again predict that facing away by the witness will enhance memory performance, compared to facing the interviewer.

Secondly, I wanted to manipulate the direction in which the interviewer faces in addition to the witness's facing direction. Although this has not been explored in the investigative interviewing context, previous literature in situations where participants are asked to look away from another person tends to show positive effects on task performance. This on its own would be an important and useful technique for investigative interviews to explore as it is quick, relatively easy and theoretically similar to what interviewers might intuitively do already (i.e., look away from the witness to help them concentrate). Therefore, I would predict that when the interviewer faces away from the witness, memory performance will be enhanced compared to when the interviewer remains facing the witness.

Perhaps the main aim of the current experiment would be to investigate the interaction between the witness's and interviewer's gaze directions. I anticipate that the potential negative effects from being observed by the interviewer during the interviewer might be negating any possible benefit from asking the witness to face away. Therefore, I might predict that facing away by the witness will be most effective at enhancing memory performance when the interviewer faces away also.

Finally, I aimed to build a rapport with all participants in Experiment 2. Rapport-building is generally recommended as part of an investigative interview, and there is reason to believe that participants might find it more comfortable to face away from the interviewer once rapport is built (as found with eye-closure in Nash et al., 2016). This might help to

create more comfortable baseline conditions for participants, in which they may be more willing to engage in the different conditions of the current experiment.

3.5 Method

3.5.1 Participants and design. A total of 128 Aston University undergraduate students (115 females, 13 males; age range 18 – 44; $M = 19.95$, $SD = 3.17$) were recruited. Power analysis showed this to be an appropriate sample size for detecting a medium-sized effect in my study design ($f = .25$), assuming $\alpha = .05$ and power = .80. Participants took part either voluntarily or in exchange for course credits. The study used a 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Interviewer gaze direction: Facing witness vs. Facing away) between-subjects design.

3.5.2 Materials. All materials were identical to those used in Experiment 1.

3.5.3 Procedure. The procedure closely followed that of Experiment 1 with the following exceptions. The first addition was rapport-building. This was done immediately after completion of the filler task, whilst participants were seated across a desk from the interviewer. The interviewer built a rapport with all participants by asking several questions (e.g., "What university course and year are you in?") in a friendly tone while ensuring to be attentive to the responses, as recommended by the Cognitive Interview (Fisher & Geiselman, 1992). Additionally, these were sometimes expanded to engage participants in further conversation (e.g., "What are your plans for the placement year?"), and the experimenter also reciprocated some information about herself, where appropriate. The rapport-building stage of the interview was not recorded or timed to allow for a more natural interaction, but it never lasted longer than five minutes.

Secondly, there was an additional manipulation of interviewer gaze direction which imitated the witness gaze direction manipulation (see Figure 1 for an example). In the "Facing away" condition, the interviewer turned her chair 180° to face away from the participant, whereas in the "Facing witness" condition, she remained facing the participant. Witness gaze direction was manipulated in the same way as in Experiment 1, whereby half

of the participants were asked to face away by turning their chair 180° around and facing a

blank wall in the "Facing away" condition, whilst the other half remained in the "Facing

interviewer" layout. Identically to Experiment 1, all participants received the same verbal

instructions regarding free recall, and regardless of condition they were again told that the

interview format was designed to help them concentrate on remembering.

Figure 1. Example demonstrating all witness gaze direction and interviewer gaze direction conditions with interviewer on the right and witness on the left in each photo

3.5.4. Data coding. All responses were coded in the same way as in Experiment 1, using the same coding scheme and blind to condition. This time, 25 randomly selected transcripts were also scored by an independent coder who was also blind to condition. Inter-rater reliability was good for free recall correct details ($r = .97$) and incorrect details ($r = .79$). Similarly, the reliability was good for responses to closed questions: correct responses ($r = .96$), incorrect responses ($r = .91$) and "Don't know" responses ($r = .99$), with an overall agreement of 91%. Therefore, the first coder's scores were retained for the analyses.

3.6   Results

3.6.1   Free Recall.

3.6.1.1 Correct details. Overall, participants recalled between 11 and 62 correct details with a mean of 30.86. Firstly, a 2 (Interviewer gaze: Facing witness vs. Facing away) x 2 (Witness gaze: Facing interviewer vs. Facing away) between-subjects ANOVA was conducted on the number of correct details reported during free recall (see Table 3 for all following analyses). There was no significant main effect of interviewer gaze, $F(1,124) = 0.04$, $p = .85$, $\eta_{p2} < .01$, or witness gaze, $F(1,124) = 0.08$, $p = .77$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 0.05$, $p = .83$, $\eta_{p2} < .01$.

3.6.1.2. Incorrect details. An ANOVA on the number of incorrect details showed no significant main effect of interviewer gaze, $F(1,124) = 0.51$, $p = .48$, $\eta_{p2} < .01$, witness gaze, $F(1,124) = 1.08$, $p = .30$, $\eta_{p2} = .01$, and again no significant interaction, $F(1,124) = 1.88$, $p = .17$, $\eta_{p2} = .01$.

3.6.1.3 Overall accuracy. The overall accuracy was calculated by dividing the number of correct details by the number of correct and incorrect details added together, per Experiment 1. As with the other analyses, an ANOVA on the overall accuracy in free recall revealed no significant main effect of interviewer gaze, $F(1,124) = 0.26$, $p = .61$, $\eta_{p2} < .01$, or witness gaze, $F(1,124) = 1.59$, $p = .21$, $\eta_{p2} = .01$, nor a significant interaction, $F(1,124) = 2.02$, $p = .16$, $\eta_{p2} = .02$.

3.6.1.4 Non-parametric analyses. As free recall variables were generally not normally distributed, I used Kruskall-Wallis tests to confirm the main effects found above. These again showed no significant effect of interviewer gaze on the number of correct details, $\chi_{2}(1) = 0.004$, $p = .95$, incorrect details, $\chi_{2}(1) = 0.54$, $p = .46$, or overall accuracy, $\chi_{2}(1) = 0.75$, $p = .39$. Similarly, there were no significant effects of witness gaze on the number of correct details, $\chi_{2}(1) = 0.01$, $p = .93$, incorrect details, $\chi_{2}(1) = 0.65$, $p = .42$, or overall accuracy, $\chi_{2}(1) = 1.13$, $p = .29$.

In summary, for free recall, neither the interviewer's nor the witness's gaze direction made any significant difference to how much correct or incorrect information participants reported, or to their overall accuracy. Of greater importance, the sizes of all of these effects were also negligible.

3.6.2 Closed Questions.

3.6.2.1 Correct responses. A 2 (Interviewer gaze: Facing witness vs. Facing away) x 2 (Witness gaze: Facing interviewer vs. Facing away) between-subjects ANOVA was carried out on the number of correct responses to the closed questions. There was no significant main effect of interviewer gaze direction, $F(1,124) = 0.73$, $p = .40$, $\eta_{p2} = .01$, or witness gaze direction, $F(1,124) = 1.17$, $p = .28$, $\eta_{p2} = .01$. There was also no significant interaction, $F(1,124) = 0.16$, $p = .69$, $\eta_{p2} < .01$.

Table 5

Mean number of details reported according to interviewer and witness gaze direction condition in Experiment 2 (standard deviations in parentheses)

		Condition			
Response type	**Interviewer gaze direction**	**Facing witness**		**Facing away**	
	Witness gaze direction	**Facing interviewer**	**Facing away**	**Facing interviewer**	**Facing away**
Free recall	Correct	30.22 (12.12)	31.16 (8.57)	30.97 (10.00)	31.09 (10.65)
	Incorrect	2.00 (1.85)	1.31 (1.40)	1.41 (1.58)	1.50 (1.59)
	Overall accuracy	0.94 (0.06)	0.96 (0.04)	0.95 (0.05)	0.95 (0.05)
Closed questions (out of 10)	Correct	6.03 (1.58)	6.44 (1.34)	5.91 (1.78)	6.09 (1.49)
	Incorrect	1.34 (1.12)	1.06 (0.98)	1.81 (1.31)	1.19 (0.82)
	Don't Know	2.59 (1.34)	2.50 (1.37)	2.28 (1.37)	2.72 (1.22)
	Overall accuracy	0.82 (0.15)	0.86 (0.12)	0.76 (0.18)	0.83 (0.13)

3.6.2.2 Incorrect responses. Another ANOVA on the number of incorrect responses to the closed questions again showed no significant main effect of interviewer gaze, $F(1,124) = 2.45$, $p = .12$, $\eta_{p2} = .02$; however, as Table 3 shows, there was a significantly higher number

of incorrect responses when the witness faced the interviewer, compared to when the witness faced away, $F(1,124) = 5.70$, $p = .02$, $\eta_{p2} = .04$. The interaction was again non-significant, $F(1,124) = 0.82$, $p = .37$, $\eta_{p2} = .01$.

3.6.2.3 "Don't know" responses. An ANOVA on the number of questions answered with "Don't know" revealed no significant main effect of interviewer gaze, $F(1,124) = 0.04$, $p = .84$, $\eta_{p2} < .01$, or witness gaze, $F(1,124) = 0.54$, $p = .47$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 1.28$, $p = .26$, $\eta_{p2} = .01$.

3.6.2.4 Overall accuracy. A between-subjects ANOVA on overall accuracy scores showed no significant main effect of interviewer gaze, $F(1,124) = 3.24$, $p = .07$, $\eta_{p2} = .03$; however, participants were significantly more accurate overall when they faced away from the interviewer than when they were facing them, $F(1,124) = 5.32$, $p = .02$, $\eta_{p2} = .04$. The interaction was non-significant, $F(1,124) = 0.23$, $p = .63$, $\eta_{p2} < .01$.

3.6.2.5 Non-parametric analyses. As incorrect responses and overall accuracy in closed questioning were not normally distributed, I used Kruskall-Wallis tests to confirm the main effects found above. The tests confirmed no significant effect of interviewer gaze direction on the number of incorrect responses, $\chi_2(1) = 2.57$, $p = .11$, or overall accuracy, $\chi_2(1) = 2.85$, $p = .09$. Similarly, the tests confirmed the significant effect of witness gaze direction on incorrect responses, $\chi_2(1) = 4.37$, $p = .04$. However, the effect of witness gaze on overall accuracy was no longer significant, $\chi_2(1) = 3.72$, $p = .05$.

On the whole, only the witness gaze manipulation had a somewhat positive impact on the responses to closed questions. Those participants who faced the interviewer answered more questions incorrectly and were less accurate overall in their responses (although the latter effect did not hold when analysed using a non-parametric test). In contrast, the direction of the interviewer's gaze had no significant impact on any of the response types.

3.6.3   Additional Analyses.

3.6.3.1   Rapport. Next, I examined rapport ratings provided by the participants, to see whether the witness and interviewer gaze manipulations affected their perceptions of the interviewer and the interaction. As in Experiment 1, scores on two items regarding the interviewer were firstly reverse coded and then all scores on the nine items regarding the interviewer were summed to produce one total score for each participant. As seen in Table 4, a 2 (Interviewer gaze: Facing witness vs. Facing away) x 2 (Witness gaze: Facing interviewer vs. Facing away) between-subjects ANOVA on these interviewer scores revealed no significant main effect of interviewer gaze direction, $F(1,124) = 0.00$, $p = .97$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,124) = 0.11$, $p = .75$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 0.85$, $p = .36$, $\eta_{p2} = .01$.

For the interaction scores, scores on nine negatively worded items were firstly reverse coded and then all 18 items were summed to produce a single total score for each participant[3]. A 2 (Interviewer gaze: Facing witness vs. Facing away) x 2 (Witness gaze: Facing interviewer vs. Facing away) on these interaction scores showed no significant main effects of interviewer gaze, $F(1,124) = 0.03$, $p = .86$, $\eta_{p2} < .01$; or witness gaze, $F(1,124) = 0.05$, $p = .82$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 1.13$, $p = .29$, $\eta_{p2} = .01$.

Overall, neither the interviewer nor witness gaze manipulations affected participants' perceptions of rapport. These results give some indication that perhaps levels of rapport with the interviewer were not significantly affected by where the witness or the interviewer was facing during the interview.

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[3] In Experiment 3, to increase the reliability of this interaction scale, I collected only seven of the 18 items, following analysis used by Vallano and Schreiber Compo (2011) who originated this measure. When I retrospectively analysed the Experiment 2 data using only those same seven items rather than the full set of 18, the reliability of the subscale was considerably better ($\alpha = .85$), but the results were unchanged.

Table 6

Mean rapport ratings according to interviewer and witness gaze direction conditions in Experiment 2 (standard deviations in parentheses)

	Condition			
Interviewer gaze direction	**Facing witness**		**Facing away**	
Witness gaze direction	**Facing interviewer**	**Facing away**	**Facing interviewer**	**Facing away**
Interviewer	48.41 (8.07)	49.13 (5.76)	49.56 (6.62)	48.06 (6.57)
Interaction	94.22 (11.73)	95.69 (10.50)	95.78 (8.62)	93.50 (8.64)

3.6.3.2 ***Brief Social Phobia Scale.*** Similarly to Experiment 1, I looked at whether participants ranged on the pre-existing trait of social phobia. A 2 (Interviewer gaze: Facing witness vs. Facing away) x 2 (Witness gaze: Facing interviewer vs. Facing away) ANOVA on the total ratings of social phobia was conducted (see Table 5 for all following analyses), which revealed no significant main effects of interviewer gaze direction, $F(1,124) < 0.01$, $p = .96$, $\eta_{p2} < .01$, or witness gaze direction – $F(1,124) = 2.91$, $p = .09$, $\eta_{p2} = .02$, nor interaction ($F(1,124) = 0.05$, $p = .82$, $\eta_{p2} < .01$. Consequently, the sample did not significantly vary on their levels of social phobia between the different conditions.

3.6.3.3 *Situational Self-Awareness*. Then, a 2 (Interviewer gaze: Facing vs. Facing away) x 2 (Witness gaze: Facing vs. Facing away) between-subjects ANOVA on the ratings of situational self-awareness was conducted for each subscale in turn. Firstly, for private self-awareness, there were no significant main effects of interviewer gaze direction, $F(1,124) = 0.10$, $p = .75$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,124) = 0.13$, $p = .72$, $\eta_{p2} < .01$. There was also no significant interaction, $F(1,124) = 0.46$, $p = .50$, $\eta_{p2} < .01$. For public self-awareness, again there were no significant main effects of interviewer gaze direction, $F(1,124) = 0.17$, $p = .68$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,124) = 0.11$, $p = .74$. $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 0.24$, $p = .62$, $\eta_{p2} < .01$. Finally, for self-

awareness of surroundings, there was a significant main effect of interviewer gaze direction, $F(1,124) = 9.19$, $p = .003$, $\eta_{p2} = .07$, with higher scores when the interviewer was facing the witness compared to interviewer facing away. However, there was no significant main effect of witness gaze direction, $F(1,124) = 0.91$, $p = .34$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 1.02$, $p = .31$, $\eta_{p2} < .01$.

In summary, the interviewer and witness gaze direction conditions only seemed to affect the self-awareness of surroundings subscale, with participants being more self-aware when the interviewer was facing them compared to when the interviewer was facing away.

Table 7
Mean scores for social phobia and situational self-awareness across the interviewer and witness gaze direction conditions in Experiment 2 (standard deviations in parentheses)

Measure		**Condition**			
	Interviewer gaze direction	**Facing witness**		**Facing away**	
	Witness gaze direction	**Facing interviewer**	**Facing away**	**Facing interviewer**	**Facing away**
Social Phobia		24.56 (7.38)	28.00 (11.00)	24.88 (11.27)	27.50 (10.08)
Situational Self-Awareness	Private	10.50 (3.61)	11.22 (4.11)	10.75 (4.20)	10.53 (3.66)
	Public	10.31 (4.54)	10.97 (4.42)	10.38 (4.33)	10.25 (4.65)
	Surroundings	13.97 (3.04)	14.00 (2.93)	12.81 (3.67)	11.69 (3.26)

3.7   Rapport across Experiments 1 and 2

Rapport-building is a standard recommendation for all investigative interviews (e.g., Vallano & Schreiber Compo, 2015), and based on our previous findings with eye-closure (Nash et al., 2016), I anticipated that participants might feel more comfortable facing away from the interviewer when rapport is built first. In Experiment 1, I found no evidence of a witness facing-away benefit; in Experiment 2, I took greater efforts to build rapport and found some minimal evidence of a facing-away benefit during closed questioning. As I did not build a rapport in Experiment 1 but I did in Experiment 2, it is possible that rapport-building could be

enhancing any possible effects of facing away. I wanted to investigate this potential difference further by comparing effects of rapport-building across Experiments 1 and 2. So I combined the data from the two experiments creating a 2 (Witness gaze: Facing vs. Facing away) x 2 (Rapport-building: Rapport vs. No rapport) between-subjects design (combined N = 170).

However, firstly there were concerns that the data from the two experiments were collected at two different time points and therefore any number of extraneous variables could be affecting results due to the lack of randomisation. Specifically, the data were collected at different points in the academic year, and this could reflect students' general motivation to engage with and complete given tasks. All students received research credits for their participation, which they collect as part of their degree, so it could be that those who participated at the beginning of the year are generally more conscientious and motivated beyond my manipulation. To get a better idea of this, I compared the number of correct responses participants gave on the arithmetic filler task (out of 20) between the two experiments (in Experiment 2, the arithmetic task was completed before rapport-building took place). If participants at the beginning of year are indeed more motivated, then I might expect to see a difference here with higher scores for one experiment compared to the other. Of course, this is not a direct way to measure participants' motivation and may not be a reliable indication, but these analyses designed to compare effects of rapport between Experiments 1 and 2 were conducted after data collection as a way to explore an idea further. As the data did not meet the required assumptions for parametric analyses, I conducted a Mann-Whitney test on the number of correct responses to arithmetic questions. This showed no significant difference between the two experiments, U = 1612.00, p = .24. Note that the total N = 130 for this test (42 for Experiment 1, which involved no rapport-building, and 88 for Experiment 2, which involved rapport-building) due to some missing participant IDs. Therefore, I can be somewhat more confident that participants' motivation to do well was similar in Experiments 1 and 2 since the two groups did not perform significantly differently on the arithmetic task.

Next, I wanted to check that the rapport manipulation had the intended effect and that participants' rapport ratings of interviewer and interaction were indeed higher when it was built compared to when it was not. An independent samples t-test on the total interviewer ratings showed that these were significantly higher for when rapport was built in Experiment 2 ($M = 48.79$; $SD = 6.75$) than when it was not built in Experiment 1 ($M = 43.02$; $SD = 7.55$), $t(168) = 4.66$, $p < .001$, $d = 0.82$ [0.47, 1.19]. Similarly, when looking at the total interaction ratings, these were significantly higher when rapport was built ($M = 37.59$; $SD = 6.04$) compared to when it was not built ($M = 32.86$; $SD = 6.64$), $t(168) = 4.29$, $p < .001$, $d = 0.76$ [0.41, 1.12]. Therefore, I can be confident that the manipulation did have the desired effect in eliciting rapport and therefore I can continue with the following analyses.

3.7.1   Free Recall. To test whether rapport-building and witness gaze direction have any separate or combined effects on details reported during free recall, the combined data across two experiments were analysed using several between-subjects ANOVAs (see Table 6 for all following analyses).

3.7.1.1 Correct details. Firstly, a 2 (Witness gaze: Facing vs. Facing away) x 2 (Rapport-building: Rapport vs. No Rapport) between-subjects ANOVA was carried out on the number of correct details recalled. This showed no significant main effects of rapport-building, $F(1,169) = 1.05$, $p = .31$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,169) = 0.19$, $p = .67$, $\eta_{p2} < .01$, nor was there a significant interaction, $F(1,169) = 0.59$, $p = .45$, $\eta_{p2} < .01$.

3.7.1.2 *Incorrect details*. Then, a between-subjects ANOVA on the number of incorrect details revealed a significant main effect of rapport-building, $F(1,169) = 9.66$, $p = .002$, $\eta_{p2} = .06$, whereby participants recalled a significantly lower number of incorrect details when rapport was built compared to no rapport. However, there was no main effect of witness gaze direction, $F(1,169) = 0.48$, $p = .49$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,169) = 0.01$, $p = .93$, $\eta_{p2} < .01$.

3.7.1.3 *Overall accuracy*. Lastly, another between-subjects ANOVA on overall accuracy again showed that there was a significant main effect of rapport, $F(1,169) = 6.70$, $p = .01$, η_{p2} = .04, with participants achieving a higher overall accuracy when rapport was built compared to no rapport. However, there was no significant main effect of witness gaze direction, $F(1,169) = 0.61$, $p = .44$, $\eta_{p2} < .01$, or interaction, $F(1,169) = 0.20$, $p = .66$, $\eta_{p2} < .01$.

3.7.1.4 *Non-parametric analyses*. As the free recall variables were again generally non-normally distributed, I carried out a number of Kruskall-Wallis tests to confirm the results above. Firstly, the non-significant effect of rapport-building on the number of correct details was confirmed, $\chi_2(1) = 1.67$, $p = .20$. Then, the tests also confirmed the significant effects of rapport-building on the number of incorrect details, $\chi_2(1) = 11.79$, $p = .001$, and overall accuracy, $\chi_2(1) = 6.59$, $p = .01$, and these effects were in the same direction as the analyses above, indicating benefits of rapport-building. Next, the tests confirmed no significant effect of witness gaze direction, on the number of correct details, $\chi_2(1) = 0.10$, $p = .75$, incorrect details, $\chi_2(1) = 0.80$, $p = .37$, or overall accuracy, $\chi_2(1) = 1.69$, $p = .19$.

Overall, the tests showed a benefit to free recall with a lower number of incorrect details recalled and a higher overall accuracy when rapport was built in Experiment 2. However, there was no effect of witness gaze direction and no significant interaction between the two variables.

Table 8

Mean number of details reported according to rapport and witness gaze direction condition across Experiments 1 and 2 (standard deviations in parentheses)

		Condition			
	Witness gaze direction	Facing interviewer		Facing away	
Response type	Rapport condition	Rapport	No rapport	Rapport	No rapport
Free recall	Correct	30.52 (11.08)	31.11 (9.59)	33.71 (9.53)	31.57 (8.54)
	Incorrect	1.19 (1.31)	1.00 (1.30)	1.90 (1.55)	1.76 (1.34)
	Overall accuracy	0.96 (0.04)	0.97 (0.03)	0.95 (0.04)	0.95 (0.05)
Closed questions (out of 10)	Correct	5.97 (1.67)	6.27 (1.42)	6.33 (1.71)	5.76 (1.92)
	Incorrect	1.58 (1.23)	1.13 (0.90)	1.29 (1.01)	1.81 (1.60)
	Don't Know	2.44 (1.36)	2.61 (1.29)	2.38 (1.20)	2.43 (1.33)
	Overall accuracy	0.79 (0.16)	0.85 (0.13)	0.82 (0.14)	0.76 (0.20)

3.7.2 Closed Questions.

3.7.2.1 Correct responses. Next, I examined responses to closed questions. A 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Rapport-building: Rapport vs. No Rapport) between-subjects ANOVA on the number of correct responses revealed no significant main effects of rapport-building, $F(1,169) = 0.06$, $p = .81$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,169) = 0.23$, $p = .63$, $\eta_{p2} < .01$, nor was there a significant interaction, $F(1,169) = 2.28$, $p = .13$, $\eta_{p2} = .01$.

3.7.2.2 *Incorrect responses*. Another between-subjects ANOVA on the number of incorrect responses again showed no significant main effects of rapport-building, $F(1,169) = 0.93$, $p = .34$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,169) = 0.03$, $p = .86$, $\eta_{p2} < .01$. However, there was a significant interaction, $F(1,169) = 5.74$, $p = .02$, $\eta_{p2} = .03$, suggesting that when rapport was built, facing away by the witness led to a lower number of incorrect responses compared to when they faced the interviewer. On the other hand, when rapport was not built, there was no significant effect of witness facing away.

3.7.2.3 *"Don't know" responses*. Next, for the number of "Don't know" responses, there were no significant main effects of rapport-building, $F(1,169) = 0.26$, $p = .61$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,169) = 0.22$, $p = .64$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,169) = 0.07$, $p = .79$, $\eta_{p2} < .01$.

3.7.3.4 *Overall accuracy*. Finally, I looked at the overall accuracy by conducting another between-subjects ANOVA. This revealed no significant main effects of rapport-building, $F(1,169) = 0.91$, $p = .34$, $\eta_{p2} < .01$, or witness gaze direction, $F(1,169) = 0.006$, $p = .94$, $\eta_{p2} < .001$. However, there was a significant interaction, $F(1,169) = 5.05$, $p = .03$, $\eta_{p2} = .03$, suggesting that when rapport was built, participants had a higher overall accuracy when facing away compared to when they faced the interviewer. However, when rapport was not built, there was no significant effect of witness facing direction on recall.

3.7.3.5 *Non-parametric analyses*. Incorrect responses and overall accuracy were again non-normally distributed so I used Kruskall-Wallis tests to confirm main effects found in the previous analyses. These tests, however, cannot test the interaction between the variables so the significant results from the main analyses should be interpreted with caution.

Firstly, Kruskall-Wallis tests confirmed no significant effect of rapport-building on the number of incorrect responses, $\chi_2(1) = 0.55$, $p = .46$, or overall accuracy $\chi_2(1) = 0.68$, $p = .41$ in closed questions. Similarly, there was no effect of witness gaze direction on the number of incorrect responses, $\chi_2(1) = 1.84$, $p = .18$. or overall accuracy, $\chi_2(1) = 1.79$, $p = .18$.

Overall, it seems that I was only able to see some benefits of facing away by the witness when rapport was built. These beneficial effects were present in incorrect responding and overall accuracy, similarly to Experiment 2.

Overall, rapport-building had some advantage in free recall, which is supportive of some of the previous research on rapport (e.g., Vallano & Schreiber Compo, 2011). Furthermore, there was a significant interaction of rapport-building and witness gaze direction for incorrect responses and overall accuracy in closed questioning, whereby facing

away was more beneficial to recall compared to facing the interviewer when rapport was built. This is in line with the findings in Experiment 2, where I found the same benefit to incorrect responses and overall accuracy in closed questioning, and with my anticipation that rapport-building could be having an effect on recall. Interestingly, these results are at a disagreement with our previous findings which showed no significant interaction between rapport-building and witness eye-closure (Nash et al., 2016).

These findings provide us with some initial indication that perhaps one of the reasons I was able to see some benefit of facing away by the witness in Experiment 2 was because participants had a good rapport with the interviewer. It may be that each effect was not large enough to influence recall on its own, and instead rapport-building could be enhancing any possible effects of facing away. However, the analyses carried out in this section were exploratory in nature and not planned before beginning of data collection. One of the main concerns was that participants were not randomised to conditions so any number of variables could have affected the results. In particular, participants could vary on their levels of engagement with the tasks or motivation from being recruited at different points in the academic year. Although I attempted to check that the samples were similar in terms of their task engagement and performance before combining the datasets, it was not a direct measure and it would be more reliable to look at rapport-building and witness gaze direction within one experiment. Overall, interpreting these results should be done with caution, particularly in regards to whether the significant interactions in closed questioning are due to rapport-building or other factors that differed between the two experiments.

Therefore, a more controlled test of these effects is required to ensure participants are recruited at the same time of the academic year and are tested within one sample. Exploring these questions further would be valuable in practice as it could offer some insight into enhancing eyewitness recall further. Gaze aversion is often recommended as an alternative for eye-closure within the Cognitive Interview manuals (e.g., Milne, 2004), if the witness does not feel comfortable closing their eyes, but it has not been questioned whether

gaze aversion is any more comfortable itself and whether it requires additional support from the interviewer, for example in the form of rapport-building.

3.8   Discussion

The current experiment examined the extent to which facing away by the witness might benefit witnesses' memory performance during mock investigative interviews, whilst simultaneously having the interviewer face the witness or face away. There were small benefits of facing away, with witness gaze aversion being somewhat beneficial only during closed questioning - participants who faced away from the interviewer tended to provide fewer incorrect responses and they were able to achieve a higher overall accuracy. However, against my predictions, I did not find a significant effect of facing away by the witness during free recall, and similarly there was no effect of interviewer facing away on any kind of recall.

One of the main aims of the current experiment was to improve robustness of my conclusions from Experiment 1 by conducting a better powered study. Low power reduces the chance of discovering a true effect and leads to an increased rate of false negative effects, compared to high-powered studies (Button et al., 2013). So I wanted to ensure that the current experiment was adequately powered to detect an effect of facing away, if one truly exists. Indeed, this time I was able to find some beneficial effects during closed questioning. These effects are in the same direction as much of the previous literature on gaze aversion, showing more accurate overall performance when averting gaze (e.g., Doherty-Sneddon et al., 2001; Markson & Paterson, 2009). However, these positive effects should be interpreted with caution as, despite being significant, they are still small effects and are not present in free recall. Ideally, these findings in closed questioning should be replicated to ensure that this is a meaningful effect that could have some benefit in practice.

The second aim of Experiment 2 was to test the idea that being observed by the interviewer may negate any positive effects of facing away by the witness, therefore being a possible reason for the null findings in Experiment 1. I predicted that facing away by the interviewer would enhance recall on its own, and that recall would be best when both the

witness and the interviewer face away simultaneously. These predictions were based on previous research into situations where participants perform a task while being watched by someone else (usually the experimenter) and generally show a decline in performance compared to performing the same task, for example, alone (e.g., Belletier et al., 2015; Helminen et al., 2016). As I did not find an interaction between interviewer and witness gaze direction, Experiment 2 provides some evidence that the lack of overall benefit from asking the witness to face away in Experiment 1 and 2 was unlikely due to being aware of another person's observation. Furthermore, interviewer gaze direction did not consistently affect participants' situational self-awareness scores or rapport between the witness and the interviewer, perhaps suggesting that where the interviewer was facing did not cause significant interference in their performance.

The fact that, in the current experiment, I found no effect of interviewer gaze at all is an interesting and unexpected finding in itself. Wagstaff et al. (2008) conducted similar research whereby additional observers were present during a witness's recall, as part of a mock investigative interview, as well as the interviewer. Although they found negative effects as the number of observers increased, they did not look at free recall and the interviewer was not considered to be an observer. So mine is the first study to investigate interviewer gaze during an eyewitness interview, and perhaps, with only the interviewer present, recall might not be negatively affected to the extent that I predicted. More research would be required to explore and confirm these findings further. However, the apparent lack of interference from the interviewer's observation might be useful knowledge in practice, where the interviewer might otherwise intuitively feel that looking away from the witness would lead to better concentrate on the task.

The final aim of Experiment 2 was to build a rapport with participants as it is standard practice recommended for investigative interviews, whilst also attempting to make participants feel more at ease with the different facing conditions. In our previous research with eye-closure, we found that participants felt more comfortable closing their eyes when rapport was built first (Nash et al., 2016). I expected that the same might happen with facing

away as the two techniques have similar theoretical background. Indeed, this time I did find some benefit of witness facing away in closed questioning, which could be attributed to rapport-building. However, as rapport-building was not manipulated in Experiment 2 and instead it was built with all participants, I would be unable to determine its precise contribution to the positive memory effects in closed questioning. From combining the data from Experiments 1 and 2 and comparing the effects of rapport-building on recall across the experiments, I had some indication that building a rapport with participants did have some positive effect on their memory performance. However, as this was only an exploratory analysis that I did not plan prior to data collection, there were some confounding variables such as collecting data at different times of the academic year for the two experiments, which need to be controlled for before drawing any certain conclusions.

In conclusion, in the current experiment, I found only minimal effects of facing away by the witness on their memory performance with some benefit during closed questioning. Moreover, this was not affected by the interviewer's gaze direction. Some of the reasons why I was able to detect these small benefits could be due to the higher power of Experiment 2 and/or the presence of rapport-building. However, rapport was built with all participants (without a control condition) leaving us unable to determine its effect on recall for certain.

Chapter 4: Investigating the effects of witness gaze direction and rapport-building on memory performance

In Experiments 1 and 2, against my predictions, I found very minimal benefit of asking the witness to face away from the interviewer during a mock investigative interview. I explored this effect by firstly looking at witness facing away alone in Experiment 1, and then in combination with facing away by the interviewer and rapport-building in Experiment 2. The latter two variables were added to explore some theoretical and practical reasons for why facing away by the witness may not have benefited memory performance in Experiment 1, despite my hypotheses being grounded in previous similar literature. In Experiment 2, when I took greater efforts to build rapport, I found some very weak evidence of a facing-away benefit within closed questioning only, and only in terms of the recall of incorrect information. Since rapport-building is often recommended for its benefits in investigative interviewing (Abbe & Brandon, 2014), it may be that building a rapport with participants could enhance any possible effects of facing away. In Chapter 3, we saw some indication of this in the form of an interaction between rapport-building and witness gaze direction during closed questioning when the data from Experiments 1 and 2 were combined. In Experiment 3, I decided to test the possible effects of rapport-building more directly.

Specifically, here the interviewer built rapport with half of the participants prior to their interview, and made no efforts to build rapport with the other half; simultaneously half of the participants in each rapport condition were asked to face away from the interviewer during the interview, and the other half remained facing the interviewer. To further strengthen the robustness of the conclusions, the protocol and analytic plan for Experiment 3 were pre-registered. Completing a pre-registration offers transparency in how the data were collected and analysed as the protocol is specified prior to data collection. This process allows to distinguish between confirmatory and exploratory analyses in the paper, helping to reduce reporting bias, whereby some results that are not desirable might be omitted from the paper. In addition, a pre-registration clearly demonstrates that the researchers thought about their

data analyses prior to seeing the data, reducing the chances of p-hacking and other bad scientific practices (see van 't Veer & Giner-Sorolla, 2016 for a further discussion on benefits of pre-registration). Overall, pre-registrations encourage a prioritisation of theory and method over results, which in turn can promote publication of null findings and reduce publication bias.

As already described in Chapter 1, rapport-building appears to be a useful tool, recommended in real-world investigative interviews. Although recently there has been some doubt over the consistency of rapport-building effects (see Vallano & Schreiber Compo, 2015 for a review), there is some evidence that rapport-building can enhance witness performance in adults in free recall (e.g., Vallano & Schreiber Compo, 2011) and closed questioning (Nash et al., 2016), in children (e.g., Roberts et al., 2004), and also in more high-risk interviews such as those with suspects (e.g., Meissner et al., 2015). Therefore, it would be reasonable to investigate the idea that the presence of rapport-building could contribute to some memory benefits I found in Experiment 2.

Furthermore, in our previous research (Nash et al., 2016) where we explored the effects of both rapport-building and eye-closure on witness recall, we had some indication that participants were more comfortable closing their eyes in front of the interviewer when rapport was built, compared to when there was no rapport. It is worth noting that in that study, although both rapport-building and eye-closure enhanced recall separately, we did not find an interaction that we expected (i.e., rapport-building did not affect the size of the eye-closure effect). Nevertheless, it could be a useful indication that rapport-building might be needed to ensure participants are comfortable with a manipulation such as facing away from the interviewer.

4.1   Aims of current experiment

Firstly, I aimed to test the effect of witness facing direction again. Replication of findings is important in order to achieve the most robust conclusions that are not due to random variation and provide us with an accurate size of the effect in question (Zwaan, Etz, Lucas, &

Donnellan, 2018). Based on previous literature, I might again predict that facing away by the witness will enhance witness memory performance compared to facing the interviewer.

Secondly, I aimed to replicate my own and other previous literature findings on the generally positive effects of rapport-building for witness recall. I might predict that building a rapport with participants will enhance memory performance compared to no-rapport.

Finally, the main aim was to test the interaction between witness facing direction and rapport-building. It may be the case that facing away by the witness is somewhat beneficial (at least during closed questioning) only when rapport is built with the witness first. Therefore, I might predict recall to be at its best when participants face away from the interviewer and rapport-building is present.

4.2   Method

4.2.1   Participants and design. A total of 128 Aston University students (107 females, 18 males, 3 did not specify their gender; age range 18 – 26; $M = 19.05$, $SD = 1.22$) participated in the experiment. Power analysis showed this to be an appropriate sample size to detect a medium-sized effect ($f = .25$) in the current study design, using $α = .05$ and power $= .80$. Participants took part either voluntarily or in exchange for course credits, and the study used a 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Rapport-building: Rapport vs. No rapport) between-subjects design.

4.2.2   Materials. All materials were identical to those used in Experiments 1 and 2 with the following exceptions. Firstly, in the current experiment, a different silent film-clip, 1 min 37 sec in length, was used. It depicted a bank robbery whereby a male threatens people with a gun inside a bank office and leaves once he fills his bag behind the counter.

Secondly, for the interaction subscale of the rapport measure, I collected only seven of the original 18 items (cooperative, harmonious, involving, friendly, active, positive, worthwhile), following the analysis approach used by Vallano and Schreiber Compo (2011) who originated this measure. Using this shorter subscale also had the benefit of increasing

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its internal reliability (with Cronbach's α increasing to .90 in this sample). For the interviewer subscale of the rapport measure, all nine items were included as before.

4.2.3 Procedure. The study was pre-registered using AsPredicted.org; the protocol can be seen at http://aspredicted.org/blind.php?x=6wr7bg. The procedure again closely followed that of Experiment 1 with the exception that I also manipulated rapport-building between-subjects. For half of participants within each witness gaze direction condition, the interviewer built a rapport in the same manner as in Experiment 2, whereas for the other half of participants the procedure was identical to that of Experiment 1, whereby the interviewer made no explicit effort to build rapport.

4.2.4 Data coding. All responses were coded in the same way as for Experiments 1 and 2, blind to condition, but using a new coding template created for the new crime film, again listing over 150 details. A total of 25 randomly selected transcripts were scored by an independent coder who was also blind to the experimental conditions. Inter-rater reliability was good for free recall: correct ($r = .96$) and incorrect details ($r = .85$). Reliability was similarly good for closed questions: correct ($r = .97$), incorrect ($r = .98$) and "Don't know" responses ($r = 1.00$), with an overall agreement of 95%. Therefore, the first coder's scores were retained for the analyses.

4.3   Results

4.3.1 Rapport manipulation check. I firstly checked whether rapport-building had the intended effect, by looking at participants' total ratings of the interviewer (maximum possible score = 63) and the interaction (maximum possible score = 49) in turn. As shown in Table 7, a 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Rapport-building: Rapport vs. No rapport) between-subjects ANOVA showed that participants in the rapport condition gave significantly higher ratings of the interviewer than did those in no rapport condition, $F(1,124) = 6.96$, $p = .01$, $\eta_{p2} = .05$. Witness gaze direction, on the other hand, had no significant effect on ratings of the interviewer, $F(1,124) = 0.60$, $p = .44$, $\eta_{p2} < .01$, and

there was no interaction between the two independent variables, $F(1,124) = 0.21$, $p = .65$, η_{p2} < .01.

Next, looking at participants' ratings of the interaction, an ANOVA revealed that participants in the rapport condition gave significantly higher ratings than did those in the no rapport condition, $F(1,124) = 9.17$, $p < .01$, $\eta_{p2} = .07$. Again, there was no significant main effect of witness gaze direction, $F(1,124) = 0.11$, $p = .74$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 1.17$, $p = .28$, $\eta_{p2} < .01$. In sum, the rapport manipulation was effective, and participants rated both the interviewer and the interaction more positively overall when rapport had been built. However, similarly to my previous findings, witness gaze direction had no statistically significant effect on perceptions of rapport.

Table 9

Mean rapport ratings according to interviewer and witness gaze conditions in Experiment 3 (standard deviations in parentheses)

Rapport-building	Condition			
	Rapport		**No rapport**	
Witness gaze condition	**Facing interviewer**	**Facing away**	**Facing interviewer**	**Facing away**
Interviewer	48.44 (7.71)	48.88 (6.99)	44.19 (8.57)	45.88 (7.74)
Interaction	39.72 (6.16)	38.84 (6.01)	34.91 (6.76)	36.56 (7.46)

4.3.2 Free recall.

4.3.2.1 Correct details. Overall, participants recalled between 17 and 55 correct details with a mean of 33.09. I firstly tested whether witness gaze direction and rapport-building had any separate or combined effects on free recall. The results of these analyses are shown in Table 8. A 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Rapport-Building: Rapport vs. No rapport) between-subjects ANOVA on the number of correct details reported during free recall showed no significant main effects of witness gaze direction, $F(1,124) = 2.48$, $p = .12$, $\eta_{p2} = .02$, or rapport-building, $F(1,124) = 0.17$, $p = .68$, $\eta_{p2} < .01$. Additionally, there was no significant interaction, $F(1,124) = 0.01$. $p = .93$, $\eta_{p2} < .01$.

4.3.2.2 Incorrect details. Looking at the number of incorrect details during free recall, there was no significant main effect of witness gaze direction, $F(1,124) = 1.14$, $p = .29$, $\eta_{p2} = .01$, or rapport, $F(1,124) = 0.02$, $p = .88$, $\eta_{p2} < .01$. Additionally, there was no significant interaction, $F(1,124) = 0.07$, $p = .80$, $\eta_{p2} < .01$.

4.3.2.3 Overall accuracy. Finally, I examined overall accuracy; an ANOVA revealed no significant main effects of witness gaze direction, $F(1,124) = 0.24$, $p = .63$, $\eta_{p2} < .02$, or rapport, $F(1,124) = 0.07$, $p = .79$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 0.05$, $p = .82$, $\eta_{p2} < .01$.

4.3.2.4 Non-parametric analyses. As incorrect details and overall accuracy during free recall were not normally distributed, I conducted Kruskall-Wallis tests to confirm the main effects found above. The tests confirmed no significant effect of witness gaze on incorrect details, $\chi_2(1) = 0.52$, $p = .47$, or overall accuracy, $\chi_2(1) = 0.02$, $p = .90$. Similarly, I again confirmed no significant effect of rapport-building on incorrect details, $\chi_2(1) = 0.16$, $p = .69$, or overall accuracy, $\chi_2(1) = 0.28$, $p = .60$.

4.3.3   Closed questions.

4.3.3.1 Correct responses. As Table 8 shows, a 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Rapport-building: Rapport vs. No rapport) between-subjects ANOVA on the number of correct responses to closed questions revealed no significant main effects of either witness gaze direction, $F(1,124) = 1.87$, $p = .17$, $\eta_{p2} = .01$, or rapport-building, $F(1,124) = 3.23$, $p = .08$, $\eta_{p2} = .03$, nor a significant interaction effect, $F(1,124) = 1.16$, $p = .28$, $\eta_{p2} = .01$.

Table 10

Mean number of details reported according to rapport and witness gaze condition in Experiment 3 (standard deviations in parentheses)

		Condition			
Response type	Witness gaze direction	Facing interviewer		Facing away	
	Rapport condition	Rapport	No rapport	Rapport	No rapport
Free recall	Correct	31.53 (7.88)	32.28 (8.62)	34.03 (8.86)	34.53 (8.73)
	Incorrect	2.25 (1.57)	2.13 (1.50)	2.50 (1.80)	2.53 (2.05)
	Overall accuracy	0.93 (0.05)	0.94 (0.04)	0.93 (0.05)	0.93 (0.05)
Closed questions (out of 10)	Correct	6.19 (1.12)	6.03 (1.23)	6.13 (1.29)	5.50 (1.27)
	Incorrect	2.53 (1.34)	2.63 (1.10)	2.28 (1.49)	2.91 (1.65)
	Don't Know	1.28 (1.05)	1.34 (0.87)	1.59 (1.13)	1.59 (1.21)
	Overall accuracy	0.72 (0.14)	0.70 (0.12)	0.74 (0.15)	0.67 (0.18)

4.3.3.2 Incorrect responses. An ANOVA on the number of incorrect responses to closed questions revealed no significant main effects of witness gaze direction, $F(1,124) = 0.00$, $p = .95$, $\eta_{p2} < .01$, or rapport-building, $F(1,124) = 2.08$, $p = .15$, $\eta_{p2} = .02$. Additionally, there was no significant interaction, $F(1,124) = 1.14$, $p = .29$, $\eta_{p2} < .01$.

4.3.3.3 "Don't know" responses. Next, I examined the number of "Don't know" responses to closed questions. Again, there was no significant main effect of witness gaze direction, $F(1,124) = 2.19$, $p = .14$, $\eta_{p2} = .02$, or rapport-building, $F(1,124) = 0.03$, $p = .87$, $\eta_{p2} < .01$, nor a significant interaction, $F(1,124) = 0.03$, $p = .87$, $\eta_{p2} < .01$.

4.3.3.4 Overall accuracy. Finally, for closed questions, I looked at overall accuracy by again dividing the number of correct responses by the total number of correct and incorrect responses. An ANOVA showed no significant main effect on accuracy of witness gaze direction, $F(1,124) = 0.05$, $p = .82$, $\eta_{p2} < .01$, or rapport-building, $F(1,124) = 2.95$, $p = .09$, $\eta_{p2} = .02$, and there was no significant interaction, $F(1,124) = 0.86$, $p = .36$, $\eta_{p2} < .01$.

4.3.4 Additional analyses.

4.3.4.1 Brief Social Phobia Scale. As Table 9 illustrates, a 2 (Witness gaze direction: Facing interviewer vs. Facing away) x 2 (Rapport-building: Rapport vs. No rapport) between-subjects ANOVA showed no significant main effects of witness gaze, $F(1,124) = 0.01$, $p = .92$, $\eta_{p2} < .01$, or rapport, $F(1,124) = 0.97$, p = .33, $\eta_{p2} < .01$, and there was no significant interaction, $F(1,124) = 0.63$, $p = .43$, $\eta_{p2} < .01$. This suggests that participants did not significantly vary on the trait levels of social phobia according to experimental condition.

4.3.4.2 Situational Self-Awareness. A 2 (Witness gaze direction: Facing vs. Facing away) x 2 (Rapport-building: Rapport vs. No rapport) between-subjects ANOVA was conducted on each of the situational self-awareness subscales in turn. Firstly, looking at private self-awareness, there were no significant main effects of witness gaze direction, $F(1,124) = 1.08$, $p = .30$, $\eta_{p2} < .01$, or rapport-building, $F(1,124) = 0.02$, $p = .89$, $\eta_{p2} < .001$. Additionally, there was no significant interaction, $F(1,124) = 0.59$, $p = .45$, $\eta_{p2} < .01$. Then, for public self-awareness, there was no significant effect of witness gaze direction, $F(1,124) = 2.61$, $p = .11$, $\eta_{p2} = .02$, or rapport-building, $F(1,124) = 0.01$, $p = .92$, $\eta_{p2} < .001$. However, there was a significant interaction, $F(1,124) = 4.95$, $p = .03$, $\eta_{p2} = .04$, whereby when rapport was not built, those who faced the interviewer had higher levels of public self-awareness compared to those to faced away. In contrast, when rapport was built with participants, there were no significant differences between the witness gaze direction conditions for public self-awareness. Finally, looking at awareness of surroundings, there were no significant main effects of witness gaze direction, $F(1,124) = 2.76$. $p = .10$, $\eta_{p2} = .02$, or rapport-building, $F(1,124) = 0.53$, $p = .47$, $\eta_{p2} < .01$, and there was no significant interaction, $F(1,124) = 0.17$, $p = .68$, $\eta_{p2} < .01$. Overall, the witness gaze direction and rapport-building manipulations only seemed to affect the public self-awareness subscale here, with participants being more aware of the public situation when they faced the interviewer (compared to facing away), when rapport was not built.

Table 11

Mean scores for social phobia and situational self-awareness across the witness gaze and rapport-building conditions in Experiment 3 (standard deviations in parentheses)

Measure		Condition			
	Rapport-building	Rapport		No rapport	
	Witness gaze direction	Facing interviewer	Facing away	Facing interviewer	Facing away
Social Phobia		25.94 (13.14)	27.84 (12.48)	25.53 (10.21)	24.06 (12.16)
Situational Self-Awareness	Private	11.59 (3.71)	10.34 (4.25)	11.16 (3.56)	10.97 (4.13)
	Public	10.56 (4.92)	11.06 (4.99)	12.47 (4.54)	9.31 (4.08)
	Surroundings	13.63 (3.19)	12.38 (3.14)	13.81 (3.41)	13.06 (3.83)

4.4 Discussion

The current experiment explored the extent to which witness gaze direction and rapport-building might affect witness memory performance in mock investigative interviews. Against my predictions, I found no evidence that either facing away by the witness or rapport-building was able to enhance recall in either free recall or closed questioning.

Firstly, no benefit of asking the witness to face away from the interviewer during recall means that I was not able to replicate my findings from closed questioning in Experiment 2 (where there was some small benefit of witness facing away). Again, these findings are against what I anticipated based on similar previous literature in other domains and witness eye-closure. Looking or facing away should allow participants to focus more fully on the task at hand as they are no longer faced with the interviewer's distracting presence (e.g., Doherty-Sneddon & Phelps, 2005), and this technique is often recommended as an alternative to eye-closure within the Cognitive Interview (e.g., Fisher & Geiselman, 1992; Milne, 2004). So far, I have not found facing away to be a useful technique in improving memory performance, which could suggest that it is less beneficial in practice than is closing the eyes. However, direct comparisons of these techniques are warranted before reaching this conclusion with any confidence.

In terms of rapport-building, I was surprised to see no effect on recall as rapport-building is widely used and generally recommended to improve the quality of real-world investigative interviewing and eyewitness memory performance (e.g., Abbe & Brandon, 2013). One explanation could be that the benefits of rapport-building may have been more apparent if I compared our rapport condition to one where rapport has been purposefully compromised (rather than a neutral condition). I followed what is generally done in this research field (e.g., Vallano & Schreiber Compo, 2011), but it may be that my no-rapport (neutral) condition was still comfortable enough for participants to have similar memory performance across both rapport-building conditions. In addition, although I followed previous research in the way that rapport was measured, it may be that the measure was not sensitive enough to detect differences between conditions. Indeed, when I directly manipulated rapport in the current experiment, the effect on participants' rapport ratings, although statistically significant, was small. These accounts might also explain why I did not find an interaction between rapport-building and witness gaze direction. This is despite some indication from analysing rapport across Experiments 1 and 2 that rapport-building could be contributing to some positive effects of facing away by the witness during closed questioning in Experiment 2. Generally, I note that effects of rapport now appear to be less consistent than had previously been believed (e.g., Sauerland, Brackmann, & Otgaar, 2018). This inconsistency in results seems to be partly due to the lack of a reliable definition and operationalising of rapport in both research and practice, suggesting the need for further research and replication (Abbe & Brandon, 2014; see Vallano & Schreiber Compo, 2015 for a review).

Overall, I again did not find facing away by the witness to be a beneficial technique to memory recall. This was despite testing it alongside rapport-building, which similarly did not have a significant effect on performance.

4.5   General discussion for Experiments 1-3

In three experiments, I examined the extent to which facing away from the interviewer would benefit witnesses' memory performance during mock investigative interviews. In all three

experiments, I found minimal evidence of such a benefit. Specifically, in Experiments 1-3, free recall was not significantly affected by where the witness was facing. In Experiment 2 only, I found some small benefit to accuracy in responding to closed questioning, but importantly, the effects of the witness facing away from the interviewer were minimal even when the interviewer also faced away from the witness in Experiment 2. In Experiment 3, the effect of facing away was negligible regardless of whether or not rapport had been built with the witness beforehand.

These overall findings are somewhat surprising in light of previous research on gaze aversion, which tends to reveal benefits of gazing away while performing cognitive tasks (e.g., Markson & Paterson, 2009). Whereas mine is the first investigative interviewing study to ask witnesses to fully face away from the interviewer, one might expect that doing so would have similar beneficial effects as those seen in previous gaze aversion and eye-closure studies, especially since gaze aversion is recommended as an alternative for eye-closure within the Cognitive Interview (e.g., Fisher & Geiselman, 1992). Decision to ask the witness to fully face away rather than gaze away from the interviewer was made as I believed that it would maximise the reduction of unnecessary environmental input for the witness to the greater extent than simply looking away. This was partly based on findings of Buchanan et al. (2014) who found that even gazing towards the experimenter's eyes while completing a visual-spatial task reduced performance compared to full gaze aversion, occlusion of the experimenter's face and eye-closure.

Results of the current experiments could be understood to imply that facing away is less beneficial than is closing the eyes, although direct comparisons of these techniques are warranted before reaching this conclusion with any confidence. If this were the case, then one explanation might be that the act of turning around made participants feel uncomfortable because, for example, they were self-aware of what might be happening behind them. However, I found minimal support for this explanation, as facing away from the interviewer had no consistent effects on participants' situational self-awareness ratings across experiments. It is possible, of course, that whereas the scale asks participants to rate their

self-consciousness and consciousness of their surroundings, turning away from the interviewer could influence some other self-conscious emotion that I did not measure, such as state anxiety. However, in Experiment 2, the lack of a witness gaze direction effect held even when participants knew the experimenter was not watching them and they should have felt less concerned with what might be happening behind them. Another explanation for our null findings could lie within the main difference of my procedure from previous studies on gaze aversion. This difference is the fact that participants were not asked to maintain eye contact throughout the face-to-face interview - they were simply expected to act how they naturally would in a conversation. This meant that participants often avoided eye contact with the interviewer and looked around the room while recalling information. Direct gaze is often found to be more disruptive than gaze aversion by requiring more attentional load (Senju & Hasegawa, 2005; Senju & Johnson, 2009). Therefore, it could be argued that even though participants were faced with the interviewer, they still experienced gaze aversion as they did not have to maintain a direct gaze, leading to minimal differences between conditions. As explained in the Method of Chapter 2, I decided not to ask participants to maintain eye contact with the interviewer as it is not something that would be asked of a witness during a real-world investigative interview, and any technique should be useful beyond what people would naturally be doing already.

Of course, another explanation could be that gaze aversion is simply not an effective technique in this setting. For example, much of research conducted by Ehrlichman and colleagues suggests that gazing away does not have a particular function or benefit to recall. Instead, they argue that looking away during a demanding cognitive task could be because these eye movements developed from already existing neural systems whereby people scan the environment until they find what they are looking for (so scanning first then stopping once find the particular memory) but they do not necessarily aid remembering (Ehrlichman & Micic, 2012).

However, at this point, rather than concluding that facing away is less effective than eye-closure or not effective at all, it could also be reasonable to conclude from these data

that the effects of gaze aversion are simply not as large as many prior studies have suggested. My findings are not, however, entirely inconsistent with the broader literature; indeed, despite strong effects of eye-closure observed in several studies (e.g., Perfect et al., 2008), other research shows that these effects are often dependent on contextual factors such as being interviewed inside or outside, and the modality of the questioning (e.g., Vredeveldt & Penrod, 2013; Vredeveldt, Hitch, & Baddeley, 2012). For example, one limitation of the present research is the short delay between the event and the interview. Here I mimicked the procedures used in other similar studies that used short delays between the event and the memory test (e.g., Perfect et al., 2008; Vredeveldt, Hitch, & Baddeley, 2011); however there is good reason to believe that I could have seen meaningful effects of facing away had I used a longer retention delay. For example, Vredeveldt et al. (2013) only found a benefit of witness eye-closure after a delay of one week (compared to a delay of two minutes). In practice, there would normally be a delay of more than just minutes when carrying out an investigative interview, so this is an important limitation to take into account. Similarly, within all experiments here, I focused on any information provided by participants that was relevant to the event rather than specifically analysing details that were central to the crime. However, both kinds of detail may be worth exploring separately. In their study, Vredeveldt et al. (2015) found that witnesses who closed their eyes during a genuine police interview did not report more information overall, but the information they provided was more forensically relevant as compared to the information provided by witnesses who kept their eyes open. Additionally, due to the absence of meaningful auditory information in both of my stimulus videos, I was unable to test for modality effects in the results. However, given that both the general cognitive load hypothesis and the modality-specific hypothesis predict effects on visual memory, which I did not observe, it seems unlikely that the inclusion of auditory detail here would have led to more theoretically informative results.

Aside from learning that the lack of benefit of facing away from the interviewer held even when participants knew they were no longer being observed by the interviewer in Experiment 2, it was surprising to learn that facing away by the interviewer had no effect on

recall on its own either. Previous research in other domains tends to find that participants'

performance on various tasks (such as learning/delayed recall, verb generation) declines

when they are observed by another person (e.g., Helminen et al., 2016; Kajimura & Nomura,

2016). To my knowledge, having the interviewer face or gaze away from the witness has not

been studied in the investigative interviewing context before, but I anticipated that this

technique would also reap similar benefits here. One explanation for the null findings could

be that the difference in the effect between the two conditions of interviewer's facing direction

was not large enough to have an impact on recall. Although previous research finds direct

gaze in particular to have a negative effect on task performance, there is also evidence that

another person's physical presence alone could also have an impact (e.g., Belletier et al.,

2015; Belletier & Camos, 2018 with working memory tasks). So it may be that the

participants were similarly distracted by the interviewer's presence in the room even when

she was not facing them. In addition, the unconventional positioning of the interviewer in the

facing away condition could have actually captured attention of the participants as something

novel and uncertain to them (Johnston, Hawley, Plewe, Elliott, & DeWitt, 1990), instead of

allowing them to concentrate on remembering. I intentionally chose to have the interviewer

completely face away from the witness in our research to mimic the dynamic recommended

in some forms of hypnotic or therapeutic interviews in addition to some evidence that looking

toward another person's face can be disruptive, not just maintaining eye contact (Buchanan

et al., 2014). However, these findings should be replicated before drawing any certain

conclusions and future research should also look into asking the interviewer to look away

rather than face away for direct comparison. Indeed, options where the interviewer is not

present at all are being researched such as conducting interviews remotely (e.g., Nash et al.,

2014) or via the Self-Administered Interview tool (Gabbert, Hope, & Fisher, 2009). However,

although they tend to be beneficial, these techniques do not normally replace the main

investigative interview but instead act as a preliminary one.

In terms of rapport-building in Experiment 3, I was again surprised to find no effect to

memory performance. I expected that building a rapport with all participants in Experiment 2

might have contributed to some positive effects of facing away in closed questioning, but it was not possible to disentangle the two effects as there was no control condition for rapport-building (i.e., no rapport). So in Experiment 3, I set out to investigate this explanation that perhaps facing away by the witness might be more beneficial when they have a rapport with the interviewer first. I did not find any evidence of this and there was also no evidence of benefit from rapport-building on its own. This is against the general recommendation of using rapport in investigative interviewing for its beneficial effects to eyewitness memory (e.g., Abbe & Brandon, 2014). However, a recent review by Vallano and Schreiber Compo (2015) shows inconsistent results across different studies. This inconsistency in results seems to be partly due to the lack of a reliable definition and operationalising of rapport in both research and practice, suggesting the need for further research and replication (see also Abbe & Brandon, 2014). Indeed, the way rapport is built varies between studies so I based mine on some of the major pieces of research in this field (e.g., the bi-directional condition in Vallano & Schreiber Compo, 2011) and also on my own previous research (Nash et al., 2016) where we were able to find a benefit of rapport-building to eyewitness recall. Similarly, for the measure of rapport, I used one designed and implemented by Vallano and Schreiber Compo (2011), which seemed effective at capturing differences in rapport. Nevertheless, it may be that this rapport measure was not sensitive enough to detect differences between conditions; indeed, when I directly manipulated rapport in Experiment 3, the effect on their rapport ratings, although statistically significant, was small.

Overall, against my predictions, over three experiments I did not find an effect of facing away by the witness to their memory recall during mock investigative interviews. These null effects still held when investigated while simultaneously manipulating interviewer's gaze direction, and the effect of facing away by the witness could not be enhanced by building a rapport with participants. Nonetheless, it is essential that non-significant findings such as these feature alongside the positive findings in the cumulative literature as these findings caution us against overestimating the benefits of eyewitness gaze aversion as a tool for investigative interviewing and also as an alternative for witness eye-

closure. The latter, however, should be directly compared to witness gaze aversion before drawing any conclusions with confidence.

Chapter 5: Comparison of witness gaze direction and witness eye-closure in memory performance

So far in this thesis, three experiments have been carried out to explore the potential benefits of facing away from the interviewer during a mock investigative interview. Against my predictions, I have found evidence of minimal benefit of facing away to memory performance on its own or alongside interviewer gaze aversion or rapport-building. Therefore, so far, it appears that facing away from the interviewer might not be as effective for investigative interviewing as anticipated based on previous research. Studies have looked into using gaze aversion with various tasks such visuospatial tasks and some have looked into memory tasks (e.g., Doherty-Sneddon et al., 2001; Glenberg et al., 1998). Most of them find gaze aversion to enhance performance on these tasks compared to, for example, gazing at another person. Similarly, studies looking into witness eye-closure show some positive effects to memory performance (e.g., Natali et al., 2012; Vredeveldt & Sauer, 2015). Looking or facing away is recommended as an alternative for eye-closure if the witness does not feel comfortable closing their eyes, but the former technique has not been tested in this setting. Instead, it has been assumed that gaze aversion and eye-closure would yield similar results due to their similar theoretical background. Up to this point, in the last three experiments, I have not found facing away to be a generally beneficial technique to recall, but it should be directly compared to eye-closure before ruling it out as a suitable alternative. Therefore, in the current experiment, I sought to compare participants' memory performance whilst facing away from the interviewer and closing their eyes (and also facing the interviewer in the control interview).

On the whole, as already explained in Chapter 1, research tends to find that asking witnesses to close their eyes for the duration of the interview can benefit their memory performance in both closed questioning (Nash et al., 2016) and free recall (e.g., Natali et al., 2012; Perfect et al., 2008). This benefit has been shown both in the laboratory and in more naturalistic settings (Vredeveldt & Penrod, 2013; Vredeveldt et al., 2015). In theory, facing

away and eye-closure might be expected to be of equal benefit to recall. These facilitative effects might be explained with two theoretical accounts, both of which receive support from empirical studies. Firstly, the general cognitive load hypothesis suggests that closing or averting the eyes frees up cognitive resources due to no longer having to monitor environmental cues. Secondly, the modality-specific interference hypothesis suggests that closing or averting the eyes allows people to better visualise the to-be-recalled material, and therefore leads to better performance on visual tasks in particular. The former hypothesis is supported by findings that show improvements in performance that extend to auditory materials, rather than only to visual materials (Glenberg et al., 1998; Perfect et al., 2008), whereas the latter is supported by findings showing that closing the eyes enhances performance on a visual task to a greater extent than for an auditory task (e.g., Vredeveldt & Penrod. 2013). Indeed, for example in studies investigating visuospatial tasks such as following pathways through imaginary matrices, eye-closure and gaze aversion tend to improve performance to a similar extent (Markson & Paterson, 2009; Buchanan et al., 2014). Therefore, in the current experiment, participants might be expected to have similar memory performance in both facing away and eye-closure conditions.

However, so far I have only found evidence of minimal benefit of facing away by the witness in the last three experiments. As gaze aversion is recommended as an alternative for witness eye-closure if they are not comfortable closing their eyes, my previous findings from Experiments 1-3 could be taken to mean that gaze aversion is not a suitable alternative. In this case, participants might be expected to have better memory performance when they close their eyes. A direct comparison of the two techniques would be needed to determine this with confidence.

5.1   Aims of the current experiment

Therefore, in the current experiment, I sought to compare facing away from the interviewer and eye-closure and also compare their effectiveness to a control face-to-face interviewing condition. Firstly, I aimed to test the effect of facing away from the interviewer again.

Throughout Experiments 1-3, one of the main aims has been to ensure that the effects I find are accurate and reliable, which can be achieved through replication. So if there is no significant effect of facing away from the interviewer in the current experiment, this would add to the confidence that can be placed on the small size of the effect found in the previous experiments.

Secondly, I aimed to test the effect of witness eye-closure in an attempt to replicate previous research that generally shows a benefit to recall. Therefore, I might predict that asking the witness to close their eyes during recall would enhance their performance, compared to a control face-to-face interview.

Finally, I aimed to directly compare facing away from the interviewer and witness eye-closure. As mentioned above, the former is recommended as an alternative for the latter, therefore I might predict no difference to recall between the two conditions. Based on previous research, both techniques should have a similar beneficial effect on recall compared to a control face-to-face interview. However, based on my own research in Experiments 1-3, as I have not found facing away to have consistent positive effects, I might alternatively predict that eye-closure would be more beneficial to recall, compared to facing away or a control interview.

5.2 Method

5.2.1 Participants and design. A total of 72 Aston University students (60 female, 12 male; age range 18 - 26; $M = 19.06$, $SD = 1.34$) participated in the experiment. Power analysis indicated this to be an appropriate sample size to detect the interaction effect in the current study design, assuming $d = 0.5$, $α = .05$, power = .80 and correlation of $r = .00$ between repeated measures. First and second year undergraduate psychology students participated either voluntarily or in exchange for course credits. The study used a 2 (Interview type: Control vs. Gaze aversion) x 2 (Gaze aversion method: Facing away vs. Eyes closed) mixed design, with interview type as the within-subjects variable and gaze aversion method as the between-subjects variable. In other words, each participant took part in two interviews:

one in which they faced the interviewer and one in which they averted their gaze, either through facing away from the interviewer or through eye-closure.

5.2.2 Materials. All materials were the same as those used in Experiments 1-3, but this time both video-clips were used – the car theft video previously used in Experiments 1 and 2 and the bank robbery video previously used in Experiment 3.

As an addition, participants were asked to estimate their perceived amount of mental effort ("Can you estimate how much mental effort you had to invest into remembering?"; 1 = Very, very low mental effort; 9 = Very, very high mental effort) after each interview, a measure previously used in Paas (1992). They were also asked to rate how difficult they found each interview ("How easy or difficult was it to remember details about the event?"; 1 = Extremely easy; 9 = Extremely difficult), a measure previously used in Pollock, Chandler, and Sweller (2002). These were used to illuminate the findings for the effects of witness gaze direction and eye-closure.

5.2.3 Procedure. The study was pre-registered using AsPredicted.org (the protocol can be seen at http://aspredicted.org/blind.php?x=65ur7h) and received a favourable ethical opinion from Aston University Life and Human Sciences Ethics Committee. The procedure was again similar to Experiments 1-3 with the following exceptions.

The main difference was that each participant took part in two interviews, both conducted within one session. Firstly, participants watched the first video-clip, then completed arithmetic puzzles as a filler task for 10 minutes and then they were interviewed about the video. After that, the same procedure was repeated for the second video. The order in which the car theft and the bank robbery videos were presented was counterbalanced (i.e., some participants watched the car theft video first and some watched it second).

All participants took part in a control interview, where they were not told anything about gaze aversion and therefore all remained facing the interviewer with their eyes open. All participants also took part in a gaze aversion interview. The order in which participants completed the control and gaze aversion interviews was counterbalanced (i.e., some

participants completed the control interview first and some completed it second). Within each gaze aversion interview, half of participants were asked to face away from the interviewer by turning their chair 180° around and the other half were asked to close their eyes for the duration of the interview. Participants were randomly assigned to these conditions. During both kinds of interviews, all participants received the same set of standardised verbal instructions as in Experiments 1-3, explaining that these arrangements were there to help them concentrate on remembering. All participants were asked to provide a free recall and they were also asked a set of 10 closed questions in each interview. After each interview, all participants estimated their perceived amount of mental effort and difficulty of the interview on paper, and also completed the situational self-awareness scale and the measure of rapport on the computer. At the end of both interviews, participants completed the brief social phobia scale once and provided their demographic information and speculations about the aims of the study on a computer while the interviewer waited outside the room. Then, they were fully debriefed.

5.2.4   Data coding. All responses were coded in the same way as for Experiments 1-3. For free recall, all details were coded as either correct or incorrect. For closed questions, all responses were coded as either correct, incorrect or "don't know".

All 72 participants' interviews were transcribed verbatim and coded first. Then, 14 participants' interviews were selected randomly, with two transcripts per participant (one control and one gaze aversion method) therefore resulting in 28 transcripts in total (14 control and 14 gaze aversion transcripts). These were scored by an independent coder who was blind to the experimental conditions. The inter-rater reliability was good for free recall correct details (r = .97) and incorrect details (r = .90). Similarly, reliability was good for correct responses to closed questions (r = .95), incorrect responses (r = .95) and "Don't know" responses (r = .98). Therefore, the first coder's scores were retained for analyses.

5.3 Results

To answer the main questions, I looked at the number of details reported during free recall and closed questioning in turn, comparing these between the two gaze aversion methods (facing away and eye-closure) and the control face-to-face interview. Overall, I expected gaze aversion interviews to yield better recall than the control ones. Further, due to the null findings with facing away in Experiments 1-3, I expected eye-closure to be more beneficial to recall overall compared to facing away.

5.3.1 Free recall.

5.3.1.1 Correct details. Overall, participants' correct recall ranged between 10 and 46 details (with a mean of 29.04) for control interviews, and between 11 and 61 (with a mean of 31.43) for gaze aversion interviews. I firstly explored what effect the independent variables had on the number of details recalled during free recall by conducting several mixed measures ANOVAs. The results of these analyses are shown in Table 10. A 2 (Interview type: Control vs. Gaze aversion) x 2 (Gaze aversion method: Facing away vs. Eye-closure) mixed-measures ANOVA on the number of correct details reported during free recall showed a significant main effect of interview type, $F(1, 70) = 6.34$, $p = .01$, $\eta_{p2} = .08$, whereby gaze aversion led to more correct details compared to the control condition. However, there was no significant effect of the gaze aversion method, $F(1, 70) = 0.21$, $p = .65$, $\eta_{p2} < .01$, and there was no significant interaction, $F(1,70) = 0.10$, $p = .75$, $\eta_{p2} < .01$. In other words, gaze aversion (regardless of whether it was facing away or eye-closure) increased the number of correct details reported during free recall to a similar degree, compared to control face-to-face interviews.

5.3.1.2 Incorrect details. Next for the number of incorrect details reported during free recall, there was no main effect of interview type, $F(1,70) = 0.25$, $p = .62$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 0.03$, $p = .86$, $\eta_{p2} < .01$. Additionally, there was no significant interaction, $F(1,70) = 0.36$, $p = .55$, $\eta_{p2} < .01$.

5.3.1.3 Overall accuracy. Similarly to Experiments 1-3, the overall accuracy was calculated

by dividing the number of correct details by the number of correct and incorrect details added

together. An ANOVA on this measure revealed no significant main effect of interview type,

$F(1,70) = 0.05$, $p = .83$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 0.04$, $p = .85$, $\eta_{p2} < .01$.

Finally, there was no significant interaction, $F(1,70) = 0.90$, $p = .35$, $\eta_{p2} = .01$.

Table 12

*Mean number of details reported according to witness gaze condition in Experiment 4
(standard deviations in parentheses). Please note that participants in the Gaze aversion –
Facing away condition only faced away in the Facing away condition; likewise participants in
the Gaze aversion – Eye-closure condition only closed their eyes in the Eye-closure
condition.*

		Condition			
	Between-subjects	Gaze aversion – Facing away		Gaze aversion – Eye-closure	
Response type	Within-subjects	Facing interviewer	Facing away	Facing interviewer	Eye-closure
Free recall	Correct	29.31 (7.31)	32.00 (9.09)	28.78 (8.97)	30.86 (9.04)
	Incorrect	2.11 (1.86)	2.08 (1.40)	2.00 (2.11)	2.31 (1.62)
	Overall accuracy	0.93 (0.05)	0.94 (0.04)	0.94 (0.05)	0.93 (0.05)
Closed questions (out of 10)	Correct	6.31 (1.21)	6.14 (1.61)	6.03 (1.65)	6.25 (1.71)
	Incorrect	1.69 (1.04)	2.00 (1.39)	2.00 (1.39)	1.67 (1.26)
	Don't Know	2.00 (1.15)	1.86 (1.27)	1.97 (1.36)	2.08 (1.75)
	Overall accuracy	0.79 (0.12)	0.76 (0.17)	0.75 (0.16)	0.79 (0.16)

5.3.2 Closed questions.

5.3.2.1 Correct responses. Next, I tested whether any of the independent variables had any

effects on responses during closed questioning by conducting several mixed-measures

ANOVAs again. These analyses are again shown in Table 10. Firstly, a 2 (Interview type:

Control vs. Gaze aversion) x 2 (Gaze aversion method: Facing away vs. Eye-closure) mixed-

measures ANOVA on the number of correct responses showed no significant main effect of

interview type, $F(1,70) = 0.01$, $p = .91$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 0.09$, p

$= .77$, $\eta_{p2} < .01$. Additionally, there was no significant interaction, $F(1,70) = 0.66$, $p = .42$, η_{p2}

$= .01$.

5.3.2.2 Incorrect responses. Looking at the number of incorrect responses to closed questions, an ANOVA showed no significant main effect of interview type, $F(1,70) = 0.01$, $p = .95$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) < 0.01$, $p = .95$, $\eta_{p2} < .01$. Furthermore, there was no significant interaction, $F(1,70) = 2.45$, $p = .12$, $\eta_{p2} = .03$.

5.3.2.3 "Don't know" responses. Then, I examined the number of "Don't know" responses to closed questions. Again, there was no significant main effect of interview type, $F(1,70) < 0.01$, $p = .96$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 0.20$, $p = .65$, $\eta_{p2} < .01$. There was also no significant interaction, $F(1,70) = 0.25$, $p = .62$, $\eta_{p2} < .01$.

5.3.2.4 Overall accuracy. Overall accuracy here showed how accurate participants were when they chose to answer the questions rather than say "don't know". An ANOVA on this measure revealed no significant main effect of interview type, $F(1,70) < .01$, $p = .99$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 0.02$, $p = .89$, $\eta_{p2} < .01$. Finally, there was no significant interaction, $F(1,70) = 2.34$, $p = .13$, $\eta_{p2} = .03$.

Overall, in terms of memory performance, gaze aversion – regardless of which method was used - led to some benefit for the number of correct details reported during free recall compared to control face-to-face interviews. However, against the predictions, for all other measures gaze aversion did not affect recall differently to the control condition. Furthermore, there was no significant difference between facing away and eye-closure on any of the measures.

5.3.3   Additional analyses.

To complement these memory findings, I firstly explored whether witness gaze direction had any effect on how difficult participants perceived remembering during interviews to be as well as how much mental effort they required. Based on previous literature on gaze aversion suggesting that looking away and eye-closure should allow more cognitive resources to be directed to the main task, I expected that the gaze aversion interviews might be rated lower on difficulty compared to control ones and similarly they should require lower amounts of mental effort. The following analyses are represented in Table 11.

5.3.3.1 Interview difficulty. Firstly, a 2 (Interview type: Control vs. Gaze aversion) x 2 (Gaze aversion method: Facing away vs. Eye-closure) mixed-measures ANOVA on ratings of difficulty showed no main effect of interview type, $F(1,52) = 0.19$, $p = .66$, $\eta_{p2} < .01$. There was a significant main effect of gaze aversion method, $F(1,52) = 4.83$, $p = .03$, $\eta_{p2} = .09$, whereby participants who closed their eyes during their gaze aversion interview gave higher difficulty ratings than those who faced away. Lastly, there was no significant interaction, $F(1,52) = 0.03$, $p = .86$, $\eta_{p2} < .01$.

5.3.3.2 Mental effort. Secondly, another mixed-measures ANOVA on ratings of mental effort showed a significant main effect of interview type, $F(1,70) = 4.65$, $p = .04$, $\eta_{p2} = .06$, whereby when participants were in the gaze aversion condition, they reported a higher level of mental effort invested in remembering compared to the control condition. However, there was no main effect of gaze aversion method, $F(1,70) = 1.84$, $p = .18$, $\eta_{p2} = .03$, or a significant interaction, $F(1,70) < .01$, $p = .95$, $\eta_{p2} < .01$.

As a way to explore the data further, I conducted a series of correlations to investigate whether some of these differences in interview difficulty and mental effort would be associated with actual memory performance. These analyses were exploratory and therefore not pre-registered before. Firstly, for control interviews, there was no significant correlation between interview difficulty and overall accuracy in free recall, $r = -.05$, $p = .72$, and the correlation with overall accuracy in closed questioning was small and non-significant, $r = -.24$, $p = .08$. Similarly, there was no significant correlation between mental effort and overall accuracy in free recall, $r = .01$, $p = .92$, and again the correlation with overall accuracy in closed questioning was small and non-significant, $r = -.18$, $p = .14$.

Then for gaze aversion interviews, the correlation between interview difficulty and overall accuracy in free recall was small and non-significant, $r = .18$, $p = .19$, and likewise for overall accuracy in closed questioning and interview difficulty, $r = .16$, $p = .24$. Similarly, there was no significant difference between mental effort and overall accuracy in free recall, $r = -.03$, $p = .80$, or overall accuracy in closed questioning, $r = .03$, $p = .79$. Although only

analyses for overall accuracy are reported here, there were also no significant correlations between interview difficulty/mental effort and any other measures of memory performance.

Overall, against my expectations, the two significant effects indicated that participants who closed their eyes rated the gaze aversion interview as more difficult (compared to those who faced away) and both groups reported the gaze aversion interview to require higher levels of mental effort. However, these ratings were not significantly associated with participants' memory performance.

Table 13

Mean scores for interview difficulty, mental effort and situational self-awareness across the witness gaze conditions in Experiment 4 (standard deviations in parentheses)

Measure		Condition			
	Between-subjects	Gaze aversion – Facing away		Gaze aversion – Eye-closure	
	Within-subjects	Facing interviewer	Facing away	Facing interviewer	Eye-closure
	Difficulty	5.20 (1.47)	5.04 (0.98)	5.79 (1.61)	5.72 (1.53)
	Mental effort	5.36 (1.78)	5.68 (1.63)	6.00 (1.60)	6.28 (1.39)
Situational Self-Awareness	Private	11.58 (4.23)	11.67 (4.73)	10.03 (4.14)	10.25 (3.75)
	Public	10.31 (3.50)	10.06 (3.38)	8.81 (3.97)	9.58 (4.27)
	Surroundings	13.69 (4.13)	13.75 (4.00)	13.06 (3.62)	12.53 (4.16)

Next, again similarly to Experiments 1-3, I wanted to ensure that participants did not significantly vary on their levels of trait social phobia as it could influence the memory findings for the between-subject variable (gaze aversion method). As participants completed this scale only once at the end of the experiment (and not after each interview), I compared scores between the two gaze aversion method groups (facing away vs. eye-closure).

5.3.3.3 Brief Social Phobia Scale. An independent samples t-test was carried out on the total ratings of social phobia. This showed no significant difference between participants who faced away ($M = 27.00$; $SD = 12.49$) and those who closed their eyes during their gaze aversion interview ($M = 25.25$; $SD = 9.93$), $t(70) = 0.66$, $p = .51$, $d = 0.16$.

Finally, similarly to Experiments 1-3, I examined participants' reported levels of situational self-awareness between conditions. The analyses are reported in Table 11.

5.3.3.4 Situational Self-Awareness. I conducted three 2 (Interview type: Control vs. Gaze aversion) x 2 (Gaze aversion method: Facing away vs. Eye-closure) mixed-measures ANOVAs. Firstly, looking at private self-awareness, there was no significant main effect of interview type, $F(1,70) = 0.18$, $p = .68$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 2.57$, $p = .11$, $\eta_{p2} = .04$. Additionally, there was no significant interaction, $F(1,70) = 0.04$, $p = .85$, $\eta_{p2} < .01$. Then, for public self-awareness, there was no significant main effect of interview type, $F(1,70) = 0.48$, $p = .49$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 1.48$, $p = .23$, $\eta_{p2} = .02$. There was also no significant interaction, $F(1,70) = 1.81$, $p = .18$, $\eta_{p2} = .03$. Finally, for self-awareness of surroundings, there was again no significant main effect of interview type, $F(1,70) = 0.51$, $p = .48$, $\eta_{p2} < .01$, or gaze aversion method, $F(1,70) = 1.12$, $p = .29$, $\eta_{p2} = .02$. Additionally, there was no significant interaction, $F(1,70) = 0.77$, $p = .38$, $\eta_{p2} = .01$.

In summary, none of the situational self-awareness subscales were significantly affected by the type of interview or the gaze aversion method that participants experienced.

5.4   Discussion

The aim of Experiment 4 was to directly compare facing away from the interviewer and witness eye-closure in order to clarify with more confidence whether the former can be a suitable alternative for the latter, as often recommended within interviewing manuals (e.g., Fisher & Geiselman, 1992; Milne, 2004). This investigation was needed after I did not find facing away from the interviewer to consistently improve recall in Experiments 1-3. On the other hand, previous research on witness eye-closure tends to show beneficial effects on recall (e.g., Perfect et al., 2008; Vredeveldt et al., 2011). Therefore, in Experiment 4, I anticipated that eye-closure would enhance recall to a greater extent than facing away from the interviewer. However, against these predictions, there was no significant difference between the two gaze aversion methods. In fact, I did not even find these two gaze aversion methods to be significantly different from the control face-to-face condition (except for increasing correct details during free recall).

These results mean that I again replicated the finding that facing away from the interviewer does not appear to be a consistently useful technique for improving recall in mock investigative interviews. Further, the finding of no difference between the two gaze aversion methods supports the recommendations that the facing away can be used as an alternative for eye-closure. However, based on previous research, the two techniques should be performing similarly at *enhancing* recall, whereas here both demonstrated only one effect in free recall in comparison to the control condition. No difference between the gaze aversion methods goes against my predictions of advantageous effects of eye-closure (in relation to facing away), which were based on previous research that generally shows eye-closure to be a beneficial technique in the investigative interviewing setting. Witness eye-closure is generally found to improve memory performance not only in laboratory settings but also in real-world police interviews including those investigating serious crime (Vredeveldt et al., 2015). I expected similar benefits from asking the witness to face away from the interviewer in the previous experiments, based on the Cognitive Interview recommendations and also on previous research into gaze aversion in other fields with different tasks (e.g., Buchanan et al., 2014; Phelps et al., 2006). However, since I have not found this technique to be beneficial in the mock investigative interviewing setting in Experiments 1-3, in the current experiment, I anticipated that eye-closure might enhance memory performance to a greater extent than facing away from the interviewer.

Therefore, I was surprised to find that asking the witness to close their eyes did not significantly affect their memory performance (even compared to the control face-to-face interview). According to the general cognitive load hypothesis, closing the eyes (or averting one's gaze) should free up cognitive resources due to no longer having to monitor the environment (Perfect et al., 2008), leading to enhanced performance on a cognitive task. Therefore, participants should find the same cognitive tasks less difficult and less effortful if they are able to direct more cognitive resources to those tasks by closing their eyes or averting their gaze. However, this was not found to be the case in the current experiment. Participants actually reported to invest a higher level of mental effort in remembering in both

gaze methods compared to control interviews, and those who closed their eyes in their gaze aversion interview additionally rated the interviews as more difficult than did those participants who faced away. These scales of mental effort and difficulty ratings are generally found to be reliable and sensitive to task conditions and complexity (Paas, van Merrienboer, & Adam, 1994). Therefore, one reason for why gaze aversion has not shown the expected benefits in Experiments 1-4 could be because, for some reason, it required a high level of mental effort. This is counter to what has been proposed and found in previous research, especially with eye-closure, suggesting the opposite – that closing the eyes or averting gaze should allow participants to free up some cognitive resources and concentrate on the task. In the current experiment, the mental effort or task difficulty scores were not correlated with participants' actual memory performance on any of the measures though so it seems unlikely that the lack of benefit to recall was because the techniques were too effortful. It could be that participants are rating gaze aversion interviews as more effortful simply because of the extra physical component of the interview (i.e., having to face away or close their eyes). In other words, if participants experienced minimal benefit from the two techniques, then facing away or closing their eyes might seem more effortful than the control interview where there were no additional actions but the recall was mostly just as good. However, this issue of difficulty and mental effort should be investigated further.

Generally, effects of eye-closure are not always found to be consistent across different contexts. For example, Ritter, Abbing and van Schie (2018) found eye-closure to enhance performance on tasks of creativity but not working memory; Vredeveldt et al. (2015) did not find their participants to report more information overall following eye-closure but the information they provided was more forensically relevant; Vredeveldt et al. (2012) found the benefits of eye-closure to be dependent on modality of information and grain-size; Vredeveldt et al. (2013) found a benefit of witness eye-closure after a delay of one week (but not after a delay of two minutes). Within the latter study, remembering should be more difficult after a delay of one week compared to two minutes, suggesting that perhaps eye-closure may be most effective when participants are exerting maximum cognitive resources. It could be that

in the current experiment, although participants never recalled near all of the possible details, they did not have to struggle to remember. This may be especially true since participants knew that there were no consequences regardless of how much they remembered (unlike with a real crime) and they were allowed to say "don't know" during closed questioning, if they wished. Therefore, it might be worthwhile for future research to investigate the role of task difficulty in effectiveness of gaze aversion methods.

In summary, I aimed to compare facing away from the interviewer to witness eye-closure more directly in order to explore whether the former can be a suitable alternative for the latter. Overall, there were no significant differences between the two gaze aversion methods, whereby both techniques enhanced the number of correct details reported during recall only.

5.5   Closed questions item analyses

One possible explanation for why gaze aversion did not increase correct responding to closed questions in the previous experiments is that there might be ceiling effects in these data. Even though overall correct responding to closed questions did not approach 100% in any of the experiments, this explanation could nevertheless still be true if several of the closed questions were impossible to answer, which would effectively cap correct participants' performance levels at a rate lower than 100%.

To address this concern, I conducted retrospective analyses of participants' responses to the closed questions about the car theft video used in Experiments 1, 2 and 4 (total $N = 242$) and those about the bank robbery video used in Experiment 3 and 4 (total $N = 200$). The number of participants who provided correct, incorrect or "don't know" responses to each of 10 questions for each video were counted regardless of what interviewing condition participants were in (see Table 12). Further, from these data, proportions of correct, incorrect and "don't know" responses were calculated for each question, and these data are represented in Figures 2 for the car theft video and Figure 3 for the bank robbery video.

Table 14

Number of participants who provided correct, incorrect and "don't know" responses to each question in the car theft and bank robbery videos

		Question number									
		1	2	3	4	5	6	7	8	9	10
Car theft	Correct	24	97	101	231	196	195	216	62	237	112
	Incorrect	6	86	30	10	29	15	14	32	2	103
	"Don't know"	212	59	111	1	17	32	12	148	3	27
Bank robbery	Correct	39	194	37	167	101	83	187	108	188	133
	Incorrect	47	6	143	33	79	75	11	42	9	42
	"Don't know"	114	0	20	0	20	42	2	50	3	25

Overall, the proportion of correct responding to each question ranged between 9.4 and 98.2% for the car theft video and between 12.5 and 96.9% for the bank robbery video. These numbers suggest that whereas one or two of the closed questions were rather difficult, none was so difficult as to effectively cap participants' correct response levels below 100%. On the other hand, there were also around three questions in each video that were answered correctly by 90 – 98% of participants, indicating that these questions could have been made more difficult. However, on the whole, the proportion of participants responding correctly to each question showed a wide range and variability with enough potential room for correct responding to be able to increase, if facing away by the witness were to have a beneficial effect on participants' memory performance. These results suggest that the reason for the lack of benefit of facing away to correct responding is unlikely to be due to ceiling effects, although in hindsight some of the questions could have been amended or replaced.
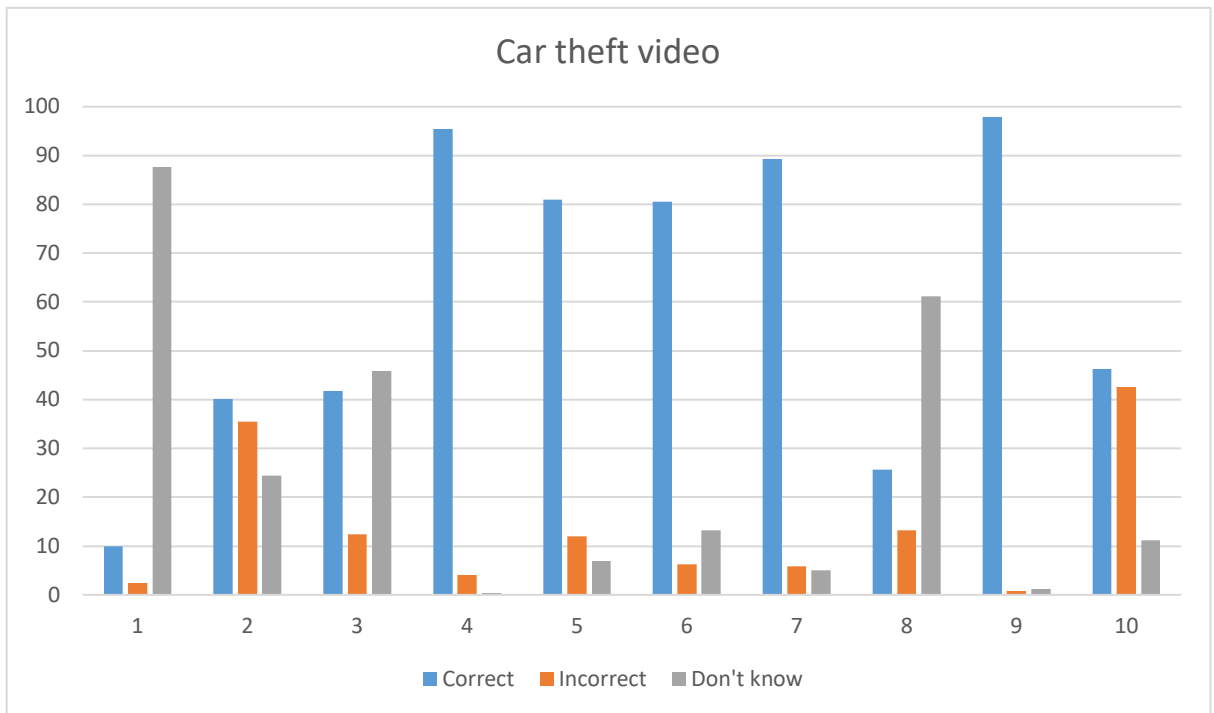
Figure 2. Proportion of correct, incorrect and "don't know" responses to each question for the car theft video
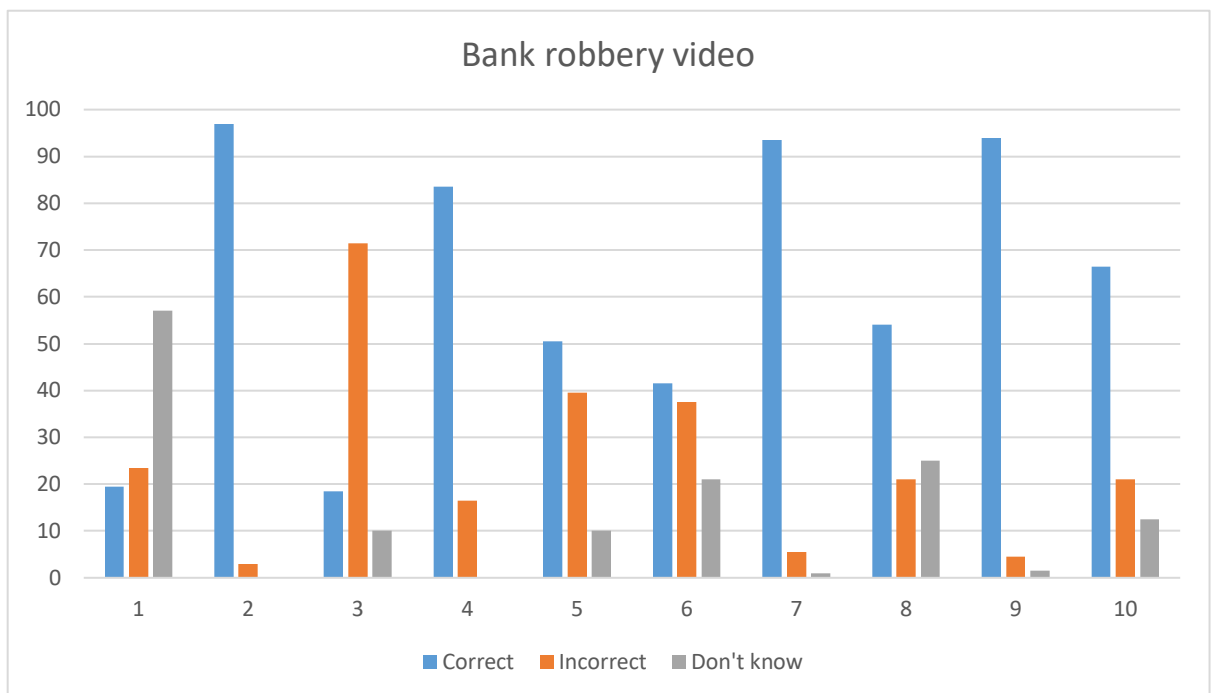
Figure 3. Proportion of correct, incorrect and "don't know" responses to each question for the bank robbery video

Chapter 6: Effect size estimation across Experiments 1 - 4

In this chapter, to estimate the size of the witness gaze direction effect across the first four experiments, I conducted a series of mini meta-analyses. These analyses involve running meta-analyses on data from several experiments within one's own paper, and there are several reasons for producing mini meta-analyses on your own series of experiments (Goh, Hall, & Rosenthal, 2016). Firstly, a meta-analysis would allow me to combine, summarise and represent data from my experiments visually, making it easier to read and interpret. Secondly, meta-analyses focus more on effect sizes rather than p-values, providing meaningful results that are less likely to be due to chance than results of an individual experiment. Thirdly, a meta-analysis has greater overall power, and the overall result gives us more confidence that the findings are reliable and replicable, compared to individual results. Single inferential analyses cannot provide support for null hypotheses but cumulative evidence can be more substantial (although the latter still cannot confirm null results).

Therefore, a mini meta-analysis was an appropriate way to further explore and present the data from Experiments 1-4. As I have found very minimal benefits of facing away from the interviewer in the experiments so far, looking at the effect sizes, and particularly the overall effect size estimate, could provide more convincing support that the effect of facing away is likely to be very small, if it does exist, than simply focusing on significance testing. Effect size estimation would allow us to interpret the results more effectively than relying on p-values alone.

The meta-analyses were carried out using Comprehensive Meta-Analysis software, using random effects models. Standardised difference in means or Cohen's d was the primary measure of effect size, and it was computed from the Ms, SDs and sample size in each facing interviewer/facing away condition. In the following analyses, a positive overall effect size value (i.e., $d > 0$) would indicate that when the witness faced away from the interviewer, scores on a particular variable were generally higher than when the witness

faced the interviewer. Likewise, a negative overall effect size value (i.e., $d < 0$) would indicate that when the witness faced away from the interviewer, scores on a particular variable were generally lower than when the witness faced the interviewer.

6.1   Memory performance

Firstly, participants' memory performance in free recall and closed questioning was analysed. As Table 13 shows, the effects of facing away were very small and non-significant for all variables, with all 95% confidence intervals including zero as a plausible effect size value. In other words, over four experiments, there is no clear evidence that witness gaze direction affected participants' memory performance in any way.

Table 15
Estimates of overall effects of the witness facing away from the interviewer (relative to facing the interviewer) on each memory outcome measure, based on mini meta-analyses of Experiments 1-4.

Response type		Standardized difference in means (Cohen's *d*)	95% Confidence Interval		*Z*	*p*
			Lower limit	Upper limit		
Free recall	Correct	0.15	-0.05	0.36	1.44	.15
	Incorrect	-0.01	-0.22	0.19	-0.13	.90
	Overall accuracy	0.08	-0.13	0.28	0.73	.47
Closed questioning	Correct	-0.09	-0.32	0.14	-0.76	.45
	Incorrect	0.01	-0.31	0.33	0.07	.95
	Don't know	0.12	-0.09	0.32	1.12	.26
	Overall accuracy	-0.02	-0.35	0.32	-0.09	.93

Looking at Figures 4 and 5, the forest plots represent effect size estimates for each experiment and the overall effect size estimate for each response type in free recall and closed questions in turn. Overall, almost all of the individual effects' confidence intervals included zero as a plausible effect size value, similarly to the overall effects. However, it can be noted that in free recall (Figure 4) there seems to be a hint of an overall beneficial effect of facing away from the interviewer, specifically for correct details and overall accuracy. This

might indicate that the effect was very small and only able to be seen with the power that the meta-analyses offered. However, although visually the overall effect size estimate seems to be edging towards the positive side for free recall correct details and overall accuracy, the meta-analysis did not show the overall effect size estimates to be significant so this interpretation should be treated with caution. Furthermore, even if facing away from the interviewer did have a very small effect on recall, in investigative interviewing practice, techniques with such small effects may not be useful as any new implementation should work to improve recall in most or all of the interviews. Looking at forest plots representing responses to closed questions (Figure 5), this time there is no apparent beneficial effect of facing away from the interviewer, and the individual effect size estimates do not seem to be positioned in any meaningful way on the plot.

A

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	-0.237	0.310	0.096	-0.844	0.370	-0.765	0.444
Expt 2	0.051	0.177	0.031	-0.295	0.398	0.291	0.771
Expt 3	0.281	0.178	0.032	-0.068	0.629	1.579	0.114
Expt 4	0.327	0.237	0.056	-0.138	0.792	1.376	0.169
	0.151	0.104	0.011	-0.054	0.355	1.446	0.148

Statistics for each study — Std diff in means and 95% CI

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

B

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	-0.099	0.309	0.095	-0.704	0.506	-0.320	0.749
Expt 2	-0.184	0.177	0.031	-0.531	0.163	-1.037	0.300
Expt 3	0.190	0.177	0.031	-0.157	0.537	1.072	0.284
Expt 4	-0.017	0.236	0.056	-0.479	0.445	-0.072	0.943
	-0.012	0.104	0.011	-0.216	0.192	-0.119	0.905

Statistics for each study — Std diff in means and 95% CI

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

C

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	0.054	0.309	0.095	-0.551	0.659	0.175	0.861
Expt 2	0.221	0.177	0.031	-0.126	0.569	1.247	0.212
Expt 3	-0.088	0.177	0.031	-0.434	0.259	-0.497	0.619
Expt 4	0.117	0.236	0.056	-0.345	0.580	0.497	0.619
	0.075	0.104	0.011	-0.129	0.279	0.718	0.473

Statistics for each study — Std diff in means and 95% CI

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

Figure 4. Forest plots showing effect size estimations of witness gaze direction on (A) Correct details, (B) Incorrect details and (C) Overall accuracy in free recall across Experiments 1-4. The diamond represents the overall meta-analytic effect across studies.

A

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	-0.314	0.311	0.096	-0.923	0.295	-1.011	0.312
Expt 2	0.192	0.177	0.031	-0.156	0.539	1.081	0.280
Expt 3	-0.239	0.177	0.031	-0.587	0.108	-1.349	0.177
Expt 4	-0.117	0.236	0.056	-0.579	0.345	-0.496	0.620
	-0.081	0.119	0.014	-0.314	0.152	-0.684	0.494

Std diff in means and 95% CI

Facing interviewer   Facing away

B

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	0.392	0.312	0.097	-0.219	1.002	1.257	0.209
Expt 2	-0.420	0.179	0.032	-0.770	-0.070	-2.350	0.019
Expt 3	0.011	0.177	0.031	-0.335	0.358	0.063	0.950
Expt 4	0.249	0.237	0.056	-0.215	0.713	1.051	0.293
	0.012	0.178	0.032	-0.337	0.360	0.066	0.948

Std diff in means and 95% CI

Facing interviewer   Facing away

C

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	0.038	0.309	0.095	-0.567	0.643	0.122	0.903
Expt 2	0.130	0.177	0.031	-0.217	0.477	0.733	0.463
Expt 3	0.264	0.178	0.032	-0.084	0.612	1.486	0.137
Expt 4	-0.115	0.236	0.056	-0.577	0.347	-0.487	0.626
	0.118	0.104	0.011	-0.086	0.322	1.130	0.258

Std diff in means and 95% CI

Facing interviewer   Facing away

D

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	-0.363	0.311	0.097	-0.973	0.247	-1.167	0.243
Expt 2	0.405	0.179	0.032	0.055	0.755	2.269	0.023
Expt 3	-0.040	0.177	0.031	-0.386	0.307	-0.225	0.822
Expt 4	-0.244	0.237	0.056	-0.708	0.220	-1.032	0.302
	-0.016	0.172	0.030	-0.353	0.321	-0.090	0.928

Figure 5. Forest plots showing effect size estimations of witness gaze direction on (A) Correct responses, (B) Incorrect responses, (C) Don't know responses and (D) Overall accuracy in closed questions across Experiments 1-4. The diamond represents the overall meta-analytic effect across studies.

6.2 Situational Self-Awareness

Next, situational self-awareness was analysed in a similar way to memory performance by conducting a series of mini meta-analyses. Situational self-awareness scores help to understand the effects of facing away from the interviewer as they can shed light on how participants were feeling in those conditions, particularly regarding another person's presence. In Experiments 1-4, I have mostly found null results with facing away significantly affecting situational self-awareness only in two analyses, but similarly to memory performance, it would be easier to interpret overall findings reliably when represented with a meta-analysis.

Here again, random effects models were used, and Cohen's d was computed based on Ms, SDs and sample sizes from each condition. A positive overall effect size (i.e., $d > 0$) indicates that when the witness faced away from the interviewer, scores on a particular variable were generally higher than when the witness faced the interviewer. Likewise, a negative overall effect size (i.e., $d < 0$) indicates that when the witness faced away from the interviewer, scores on a particular variable were generally lower than when the witness faced the interviewer.

As Table 14 shows, effect sizes for measures of situational self-awareness were again very small and non-significant, with all 95% confidence intervals including zero as a possible effect size. Therefore, over four experiments, there is no clear evidence that witness gaze aversion had any substantial effect on participants' feelings of situational self-awareness. This is visually represented in Figure 6, where the effects are spread on both sides around the line of null effect, again indicating no consistent effect of witness gaze direction in either direction. Although still small and non-significant, the effect on self-awareness of surroundings appears to be the largest with the overall effect size estimate more strongly in the direction of facing the interviewer, indicating higher scores on this variable when facing the interviewer relative to facing away. This again might suggest that

participants' facing direction might have had a small effect on participants' performance that was not detected in Experiments 1-4 as these experiments were powered to detect medium-sized effects. However, interpretations of these small and non-significant effects should again be treated with caution without making strong recommendations for practice.
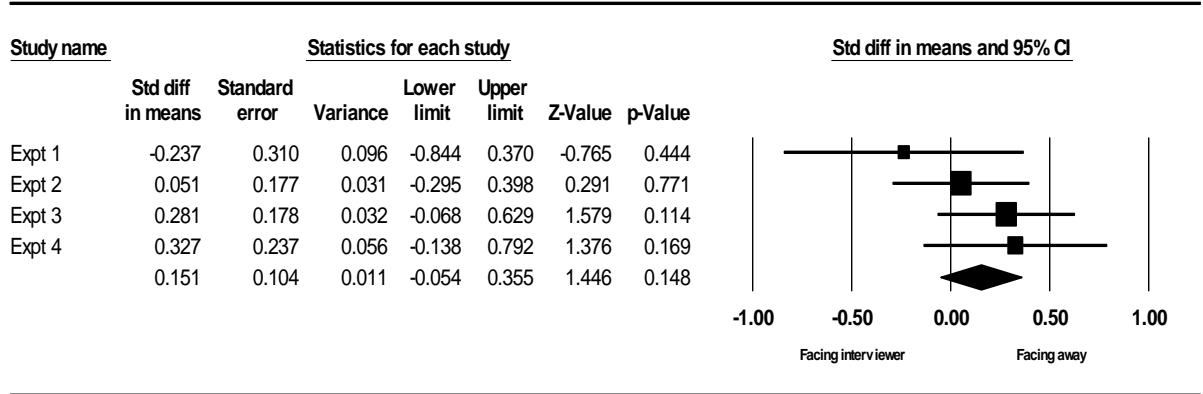
Table 16

Estimates of overall effects of the witness facing away from the interviewer (relative to facing the interviewer) on each measure of situational self-awareness, based on mini meta-analyses of Experiments 1-4.

		Standardized difference in means (Cohen's *d*)	95% Confidence Interval		*Z*	*p*
Response type			**Lower limit**	**Upper limit**		
Situational self-awareness	Private	0.03	-0.20	0.26	0.23	.82
	Public	-0.09	-0.39	0.21	-0.61	.55
	Surroundings	-0.14	-0.34	0.07	-1.34	.18

Overall in this section, I conducted a series of mini meta-analyses to explore the cumulative effects of witness gaze direction on memory performance and situational self-awareness over Experiments 1-4. All of the effects were found to be very small and non-significant. However, specifically in free recall correct details and overall accuracy and awareness of surroundings, there was a hint of an overall beneficial effect of facing away. Although, even if a very small effect is present, the size of it may not be meaningful enough for facing away to be useful for investigative interviewing in practice.

A

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	0.567	0.315	0.099	-0.050	1.184	1.802	0.071
Expt 2	0.060	0.177	0.031	-0.287	0.406	0.337	0.736
Expt 3	-0.282	0.178	0.032	-0.631	0.066	-1.589	0.112
Expt 4	0.019	0.236	0.056	-0.443	0.481	0.079	0.937
	0.028	0.152	0.023	-0.270	0.325	0.184	0.854

Std diff in means and 95% CI

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer   Facing away

B

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	0.150	0.309	0.096	-0.455	0.756	0.486	0.627
Expt 2	0.064	0.177	0.031	-0.282	0.411	0.364	0.716
Expt 3	-0.184	0.177	0.031	-0.532	0.163	-1.041	0.298
Expt 4	-0.073	0.236	0.056	-0.535	0.389	-0.308	0.758
	-0.038	0.104	0.011	-0.242	0.166	-0.369	0.712

Std diff in means and 95% CI

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer   Facing away

C

Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Expt 1	0.158	0.309	0.096	-0.448	0.764	0.511	0.609
Expt 2	-0.164	0.177	0.031	-0.511	0.183	-0.925	0.355
Expt 3	-0.295	0.178	0.032	-0.644	0.053	-1.662	0.097
Expt 4	0.014	0.236	0.056	-0.448	0.476	0.058	0.954
	-0.138	0.104	0.011	-0.342	0.067	-1.321	0.187

Std diff in means and 95% CI

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer   Facing away

Figure 6. Forest plots showing effect size estimations of witness gaze direction on (A) Private self-awareness, (B) Public self-awareness and (C) Awareness of surroundings across Experiments 1-4. The diamond represents the overall meta-analytic effect across studies.

6.3   Moderator analyses

Overall, the meta-analyses in the previous section did not show any consistent effects of facing away from the interviewer in free recall or closed questioning. In this section, the data were explored further by conducting a series of moderator analyses, with rapport-building as the moderator variable.

6.3.1   Memory performance. In Chapter 3, I already compared the effects of rapport-building across Experiments 1 and 2. There, I found significant interactions of rapport-building and witness gaze direction for incorrect responses and overall accuracy during closed questioning, and significant main effects of rapport-building on the number of incorrect details and overall accuracy in free recall. However, these effects were not found to be consistent as, when investigated within one sample in Chapter 4, rapport-building (alone or in combination with facing away) did not have a significant impact on participants' performance. When combining data from Experiments 1-4 in the previous meta-analyses, I was conscious of these varying effects of rapport-building and whether they might be affecting results of the meta-analyses. Rapport was built with all participants in Experiment 2, it was not built at all in Experiments 1 and 4, and it was built with half of the participants and not built with the other half in Experiment 3. Therefore, rapport-building should be included as a moderator in order to tease apart its possible effects from the effects of witness gaze direction.

Here, again I conducted the same meta-analyses as in the previous section, looking at free recall, closed questioning and situational self-awareness in turn. However, this time rapport-building was included as a moderator, allowing us to analyse the effects of witness gaze direction separately for "rapport" and "no-rapport" experiments as well as allowing us to make comparisons between them. As can be seen in Table 15, the Q statistic represents homogeneity of effect sizes across studies. A null result here would indicate that the results represent a single population effect, whereas a significant value of Q ($p < .05$) would suggest heterogeneity of results across studies (Eastvold et al., 2012). Therefore, the latter would indicate possible moderator effects.

Similarly to before, the meta-analyses used random effects models and the standardised difference in means or Cohen's *d* was computed based on *M*s, *SD*s and sample sizes from each experiment. A positive overall effect size (i.e., *d* > 0) here again indicates that when the witness faced away from the interviewer, scores on a particular variable were generally higher than when the witness faced the interviewer. Likewise, a negative overall effect size (i.e., *d* < 0) indicates that when the witness faced away from the interviewer, scores on a particular variable were generally lower than when the witness faced the interviewer. Additionally in this section, Experiment 3 data were split into "rapport" and "no-rapport" to be analysed separately as Experiment 3 included both conditions.

Table 17
Tests of significance of the rapport moderator in each memory outcome measure. p < .05 would indicate heterogeneity in results across "rapport" and "no-rapport" studies for a particular response type.

Response type		*Q*	df	*p*
Free recall	Correct	0.02	1	.89
	Incorrect	0.28	1	.60
	Overall accuracy	0.31	1	.58
Closed questioning	Correct	3.37	1	.07
	Incorrect	8.28	1	.004
	Don't know	0.41	1	.52
	Overall accuracy	7.34	1	.007

Firstly, looking at analyses for free recall, it is evident from Figure 7 that the overall effects for witness gaze direction were again non-significant both when rapport was built and when it was not built with participants. Both "rapport" and "no-rapport" overall effect size estimates are small, and the confidence intervals include zero as a plausible value. Further, Table 15 shows that the *Q* statistic was not significant for any variables in free recall, suggesting homogeneity in results across studies. This result can be interpreted to mean that results across "rapport" and "no rapport" experiments were similar, and this applied to all response types in free recall.

Then, looking at analyses for closed questioning, the forest plots show a clearer split between experiments that included rapport-building and those that did not. Indeed, Table 15

demonstrates that this time the moderator seems to have a significant effect on incorrect response and overall accuracy, suggesting heterogeneity in results across the "rapport" and "no-rapport" studies. It is evident from Figure 8 that when rapport was built with participants, facing the interviewer led to more incorrect responses and lower overall accuracy, relative to facing away. However, these effects were still relatively small. The moderator did not have a significant effect on correct responses, although they were in the same direction, showing an improvement in performance when rapport was built.

Overall, conducting the moderator analyses allowed us to tease apart the effects of rapport-building from witness gaze direction. A small but significant benefit of facing away from the interviewer was detected for incorrect responses and overall accuracy in closed questioning when rapport was built with participants. These findings are in line with results from Chapter 3 where the effects of rapport across Experiments 1 and 2 were analysed. However, no such interaction between rapport-building and witness gaze direction was found in Chapter 4 where the two effects were investigated within one sample. This could be because a large sample was required in order to detect these small effects, and this was achieved by combining data from several experiments in Chapter 3 and in the current meta-analyses. For free recall, including a moderator did not lead to any significant effects.

A

Group by Rapport	Studyname	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
No rapport	Expt 1	-0.237	0.310	0.096	-0.844	0.370	-0.765	0.444
No rapport	Expt 3 no rapport	0.259	0.251	0.063	-0.233	0.752	1.034	0.301
No rapport	Expt 4	0.327	0.237	0.056	-0.138	0.792	1.376	0.169
No rapport		0.163	0.162	0.026	-0.154	0.480	1.009	0.313
Rapport	Expt 2	0.051	0.177	0.031	-0.295	0.398	0.291	0.771
Rapport	Expt 3 rapport	0.298	0.251	0.063	-0.194	0.791	1.186	0.235
Rapport		0.133	0.145	0.021	-0.150	0.417	0.920	0.357
Overall		0.147	0.108	0.012	-0.065	0.358	1.359	0.174

Std diff in means and 95% CI

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

B

Group by Rapport	Studyname	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
No rapport	Expt 1	-0.099	0.309	0.095	-0.704	0.506	-0.320	0.749
No rapport	Expt 3 no rapport	0.227	0.251	0.063	-0.265	0.718	0.903	0.366
No rapport	Expt 4	-0.017	0.236	0.056	-0.479	0.445	-0.072	0.943
No rapport		0.051	0.150	0.023	-0.243	0.345	0.339	0.734
Rapport	Expt 2	-0.184	0.177	0.031	-0.531	0.163	-1.037	0.300
Rapport	Expt 3 rapport	0.148	0.250	0.063	-0.342	0.639	0.593	0.553
Rapport		-0.065	0.159	0.025	-0.377	0.247	-0.407	0.684
Overall		-0.004	0.109	0.012	-0.218	0.211	-0.032	0.974

Std diff in means and 95% CI

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

133

C

Group by Rapport	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Std diff in means and 95% CI
No rapport	Expt 1	0.054	0.309	0.095	-0.551	0.659	0.175	0.861	
No rapport	Expt 3 no rapport	-0.123	0.250	0.063	-0.614	0.367	-0.492	0.623	
No rapport	Expt 4	0.117	0.236	0.056	-0.345	0.580	0.497	0.619	
No rapport		0.016	0.150	0.023	-0.278	0.310	0.106	0.916	
Rapport	Expt 2	0.221	0.177	0.031	-0.126	0.569	1.247	0.212	
Rapport	Expt 3 rapport	-0.048	0.250	0.063	-0.538	0.442	-0.191	0.849	
Rapport		0.131	0.145	0.021	-0.152	0.415	0.907	0.364	
Overall		0.076	0.104	0.011	-0.128	0.280	0.727	0.467	

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer   Facing away

Figure 7. Forest plots showing moderator effect size estimations of witness gaze direction on (A) Correct details, (B) Incorrect details and (C) Overall accuracy in free recall across Experiments 1-4. The black diamonds represent the overall meta-analytic effect for the subset of studies involving rapport/no-rapport, whereas the red diamond represents the effect size across all studies.

A

Group by Rapport	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Std diff in means and 95% CI
No rapport	Expt 1	-0.314	0.311	0.096	-0.923	0.295	-1.011	0.312	
No rapport	Expt 3 no rapport	-0.425	0.253	0.064	-0.920	0.071	-1.680	0.093	
No rapport	Expt 4	-0.117	0.236	0.056	-0.579	0.345	-0.496	0.620	
No rapport		-0.273	0.151	0.023	-0.568	0.023	-1.810	0.070	
Rapport	Expt 2	0.192	0.177	0.031	-0.156	0.539	1.081	0.280	
Rapport	Expt 3 rapport	-0.052	0.250	0.063	-0.542	0.438	-0.207	0.836	
Rapport		0.110	0.145	0.021	-0.173	0.394	0.763	0.446	
Overall		-0.073	0.104	0.011	-0.278	0.131	-0.703	0.482	

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer — Facing away

B

Group by Rapport	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Std diff in means and 95% CI
No rapport	Expt 1	0.392	0.312	0.097	-0.219	1.002	1.257	0.209	
No rapport	Expt 3 no rapport	0.200	0.251	0.063	-0.291	0.692	0.799	0.424	
No rapport	Expt 4	0.249	0.237	0.056	-0.215	0.713	1.051	0.293	
No rapport		0.265	0.151	0.023	-0.031	0.560	1.757	0.079	
Rapport	Expt 2	-0.420	0.179	0.032	-0.770	-0.070	-2.350	0.019	
Rapport	Expt 3 rapport	-0.176	0.250	0.063	-0.667	0.314	-0.704	0.481	
Rapport		-0.338	0.145	0.021	-0.623	-0.053	-2.322	0.020	
Overall		-0.047	0.105	0.011	-0.252	0.158	-0.449	0.653	

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer — Facing away

C

Group by Rapport	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
No rapport	Expt 1	0.038	0.309	0.095	-0.567	0.643	0.122	0.903
No rapport	Expt 3 no rapport	0.237	0.251	0.063	-0.255	0.729	0.945	0.345
No rapport	Expt 4	-0.115	0.236	0.056	-0.577	0.347	-0.487	0.626
No rapport		0.047	0.150	0.023	-0.247	0.342	0.315	0.753
Rapport	Expt 2	0.130	0.177	0.031	-0.217	0.477	0.733	0.463
Rapport	Expt 3 rapport	0.286	0.251	0.063	-0.207	0.778	1.137	0.256
Rapport		0.181	0.145	0.021	-0.102	0.465	1.254	0.210
Overall		0.117	0.104	0.011	-0.087	0.321	1.122	0.262

Std diff in means and 95% CI

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

D

Group by Rapport	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
No rapport	Expt 1	-0.363	0.311	0.097	-0.973	0.247	-1.167	0.243
No rapport	Expt 3 no rapport	-0.200	0.251	0.063	-0.691	0.291	-0.797	0.425
No rapport	Expt 4	-0.244	0.237	0.056	-0.708	0.220	-1.032	0.302
No rapport		-0.256	0.151	0.023	-0.551	0.039	-1.700	0.089
Rapport	Expt 2	0.405	0.179	0.032	0.055	0.755	2.269	0.023
Rapport	Expt 3 rapport	0.126	0.250	0.063	-0.364	0.617	0.504	0.614
Rapport		0.311	0.145	0.021	0.026	0.596	2.140	0.032
Overall		0.038	0.105	0.011	-0.167	0.242	0.359	0.720

Std diff in means and 95% CI

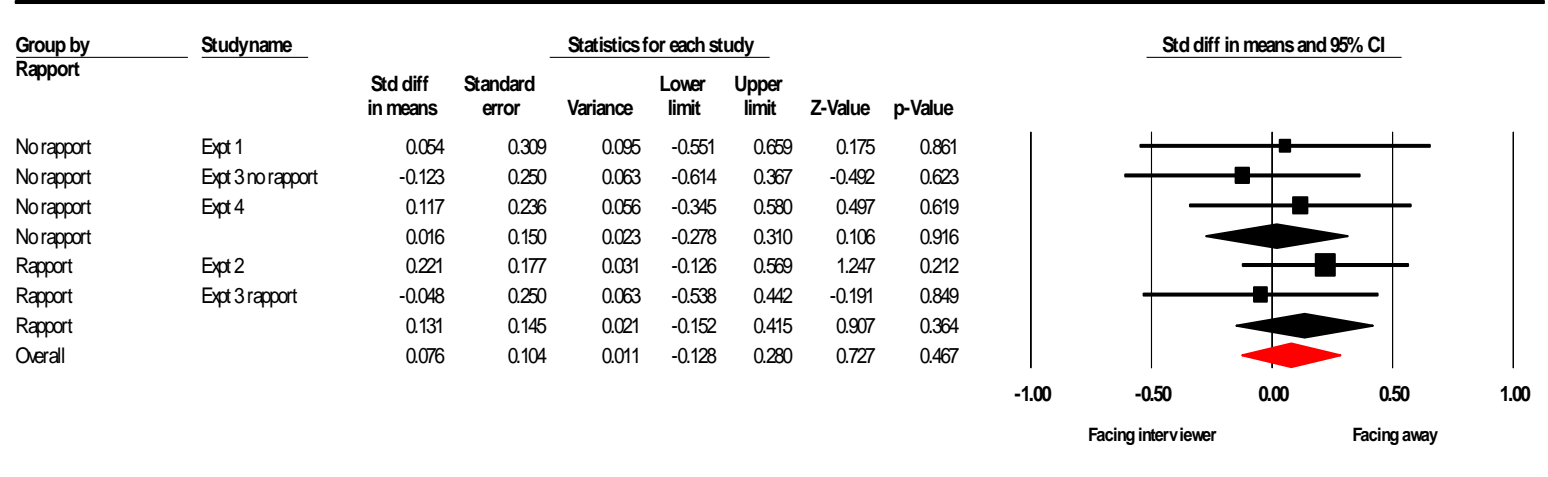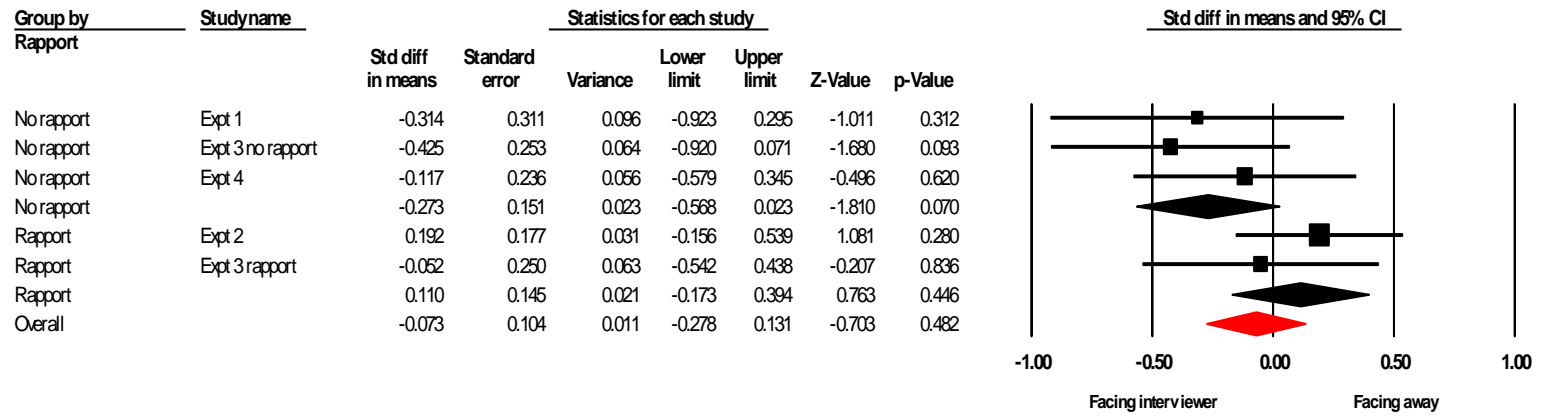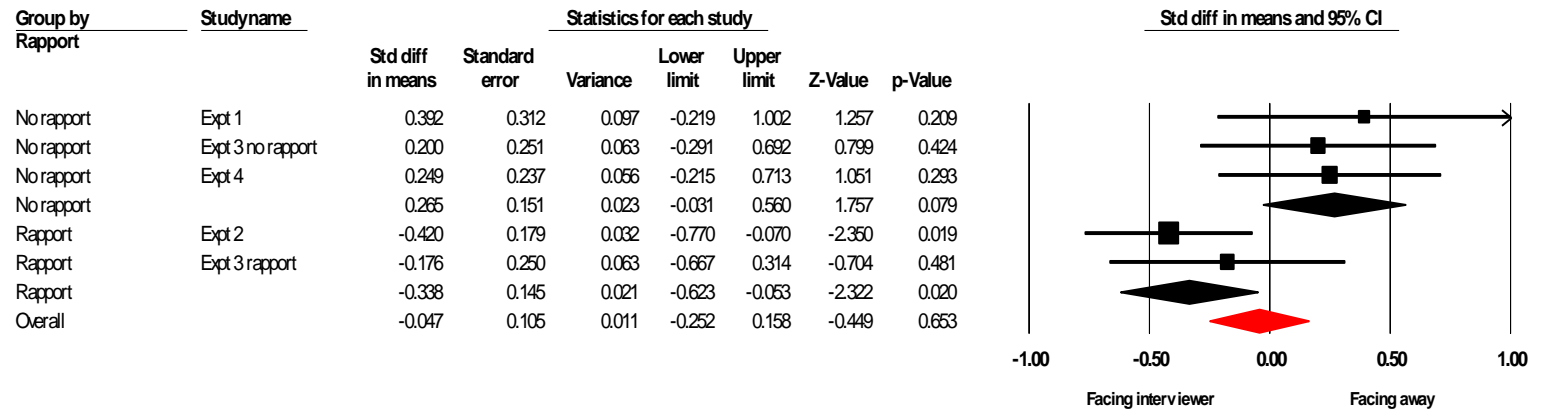-1.00   -0.50   0.00   0.50   1.00
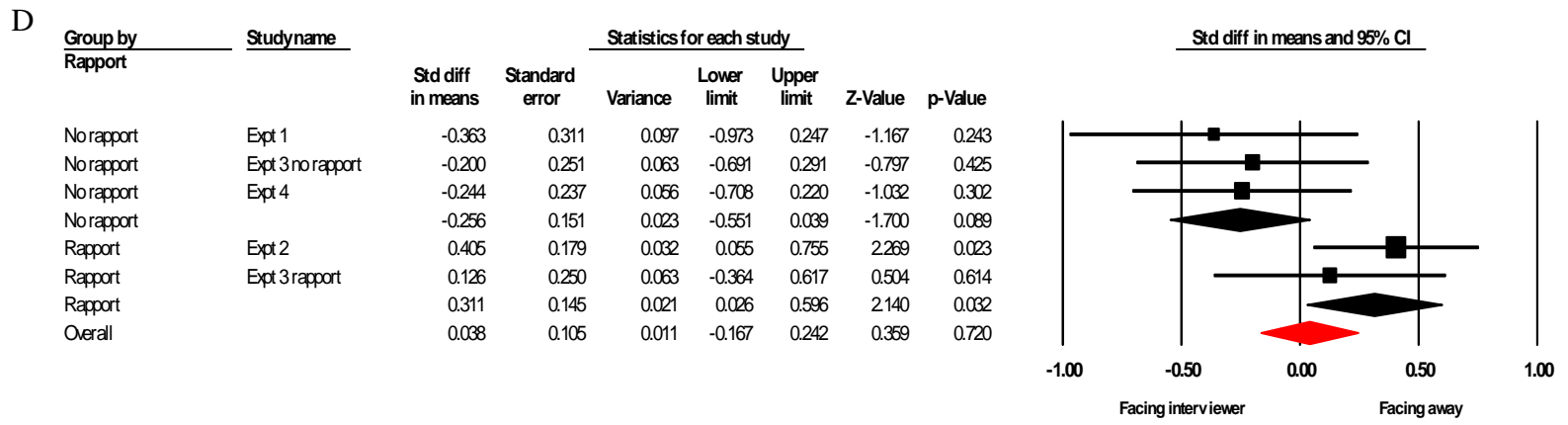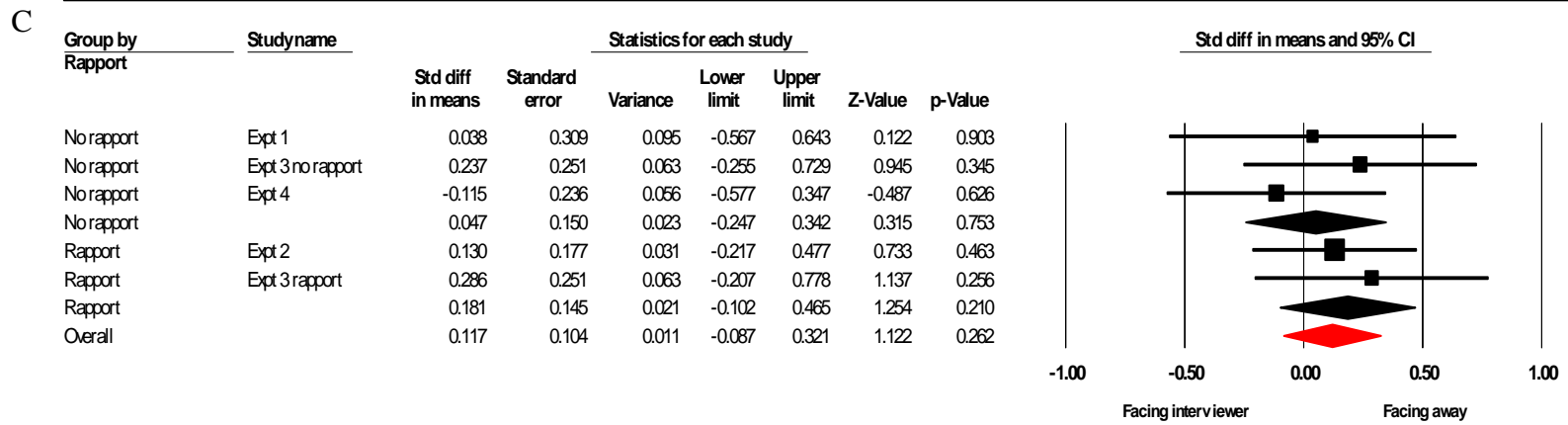
Facing interviewer   Facing away

Figure 8. Forest plots showing moderator effect size estimations of witness gaze direction on (A) Correct responses, (B) Incorrect responses, (C) Don't know responses and (D) Overall accuracy in closed questions across Experiments 1-4. The black diamonds represent the overall meta-analytic effect for the subset of studies involving rapport/no-rapport, whereas the red diamond represents the effect size across all studies.

6.3.2 Situational self-awareness. Similarly to the previous section, this time I conducted

moderator analyses to investigate the possible role of rapport-building in the effect of witness

gaze direction on measures of situational self-awareness. Here again, as can be seen in

Table 16, the Q statistic represents homogeneity of effect sizes across studies. As before, a

significant value of Q ($p < .05$) would suggest heterogeneity of results across studies,

indicating possible moderator effects. Further, a positive overall effect size (i.e., $d > 0$)

indicates that when the witness faced away from the interviewer, scores on a particular

variable were generally higher than when the witness faced the interviewer. Likewise, a

negative overall effect size (i.e., $d < 0$) indicates that when the witness faced away from the

interviewer, scores on a particular variable were generally lower than when the witness faced

the interviewer. Furthermore, again Experiment 3 was split into "rapport" and "no rapport".

As can be seen from Figure 9, the effect of witness gaze direction was still non-

significant regardless of whether participants were in a "rapport" or "no rapport" experiment,

with no clear pattern to the spread of the effects in the forest plots. Both "rapport" and "no-

rapport" effect size estimates for all measures were small, with confidence intervals including

zero as a plausible value. Further, as represented in Table 16, the non-significant Q statistics

show homogeneity in results across "rapport" and "no rapport" studies.

Table 18

Tests of significance of the rapport moderator in each measure of situational self-awareness.
p < .05 would indicate a significant difference in effect size estimates between "rapport" and
"no-rapport" experiments for a particular situational self-awareness measure.

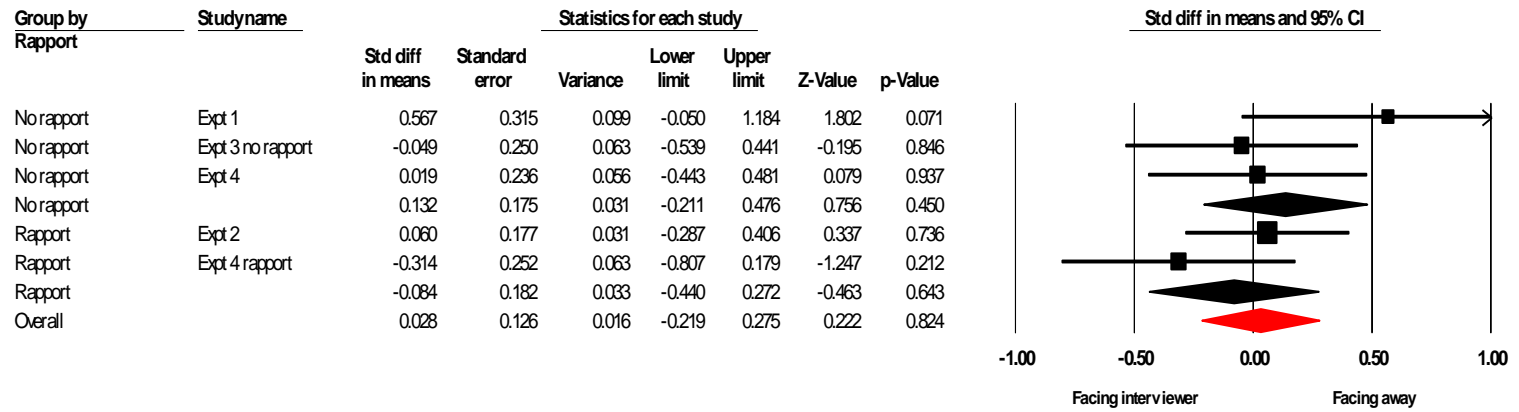|		Q-value	df	*p*
Situational self-awareness	Private	0.74	1	.39
	Public	1.07	1	.30
	Surroundings	1.00	1	.32

6.4 Summary

In summary, I firstly conducted a series of mini meta-analyses, investigating the effect of

witness gaze direction on participants' memory performance in free recall and closed

questioning. There were no significant effects of witness gaze direction on any of the response types. Similarly, a series of meta-analyses on the measures of situational self-awareness also did not produce any notable effects. All effects for these meta-analyses were small with confidence intervals including zero as a plausible effect size value.
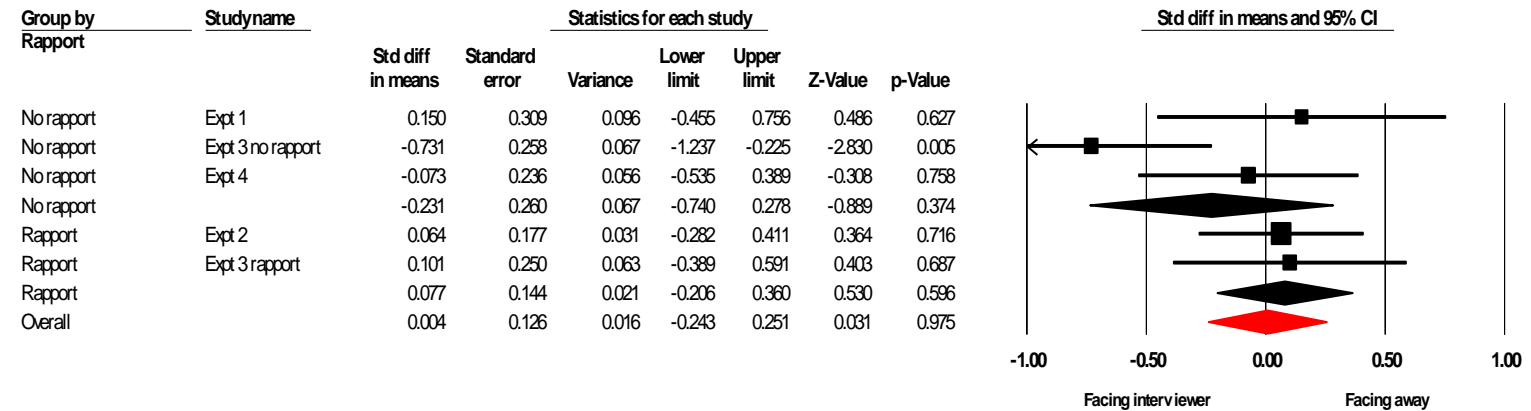
Then, I conducted a series of moderator analyses on the same data in order to tease apart any possible effects of rapport-building. This time, some moderators were significant with some significant but small beneficial effects of facing away in closed questioning when rapport-building was present. No such effects were observed in free recall or for situational self-awareness.

Overall, conducting a series of mini meta-analyses allowed me to summarise and present data across Experiments 1-4, ensuring better power for more reliable results than individual experiments alone. These analyses provided further insight into the data that was not possible when looking at the experiments individually, showing that the effect of witness gaze direction in investigative interviewing appears to be smaller than previous research in eye-closure and gaze aversion in other fields has suggested so far. In addition, the moderator analyses revealed that perhaps facing away from the interviewer could potentially produce the expected advantageous effects to memory performance but only when rapport is built first and only during closed questioning. Applicability of these relatively small effects that only manifest under certain conditions might therefore be questioned in practice.
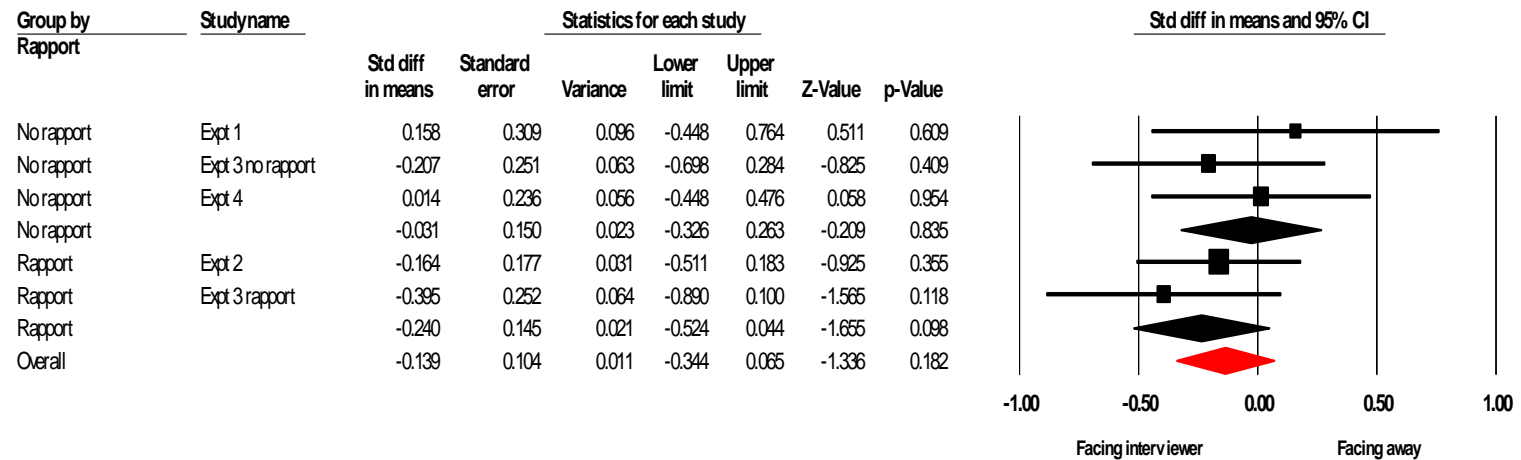
A

Group by Rapport	Studyname	Statistics for each study							Std diff in means and 95% CI
		Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	
No rapport	Expt 1	0.567	0.315	0.099	-0.050	1.184	1.802	0.071	
No rapport	Expt 3 no rapport	-0.049	0.250	0.063	-0.539	0.441	-0.195	0.846	
No rapport	Expt 4	0.019	0.236	0.056	-0.443	0.481	0.079	0.937	
No rapport		0.132	0.175	0.031	-0.211	0.476	0.756	0.450	
Rapport	Expt 2	0.060	0.177	0.031	-0.287	0.406	0.337	0.736	
Rapport	Expt 4 rapport	-0.314	0.252	0.063	-0.807	0.179	-1.247	0.212	
Rapport		-0.084	0.182	0.033	-0.440	0.272	-0.463	0.643	
Overall		0.028	0.126	0.016	-0.219	0.275	0.222	0.824	

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer   Facing away

B

Group by Rapport	Studyname	Statistics for each study							Std diff in means and 95% CI
		Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	
No rapport	Expt 1	0.150	0.309	0.096	-0.455	0.756	0.486	0.627	
No rapport	Expt 3 no rapport	-0.731	0.258	0.067	-1.237	-0.225	-2.830	0.005	
No rapport	Expt 4	-0.073	0.236	0.056	-0.535	0.389	-0.308	0.758	
No rapport		-0.231	0.260	0.067	-0.740	0.278	-0.889	0.374	
Rapport	Expt 2	0.064	0.177	0.031	-0.282	0.411	0.364	0.716	
Rapport	Expt 3 rapport	0.101	0.250	0.063	-0.389	0.591	0.403	0.687	
Rapport		0.077	0.144	0.021	-0.206	0.360	0.530	0.596	
Overall		0.004	0.126	0.016	-0.243	0.251	0.031	0.975	

-1.00 -0.50 0.00 0.50 1.00

Facing interviewer   Facing away

139

C

Group by Rapport	Study name	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Std diff in means and 95% CI
No rapport	Expt 1	0.158	0.309	0.096	-0.448	0.764	0.511	0.609	
No rapport	Expt 3 no rapport	-0.207	0.251	0.063	-0.698	0.284	-0.825	0.409	
No rapport	Expt 4	0.014	0.236	0.056	-0.448	0.476	0.058	0.954	
No rapport		-0.031	0.150	0.023	-0.326	0.263	-0.209	0.835	
Rapport	Expt 2	-0.164	0.177	0.031	-0.511	0.183	-0.925	0.355	
Rapport	Expt 3 rapport	-0.395	0.252	0.064	-0.890	0.100	-1.565	0.118	
Rapport		-0.240	0.145	0.021	-0.524	0.044	-1.655	0.098	
Overall		-0.139	0.104	0.011	-0.344	0.065	-1.336	0.182	

-1.00   -0.50   0.00   0.50   1.00

Facing interviewer   Facing away

Figure 9. Forest plots showing moderator effect size estimations of witness gaze direction on (A) Private self-awareness, (B) Public self-awareness and (C) Awareness of surroundings across Experiments 1-4. The black diamonds represent the overall meta-analytic effect for the subset of studies involving rapport/no-rapport, whereas the red diamond represents the effect size across all studies.

Chapter 7: Effects of witness gaze direction and eye-closure in a picture memory task

Within the previous four experiments, I investigated whether facing away from the interviewer might enhance witness recall during an investigative interview, as is similarly found with gaze aversion in other fields and with witness eye-closure (e.g., Buchanan et al., 2014; Perfect et al., 2008). All experiments showed minimal evidence of such a benefit, when facing away was explored alone, alongside interviewer facing away or rapport-building. Gaze aversion is recommended as an alternative to witness eye-closure if the witness is not comfortable closing their eyes (e.g., Milne, 2004), but my findings so far suggested that gaze aversion might not be a comparable alternative. So in Experiment 4, facing away from the interviewer was directly compared to witness eye-closure to determine with confidence whether facing away can be used as an alternative for eye-closure. I did not find the two techniques to be significantly different from each other in terms of their effects on memory, but both techniques did benefit correct details reported during free recall to the same extent. Further, when exploring the data across all experiments in a series of mini meta-analyses in Chapter 6, I found some significant beneficial effects of witness gaze direction in closed questioning, when rapport-building was included as a moderator. The effects were also mostly in the same direction in free recall analyses, although not significant. Therefore, it seems that the potential benefits of facing away might still be present (albeit they appear to be smaller than expected) and should not be ruled out before some further investigation.

One reason for the lack of predicted effects overall might be that the tasks were not difficult enough to see an effect of facing away or eye-closure. According to the cognitive load explanation of these techniques, averting gaze or closing the eyes should facilitate performance as these techniques free up cognitive resources to be used for the task at hand that might otherwise be directed to monitoring of the environment. However, eye-closure and facing away might not be beneficial if the cognitive load is not at a particularly high level as participants would be doing well enough anyway. If the task is not cognitively demanding and

there is no need for these techniques, they could, in fact, be causing a distraction by adding a task that participants have to perform but do not see a benefit behind it (i.e., having to face away or close their eyes). This explanation might account for why I found that participants reported to invest a higher level of mental effort in remembering for both facing away and eye-closure, and that eye-closure interviews were also rated as more difficult, compared to facing the interviewer in Experiment 4. Alternatively, it could be that the tasks in my previous experiments were difficult enough, but participants simply did not feel any obligation or feel motivated to keep going with their recall once it became difficult to recall – they could simply say "don't know" in closed questions or that they could not remember any more in free recall. After all, my experiments involved a mock interview so participants would not feel as motivated as they might with a real crime where the stakes are high.

Indeed, in one study, Vredeveldt et al. (2013) questioned their participants two minutes and one week after they witnessed a filmed event, with their eyes open or closed. The authors found eye-closure to have no effect on recall during the first interview, but it increased the amount of correct information reported during the second interview. The delay of one week made recall more difficult, and this study's results suggest that eye-closure might be most effective when maximum efforts need to be exerted. However, other research has found eye-closure to be beneficial to recall shortly after witnessing an event (Perfect et al., 2008; Vredeveldt & Penrod, 2013). Therefore, the explanation that facing away and eye-closure might be most beneficial when the task is difficult and cognitively demanding should be tested out directly.

To test out this explanation, a suitable task would be one where difficulty can be objectively manipulated. Video-clips are typically used in eyewitness research, but videos usually contain a lot of information, some of which might be seen as difficult by some people but not by others. In addition, when recalling video-clips of an event, the details are usually related (so report of one item might trigger a memory of another item; Uchiyama & Mitsudo, 2019), therefore a direct and objective manipulation of task difficulty might be more suitable to investigate my research question in Experiment 5. In addition, using a different task to

ones that I have already used would ensure that my previous results are not due to the nature of the videos that were used and can be replicated across a range of materials. Both facing away and eye-closure have been used in several tasks such as ones assessing verbal and arithmetic reasoning, new word learning and creativity (Doherty-Sneddon et al., 2002; Einstein et al., 2002; Ritter et al., 2018) so I would expect similar results in the current experiment. In order to address the possibility that participants in my previous experiments did not feel motivated to try hard when recalling the event, participants in the current experiment were explicitly asked to try as hard as they can because they could find out their total score at the end.

7.1 Aims of the current experiment

The main aim of Experiment 5 was to manipulate task difficulty in order to test whether facing away from the interviewer and eye-closure might be most effective when the task is relatively demanding. Therefore, I might predict an interaction whereby both facing away and eye-closure would enhance participants' memory performance on a harder task, compared to a control face-to-face interview. However, I would predict no difference between conditions when the task is easier.

In terms of the main effects, I would predict that the overall memory performance will be enhanced on the easier tasks, compared to the harder ones, regardless of interview type. However, based on the mostly null findings from Experiments 1-4, I would predict no significant main effect of interview type.

7.2 Method

7.2.1 Participants and design. A total of 70 Aston University students were initially recruited for the experiment, however three participants' data were excluded (one was not able to name all pictures in English and two kept their eyes closed without being prompted in the control condition). Therefore, an additional three participants were recruited in their place. This resulted in a total sample of 70 Aston University students (59 female, 9 male, one did

not specify their gender; age range 18 – 21; M = 18.87, SD = 0.82)[4]. Power analysis

indicated this to be appropriate sample size to detect the interaction effect (f = .25) in the

current study design, assuming α = .05, power = .90, and correlation between repeated

measures of r = .00. First and second year undergraduate psychology students participated

either voluntarily or in exchange for course credits. The study used a 3 (Interview type:

Control vs. Facing away vs. Eye-closure) x 2 (Difficulty: Easier vs. Harder task) within-

subjects design.

7.2.2   Materials. A total of 216 pictures were implemented across six conditions (pictures

were previously used in Konckle, Brady, Alvarez, & Oliva, 2010). The pictures depicted

various simple everyday objects such as animals, food, household objects. Each was used

once across the conditions, and pictures were selected so that the object was a familiar

everyday item and could be named with one or two words. The pictures were presented in a

grid of 12 for the easier condition and a grid of 36 for the harder condition (see Figures 10

and 11 for examples). All pictures were approximately the same size (around 3cm x 3cm)

and they were presented in Microsoft PowerPoint.

Six sets of harder grids were created first with 36 different pictures in each grid. For

the easier conditions, a subset containing 12 pictures was taken from each of the harder

grids (see Figures 10 and 11 for an example) in order to ensure that the content of the grids

remained the same and only the quantity of pictures was manipulated across conditions. For

both difficulty conditions, the order of pictures within each set remained the same for every

participant, and the order in which the sets were presented also remained the same. Using

Figures 10 and 11 as examples, these particular grids always had apple as the first picture,

followed by bench, camel, mug etc. These grids were the first set presented to participants

(Figure 10 in the easier condition and Figure 11 in the harder condition) and it always

remained as the first set for all participants. However, the order in which the easier and

harder conditions were implemented was randomised across all participants. Therefore,

[4] Due to one participant's missing online data, these statistics are based on 69 participants

some participants saw Figure 10 first as they completed the easier condition first and others saw Figure 11 first as the completed the harder condition first. The same applied to the remaining five conditions.

Similarly to Experiment 4, participants were again asked to estimate their perceived amount of mental effort (Paas, 1992) and how difficult they found each interview (Pollock et al., 2002). Participants also completed the Brief Social Phobia scale once at the end of the experiment (Davidson et al., 1991).

Figure 10. A layout example of a grid of pictures
in the easier condition (not actual size).

Figure 11. A layout example of a grid of pictures in the harder
condition (not actual size).

7.2.3 Procedure. The study was pre-registered using AsPredicted.org; the protocol can be found at http://aspredicted.org/blind.php?x=w27af9. The study received a favourable ethical opinion from Aston University Life and Human Sciences Ethics Committee. All participants were tested individually in a quiet laboratory in a single session. The same interviewer conducted all of the interviews, and participants were told that the study would test how much they can remember.

The overall procedure was similar to Experiment 4 with some exceptions. After consenting to take part, participants were presented with the first picture grid and asked to study it for 90 seconds. Then, they were interviewed with the aim of retrieving as many of the picture labels as possible. All participants took part in all conditions resulting in six interviews for each participant in total (interview format x difficulty). The order in which these conditions were implemented was randomised across participants. The interview procedure mimicked that of Experiments 1-4, whereby participants were seated across a desk from the interviewer while they received a standardised set of verbal instructions. The interviewer asked that participants report everything that they could remember in any order, and participants were told to avoid guessing, if they could not remember certain pictures. Participants were also told that they were free to recall at their own pace and that this part of the experiment was not timed. In order to address the possibility that participants in my

previous experiments did not feel motivated to try hard when recalling the event and to increase their motivation, participants were asked to try as hard as they can as they would receive their total score at the end. All interviews were audio-recorded to allow for accurate transcription and coding.

After these instructions, the interview type manipulation was implemented. The conditions mimicked those in Experiments 1-4, whereby during the facing away interview, participants were asked to turn their chair 180° to face a blank wall, during the eye-closure interview, participants were asked to close their eyes for the duration of the interview whilst facing the interviewer, and during the control interview, participants did not receive any additional instructions, and therefore all remained facing the interviewer with their eyes open. Participants were told that these arrangements were in place to help them concentrate on remembering, and that the interviewer would remain quiet and take notes without interruption. Participants were told to let the interviewer know when they cannot remember any more and were given opportunity to ask questions. Then, participants were prompted to start speaking by asking them to tell everything that they can remember from the grid of pictures.

After participants exhausted their recall, they were asked to estimate how much mental effort they had to invest in remembering and how easy or difficult it was, on paper. This procedure was repeated for all six interviews for each participant. At the end of all interviews, participants completed the Brief Social Phobia scale once and provided their demographic information and speculations about the aims of the study on a computer while the interviewer waited outside the room. Finally, they were fully debriefed.

7.2.4 Data coding. Each interview was transcribed verbatim and coded blind to condition. For each item, prior to data collection, I established which answers would be accepted as correct responses. Each response was coded as either correct or incorrect. Responses were ignored when they described an item in too general terms (e.g., "bird" or "animal" instead of specifying the kind). If the participant changed their mind, only their final response was

coded, and if they expressed uncertainty about their answer, this was still coded as their answer.

A total of 14 participants' randomly selected transcripts (with each transcript containing an interview from each of the six trials) were coded by an independent coder who was also blind to the experimental conditions. After being coded, correct responses were summed across all participants separately for each trial and for each coder. Therefore, in the end, there were six values from the first coder (one for each trial) that were assessed against the six values from the second coder. Overall, the inter-rater reliability was good ($r = .97$) and therefore the first coder's scores were retained for analyses.

7.3   Results

To answer the main research question, I explored the proportion of correct responses in the interview type and difficulty conditions. Then, I also looked at participants' ratings of interview difficulty and mental effort across these conditions. Additionally, I conducted some exploratory analyses, looking at participants' false recall.

7.3.1   Proportion correct. Across all interview type conditions, participants recalled between two and 12 items in the easy condition and between two and 22 items in the difficult condition. Therefore, proportion of correct responses was calculated to standardise correct recall across difficulty conditions by dividing the number of correct responses by the number of total items presented in each condition. Then, a 3 (Interview type: Control vs. Facing away vs. Eye-closure) x 2 (Difficulty: Easier vs. Harder task) repeated measures ANOVA was carried out on the proportion of items recalled correctly. The analyses are presented in Table 17. There was no significant main effect of interview type, $F(2,138) = 0.77$, $p = .46$, $\eta_{p2} = .01$. However, there was a significant main effect of difficulty, $F(1,69) = 1477.38$, $p < .001$, $\eta_{p2} = .96$, with participants reporting a higher proportion of correct responses in the easier condition compared to the harder condition. Finally, there was no significant interaction, $F(2,138) = 0.81$, $p = .45$, $\eta_{p2} = .01$.

Table 19

Mean proportion of correct responses across the interview type and difficulty conditions in Experiment 5 (standard deviations in parentheses)

	Condition					
	Control		**Facing away**		**Eye-closure**	
	Easy	**Difficult**	**Easy**	**Difficult**	**Easy**	**Difficult**
Proportion correct	0.78 (0.17)	0.33 (0.09)	0.78 (0.15)	0.36 (0.11)	0.76 (0.17)	0.35 (0.11)

7.3.2 Difficulty. As a manipulation check for the difficulty condition and also as a way to explore the interview type conditions further, a repeated measures ANOVA was conducted on participants' scores of difficulty of remembering. There was no significant main effect of interview type, $F(2, 138) = 0.67$, $p = .52$, $\eta_{p2} = .01$. However, there was a significant main effect of difficulty, $F(1, 69) = 147.39$, $p < .001$, $\eta_{p2} = .68$, with participants reporting the harder conditions to be more difficult compared to the easier ones (see Table 18 for these analyses). Therefore, this confirms that the manipulation had the desired effect in varying task difficulty. Finally, there was no significant interaction, $F(2, 138) = 0.83$, $p = .44$, $\eta_{p2} = .01$.

7.3.3 Mental effort. Similarly to analyses of difficulty above, a repeated measures ANOVA on participants' reported levels of mental effort invested in remembering was carried out. This analysis showed no significant main effect of interview type, $F(2,138) = 1.10$, $p = .34$, $\eta_{p2} = .02$. However, there was a significant main effect of difficulty, $F(1,69) = 63.25$, $p < .001$, $\eta_{p2} = .48$, with participants rating the harder conditions as requiring more mental effort than easier ones (see Table 18 for these analyses). Finally, there was again no significant interaction, $F(2,138) = 1.21$, $p = .30$, $\eta_{p2} = .02$.

Table 20

Mean scores for interview difficulty and mental effort across the interview type and difficulty conditions in Experiment 5 (standard deviations in parentheses)

| | Condition | | | | | |
| | Control | | Facing away | | Eye-closure | |
	Easy	**Difficult**	**Easy**	**Difficult**	**Easy**	**Difficult**
Difficulty	4.67 (1.72)	6.59 (1.54)	4.70 (1.57)	6.66 (1.38)	4.39 (1.76)	6.63 (1.42)
Mental effort	5.54 (1.42)	6.69 (1.27)	5.47 (1.56)	6.73 (1.31)	5.20 (1.70)	6.69 (1.35)

7.3.4 Exploratory analyses

7.3.4.1 False recall

As a way to explore the data further, I looked at the number of false details recalled by participants. False recall was split into intrusion errors and new items. Responses were coded as intrusion errors when participants recalled an item from a previous grid, and responses were coded as a new item when participants recalled an item that was not present in any of the grids.

7.3.4.2 Intrusion errors. Firstly, intrusion errors were defined as any items from a picture grid reported by a participant that actually belonged on another previously seen grid. Therefore, these items would be cases where participants confused the source of their memory (i.e., how they learnt these items; see Johnson, Hashtroudi, & Lindsay, 1993 for source monitoring framework).

As can be seen from Figure 12, summed across all interview types, participants made more intrusion errors in the harder conditions compared to the easier ones, $Z = -3.12$, $p = .002$. For the easier conditions, across all participants, there were nine to 10 intrusion errors reported in each interview type condition. For the harder conditions, across all participants, there were between 16 and 25 intrusion errors reported in each interview type condition, with eye-closure resulting in the lowest rates, followed by facing away, and facing interviewer had the highest rates of errors. It is interesting to note that when the task was harder, eye-closure seemed to help participants make fewer intrusion errors compared to the other interview type

conditions. This difference was not significant when tested using the Friedman test, $\chi_2(2) =$ 1.33, $p = .51$, but it should be noted that this test was based on a small number of intrusion errors as the majority of participants did not report any.

7.3.4.3 New items. New items were defined as any items reported by a participant that were not present in any of the picture grids. These scores might be akin to confabulation in eyewitness research.

As can be seen from Figure 13, summed across all interview types, participants recalled more new items in the harder conditions compared to the easier ones, $Z = -2.50$, $p = .01$. For the easier conditions, across all participants, there were between 3 and 5 new items reported in each interview type condition, and similarly to intrusion errors, these scores appear to be similar across the interview types. For the harder conditions, across all participants, the scores ranged between six and 13 new items in each interview type condition, and this time participants recalled nearly twice as many new items in the facing away condition compared to the other two. Although this time, the highest rates of false recall were now in the facing away condition, it is worth noting that the rates in the eye-closure condition have remained relatively low, similarly to intrusion errors. However, these differences between interview type conditions were again not significant, $\chi_2(2) = 2.15$, $p = .34$.
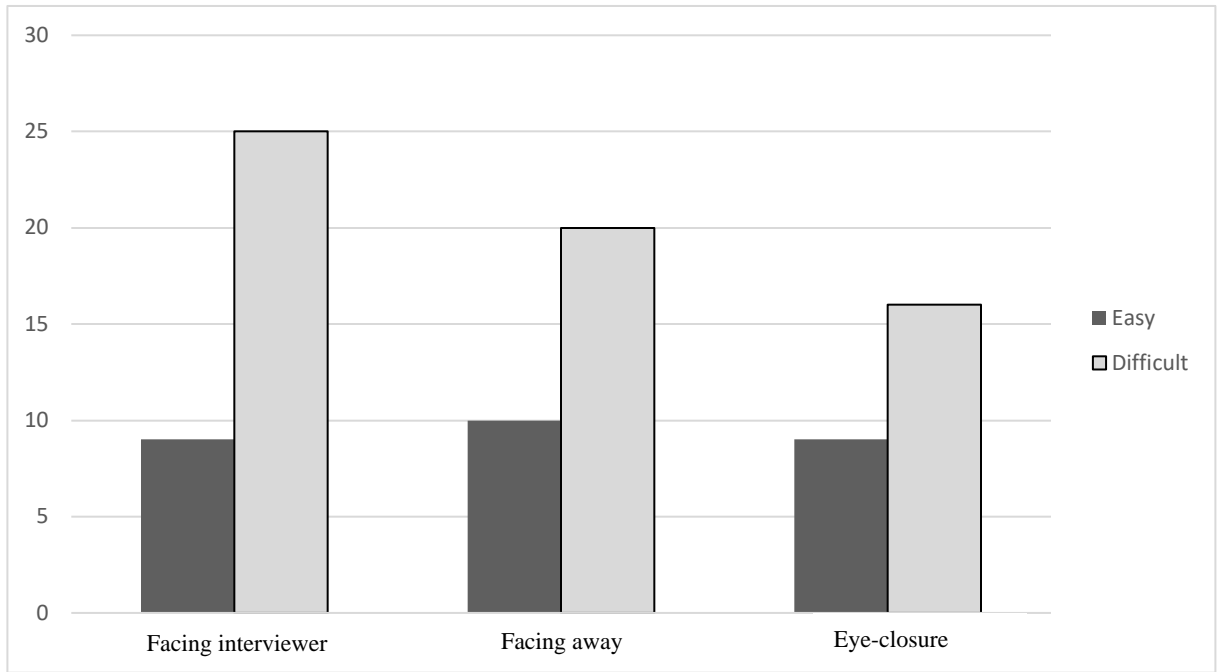
Figure 12. Number of intrusion errors reported in the different interview type conditions across easier and harder tasks
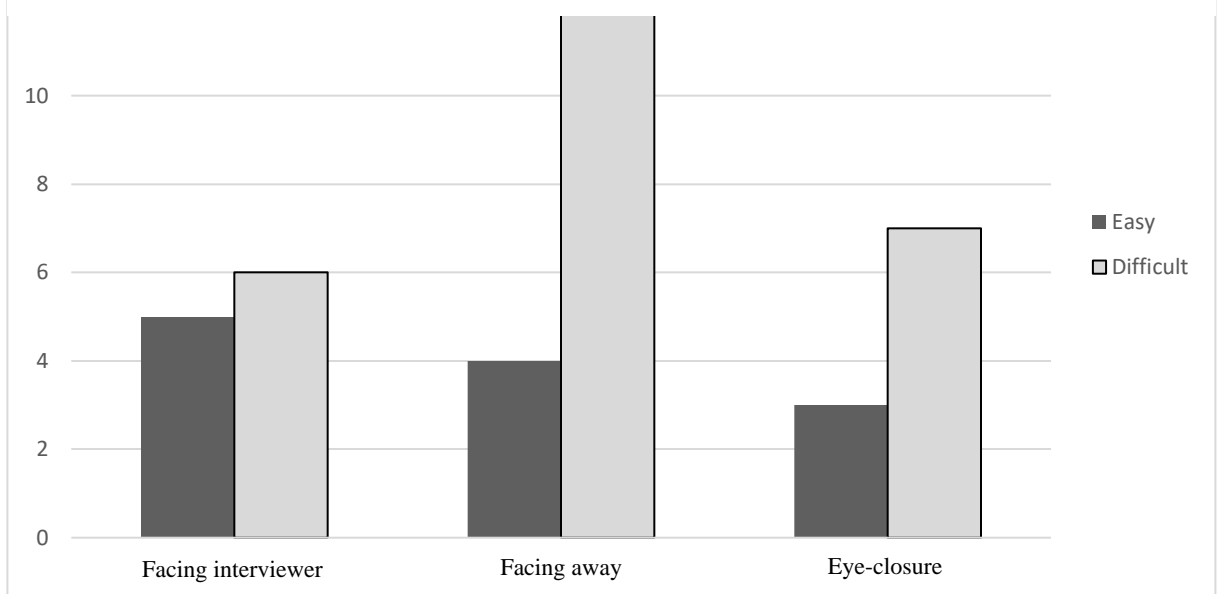
Figure 13. Number of new items reported in the different interview type conditions across easier and harder tasks

The aim of Experiment 5 was to test out the final explanation, as part of the current thesis, for why I might not have found a consistent benefit of facing away across Experiments 1-4. Based on some of the results from Experiment 4 and previous research, I hypothesised that the benefits of facing away and eye-closure might be more apparent when the task is particularly difficult. Participants in my previous experiments might have been able to do well without the need for additional interviewing techniques, hence no difference between conditions in most cases. Seeing as facing away and eye-closure were found to be similarly beneficial to correct responding in free recall in Experiment 4 and the mini meta-analyses in Chapter 6 showed an indication of some possible positive small effects of facing away, particularly when including rapport-building as a moderator, I did not want to rule out facing away as an alternative for eye-closure yet. To investigate the main research questions in the current experiment, I used a picture memory task where difficulty can be objectively manipulated by varying the number of pictures to be remembered. In addition, using a different task to Experiments 1-4 also allowed to see if my previous results could be replicated across a range of materials.

Overall, although task difficulty had the desired effect on recall whereby harder tasks were consistently rated as more difficult than easier ones, there was no effect of interview type on proportion of correct responses and there was no interaction between the two variables. In other words, whether the task was easy or difficult, there was no difference in how beneficial facing away or eye-closure (or the regular face-to-face interview) were to recall. One of the main concerns from the previous experiments was the possibility that participants did not have to continue trying to recall when it became difficult - they could simply say that they could not remember any more. In a real-life police interview, this would be beneficial to avoid guessing, but in the lab experiments where there is no real motivation or consequence to reporting every detail, participants might have wanted to end their recall as soon as they felt they reported some information. Therefore, in the current experiment, I attempted to motivate participants by telling them that they can find out how they performed and their total score at the end. However, although most participants recalled the majority of

pictures in the easier condition and around a third in the harder condition, there is still question as to whether telling participants that they would find out their score actually increased motivation. In hindsight, it might have been useful to explicitly ask participants for their ratings of motivation.

Another way to motivate participants to report as much information as possible could be to avoid telling participants that it is fine when they cannot remember any more, but the intention of the current experiment and the thesis overall was to test out techniques that could be implemented in practice where witnesses would be advised to avoid guessing and stop when they cannot remember any more. Therefore, I have based the witness instructions on those recommended for the CI (for a further discussion of this point, see Chapter 8).

When looking at the effects of interview type on participants' ratings of interview difficulty and mental effort, this time, there were no significant effects, suggesting that all interviews were rated similarly across the interview type conditions. Therefore, the results I found in Experiment 4 whereby facing away and eye-closure required a higher level of mental effort and eye-closure interviews were rated as more difficult were not replicated here.

Finally, to explore the data further, I looked at false recall in a series of exploratory analyses. Although the majority of participants' responses did not contain false details, it was interesting to note that, overall, there were more false recall items in the harder conditions than easier ones. As a speculation, participants might have been more likely to get confused about which pictures they saw and where, as they were struggling to remember all 36 pictures from the harder grid. On average, across the interview type conditions, participants were able to report between 11 and 12 pictures in the harder conditions (around one-third of the total). From observation during the interview, as participants struggled to remember most of the pictures and searched through their memories, they seemed more likely to give answers that they were not sure about. On the other hand, in the easier conditions, participants clearly found it less difficult to bring to mind the majority of the pictures presented to them and therefore seemed less likely to continue searching for more pictures that they

were not immediately confident about (on average, participants were able to report around three-quarters of the pictures in the easier conditions).

The intrusion errors, in particular, can be explained with the source monitoring framework. Source monitoring involves identifying the origins of one's memories, and these sources are more likely to be confused if they are perceptually similar (Johnson et al., 1993; Mitchell & Johnson, 2000). Therefore, it is perhaps not surprising that participants made intrusion errors on this task as all pictures were presented in the same way (e.g., timing of presentation, size of pictures) and many were also semantically related (e.g., different types of animals or birds). Consequently, among many pictures seen throughout the experiment, it is possible that participants could remember seeing a picture but could not remember which grid it came from, hence creating intrusion errors. Overall, the lack of an increase in errors for facing away or eye-closure, compared to the control condition (in fact, eye-closure had some of the lowest rates of false recall, especially for the harder conditions), is in support of previous findings that do not show an associated increase in incorrect recall when exploring benefits of eye-closure (e.g., Perfect et al., 2008; Vredeveldt et al., 2013).

In sum, in the current experiment, I explored the effects of facing away and eye-closure in a picture memory task, varying the level of difficulty of the task. Overall, although the harder tasks were consistently found to be more difficult than the easier ones, there were no effects of any of the interview types.

Chapter 8: General Discussion

In a series of five experiments, this thesis explored the effectiveness of facing away from the interviewer as a technique to enhance witness recall during investigative interviewing. The technique was initially tested alone, then alongside interviewer facing away and rapport-building and it was also compared to witness eye-closure, using a mock investigative interview set-up in Experiments 1-4 and also using a picture memory task in Experiment 5. Interviewing guidelines often recommend that witnesses can be asked to look toward a blank field such as a wall as an alternative to eye-closure, but the effectiveness of the former technique has not been empirically tested before. Furthermore, research from the broader cognitive literature suggests that being observed by and observing another person can be detrimental to task performance. Therefore, overall, I predicted that facing away by the witness would enhance their recall, compared to a face-to-face interview.

Against my predictions, I found evidence of minimal benefit of facing away over the five experiments with some small but enhancing effects present during closed questioning in Experiment 2 and during free recall in Experiment 4. The minimal benefits were despite also having the interviewer face away in Experiment 2 in order to counteract the problem of being observed and despite building a rapport with witnesses in Experiment 3. Furthermore, facing away and witness eye-closure were found to affect recall similarly across Experiments 4 and 5, with both techniques showing a beneficial effect on correct details during free recall in Experiment 4 only.

The lack of consistent benefit of facing away across my experiments could mean that facing away is simply not an effective technique in the investigative interviewing setting. Over five experiments, there is evidence of some benefit only in Experiment 2 in closed questioning and in Experiment 4 in free recall, but both of these findings were not replicated in any of the other experiments and could be due to chance (Colquhoun, 2014). Individual, moderately powered studies, in particular, are more prone to errors such as false positive results (Nord, Valton, Wood, & Roiser, 2017), and therefore as one way to explore the data

across the experiments further with greater power, I conducted a series of mini meta-analyses in Chapter 6. Overall, witness gaze direction did not significantly affect memory performance. However, as part of these analyses, rapport-building as a moderator had a small but significant effect on incorrect responses and overall accuracy in closed questioning, with facing away from the interviewer being more beneficial when rapport was built. Thus the results of the mini meta-analyses might be suggestive of an effect of rapport-building in enhancing the small effects of facing away, particularly within a more well-powered design than the individual studies alone. Furthermore, although results of the main mini meta-analyses were not significant, from visually inspecting the forest plots, hints of other effects in the same direction can be seen, including ones in free recall. Therefore, rather than concluding with certainty that facing away is not an effective technique in investigative interviewing, it is possible that this technique could have a very small effect on memory performance, which could be detected with greater power offered by the meta-analyses. My individual experiments were only powered to detect a medium sized effect ($d = 0.5$) so it could be that more participants would be needed to consistently detect the small effects. The reason for choosing to power for a medium effect size was because particularly small effects might not be meaningful in practice where a technique needs to be reliable and work with most witnesses. Therefore, applicability of these relatively small effects that only manifest under certain conditions might therefore be questioned in practice.

These small and inconsistent effects of witness gaze direction on memory performance appear to neither support nor dispute the theoretical mechanisms behind the gaze aversion technique. As explained in Chapter 1, the benefits of gaze aversion and eye-closure tend to be explained with one of two hypotheses. Firstly, the modality-specific hypothesis suggests that these techniques work by allowing the witness to visualise the event that they are remembering by reducing the amount of visual input from the environment. Support for this hypothesis comes from studies that find a benefit of eye-closure (or gaze aversion) that is greater for visual details than auditory ones (e.g., Vredeveldt et al., 2011). As none of the events in my experiments included any meaningful

auditory information and therefore it is not possible to compare recall for visual and auditory details, my findings are not able to offer insight into or support for the modality-specific hypothesis. It might be that although my findings were mostly null overall, splitting the recall by modality could have revealed a greater benefit of gaze aversion or eye-closure in recall of visual details relative to auditory ones. This is something that should be addressed in future research (see Section 8.6 for further suggestions on this).

On the other hand, the general cognitive load hypothesis suggests that monitoring of the environment requires additional overall cognitive resources and therefore it can often lead to impairment of performance on a concurrent task, regardless of modality. In other words, unlike the modality-specific hypothesis discussed previously, the general cognitive load hypothesis suggests that averting the gaze or closing the eyes should improve recall of both visual and auditory details to a similar extent from no longer having to monitor the environment and focusing more cognitive resources on remembering. This is similar to the executive functioning model of memory discussed in Section 1.3.5, which suggests that the central executive has limited attentional capacity in processing and storing information. Therefore, if two tasks, such as recalling details about an event and keeping up with the interviewer's presence, need to be carried out simultaneously, attention needs to be divided or switched between the two tasks. This division or switching of attention can in turn have a detrimental impact on either or both of the tasks as the amount of resources available is now reduced. Therefore, similarly to the general cognitive load hypothesis, alleviating the attentional needs of one of the tasks (in this case, asking the witness to no longer monitor the interviewer) might be beneficial to the other task (i.e., recalling details of the witnessed event).

Overall, the cumulative null findings across my experiments do not show reliable support for these explanations. Asking the witness to gaze toward a blank wall, as opposed to observing the interviewer, did not lead to the expected benefits. These findings could go against the theories discussed in the previous paragraph, suggesting that attempting to reduce witnesses' attentional load did not appear to have a significant impact on their

performance on a simultaneous memory task, which should also present significant attentional costs. However, a possible alternative explanation might be that the attentional load of the interview was not demanding enough for witnesses to need a gaze aversion technique. Experiment 5 began to test this explanation with manipulation of task difficulty in addition to facing direction of the witness, but further research employing other difficulty manipulations that might be more applicable to real-life would be necessary before commenting on these theories further (see Section 8.6 for future research suggestions regarding this point).

Overall, the individual effects of witness gaze direction that were observed were in support of this beneficial effect of facing away compared to facing the interviewer. In particular, rapport-building might be playing a role in revealing some positive effects of facing away. The cognitive load model does not specify any social conditions, instead suggesting that no longer monitoring the environment in general should facilitate performance on other tasks carried out simultaneously. However, findings from my mini meta-analyses suggest that establishing a good rapport first (compared to no rapport-building) might be needed for these facilitative effects to take place, at least in closed questioning. The lack of rapport or a good relationship with the interviewer could be argued to require cognitive resources in itself as the witness might feel unsure or anxious about the unfamiliar situation of being interviewed, which in turn could be distracting from the interview. Indeed, Geiselman and Fisher (2014) suggest that asking the witness to close their eyes when recalling information requires that the interviewer has developed rapport with the witness first. To my knowledge, the findings from the mini meta-analyses are the first to empirically confirm the involvement of rapport-building in witness gaze direction. However, the same results have not been found in Experiment 3 and also in our previous research, where we did not find an interaction between rapport-building and witness eye-closure (Nash et al., 2016). Therefore, these are still early findings and the beneficial role of rapport-building in asking the witness to face away from the interviewer should be further confirmed.

Overall, the effects of gaze aversion, particularly in the field of investigative interviewing, may be smaller than the previous literature has suggested so far. These findings are timely with the recent movements in open science and reproducibility (Open Science Collaboration, 2015). Size of effects is frequently found to be inflated in the literature due to publication or reporting biases, whereby only significant findings are published or reported in a paper (Ioannidis, 2005) Therefore, it is crucial to replicate effects found in previous research and report null results in order to prevent effect size inflation. It seems that gaze aversion might only have a very small effect in memory performance during investigative interviews. This effect appears to be smaller than the previous literature in other domains has suggested so far (for example, previous studies generally show mostly medium to large effect sizes for witness eye-closure and gaze aversion) and not consistently found in all types of recall.

The lack of predicted effects, mostly inconsistent with previous literature, has important implications in practice. As mentioned before, it is recommended within the Cognitive Interview manual that witnesses can be asked to look toward a blank wall or another blank field, if they are not willing to close their eyes (Milne, 2004). However, the former technique has not previously been tested. Instead, it has been assumed that, since gaze aversion and eye-closure share the same theoretical mechanisms, the former can be used an alternative for the latter. Experiments reported in this thesis suggest that at the very least asking the witness to look toward a blank wall has significantly fewer benefits to memory performance than anticipated. It should be noted, however, that the physical act of turning away from the interviewer makes it a more complex manipulation than simply asking participants to look away, and therefore it might be affecting participants' performance differently compared to previous research on gaze aversion in other fields (this point will be discussed further in Section 8.1). These mostly non-significant results overall when asking the witness to face away from the interviewer caution us against overestimating the benefits of this technique in the investigative interviewing setting. Experiments 4 and 5 did not show a difference between facing away and eye-closure in improving recall, suggesting that perhaps

the former technique can be used as an alternative for the latter, but both techniques were similarly unable to elicit consistent benefits in recall across different types of recall.

However, although the benefits of both techniques were small overall, neither significantly harmed recall in any of my experiments. As discussed in Chapter 1, some of the potential downsides of asking the witness to face or gaze away from the interviewer could be that it limits or eliminates the ability to pick up on communication signals from the interviewer. This could, in turn, have negative effects of the relationship between the witness and interviewer or leave the witness feeling uncomfortable. For example, being able to observe the interviewer would leave the witness unable to see whether they are being listened to and could harm turn-taking during the conversation. Furthermore, taking such an unconventional position during the interview is likely to go against social norms, Therefore, one concern with the gaze aversion technique was whether its potential benefits of reducing environmental distraction during remembering would outweigh various practical implications of facing away from the interviewer such as limited ability to build a rapport or feeling uncomfortable from being unable to maintain and observe eye contact. From my experiments, it does not appear that gaze aversion produced any noticeable negative effects in witnesses as facing away was not harmful to recall in any of the experiments and it did not affect other measures such as situational self-awareness or rapport with the interviewer (this point is discussed further in Section 8,1). Therefore, in practice, interviewers might still decide to employ these techniques in their witness interviews if they see fit, but they should not expect large improvements in recall, as indicated by previous literature in other fields.

8.1 Methodological reasons

Other reasons for the lack of predicted effects of witness gaze direction in my experiments could be due to the way the experiments were designed and conducted. In the current section, I will examine these possible reasons to ensure that conclusions drawn from my research are valid.

Firstly, based on my findings from Experiment 2, it seems that facing away from the interviewer might be somewhat more useful in closed questioning compared to free recall (although the benefits are still small and not found consistently). Having interviewed participants in all of the experiments and observed their behaviour, this finding is perhaps not surprising. One reason for the relative benefit in closed questioning could be due to the fact that during closed questioning, participants were generally more likely to gaze at the interviewer in anticipation of the next question. On the other hand, during free recall, participants had an extended period of time where they focused solely on recalling the event without interruption from the interviewer. Therefore, during free recall, perhaps the interviewer's presence did not cause much of a distraction as participants could regulate their own cognitive load without the need for an instruction to face away. Supporting this explanation, Clifford and George (1996) found that their participants benefited from instruction to use imagery as part of an interview, but this benefit did not hold for open questions. The authors suggest that this is because with open questions, the witness is given time to think about the question so they employ imagery automatically. Similarly to this suggestion, in my experiments, participants might have naturally averted their gaze, particularly in free recall where there was no expectation continue looking at the interviewer, and therefore benefited from gaze aversion even in the face-to-face interview, leading to no differences between conditions. After all, people are sometimes found to naturally look away, especially when completing a particularly difficult task (e.g., Abeles & Yuval-Greenberg, 2017; Doherty-Sneddon & Phelps, 2005).

Leading on from this point, one way in which the procedure of my experiments differed from previous literature was that I did not ask participants to maintain eye contact with the interviewer in face-to-face interviews. Gaze aversion studies (e.g., Markson & Paterson, 2009; Buchanan et al., 2014) generally compare gaze aversion against a condition of continuous eye contact, but instructing the witness to maintain eye contact is not something that would be done in a real-world interview so any proposed interviewing technique should be helpful beyond what happens naturally. Therefore, in my experiments,

participants were free to avert their gaze from the interviewer when they needed to, even when they faced the interviewer, just as they would in any other conversation. Indeed, from observation, most participants did not maintain continuous eye contact with the interviewer, but instead looked away periodically. Being able to look away from the interviewer, therefore, might have helped to ease parts of the tasks that participants found particularly difficult. So it could be argued that participants experienced natural gaze aversion even in the control face-to-face condition, leading to no relative benefit of facing away. Therefore, the minimal benefits of facing away relative to participants' natural gaze behaviour in the control conditions might suggest limited potential benefits of facing away in practice, where witnesses would not be asked to maintain eye contact with the interviewer.

Furthermore, as discussed in Section 1.4, another difference in procedure of my experiments to previous gaze aversion research was that participants were asked to fully face away rather than simply averting their gaze from the interviewer. This decision was made to maximise the reduction of unnecessary environmental distraction, particularly as faces with direct gaze tend to attract our attention over other objects in the environment (e.g., Mares et al., 2016). In addition, this decision was partly based on findings of Buchanan et al. (2014) who found that even gaze toward another person's face (without maintaining eye contact) can be disruptive to performance on a visuospatial task. One concern with fully facing away from the interviewer could be that participants might feel uncomfortable doing so or it might impede the interviewer's relationship with the witness. This in turn could be negating any possible effects of facing away, as discussed in Chapter 1 with possible downsides of remote or gaze aversion interviews. However, I found minimal evidence for this explanation as participants' situational self-awareness scores did not reflect any difference between the conditions. Of course, it could be that this measure did not capture the difference between conditions and a different measure could have been more effective (e.g., state anxiety). However, there were similarly no differences in rapport scores between the witness gaze direction conditions across the experiments, suggesting that facing away did not impair the relationship between the witness and interviewer or make the witness feel

uncomfortable to a significant extent. Furthermore, even when participants knew that the interviewer faced away from them in Experiment 2, it did not make a difference to their memory performance.

In sum, the effect of witness gaze direction has been found to be smaller and more inconsistent than previous research has indicated so far, suggesting limited application in practice. However, results of the mini meta-analyses suggest that rapport-building might play a role in enhancing effects of facing away from the interviewing, at least during closed questioning. Further, I suggested how some changes in the procedure of my experiments in comparison to previous gaze aversion research might account for the lack of predicted effects of facing away. However, these changes were in place in an attempt to make the technique more applicable in practice and to maximise its benefits. In the following sections, I will discuss other findings from my experiments, namely findings relating to interviewer gaze direction, rapport-building and witness eye-closure, and their implications to the field of investigative interviewing.

8.2   Interviewer gaze direction

Overall, having the interviewer fully face away from the witness did not have the predicted beneficial effect on recall. Facing away by the interviewer similarly had minimal effect on participants' ratings of situational self-awareness or rapport. These findings suggest that witnesses' memory performance, general self-awareness and reported relationship with the interviewer were not affected by whether the interviewer was facing (and observing) them.

Previous research suggests that being observed by another individual, particularly with their direct gaze, can be detrimental to performance on a concurrent task as others' direct gaze attracts attention away from other objects in the environment (Mares et al., 2016; Senju & Hasegawa, 2005). In addition, being observed can often increase physiological arousal and lead to changes in behaviour. Performance on various cognitive tasks such as the Stroop task, verb generation task and others have been found to be impaired when participants were simultaneously presented with faces gazing directly back at them.

Therefore, it seems reasonable that being observed by the interviewer during an investigative interview might similarly have detrimental effects on witness recall. To my knowledge, Experiment 2 was the first to investigate the effects of interviewer gaze direction in this setting. Wagstaff et al. (2008) found that the presence of additional observers during an interview impaired participants' correct recall, but the role of the interviewer was not explored. One reason why the interviewer's observation did not have a negative impact on memory performance in Experiment 2 is because the interviewer was directly involved in the interview and remembering. In previous studies with other cognitive tasks such as the Stroop task, the presence or a photo of another individual gazing at the participant is usually not related to the actual task itself. Therefore, the observation from this individual might be particularly distracting not only because faces attract our attention over other objects in the environment but also because the face is not relevant to the main task or the reason for its presence might not always be explained. On the other hand, in an investigative interview, the interviewer has a clear role in asking the witness questions and helping them through the process.

The finding that the interviewer's presence did not have a negative impact on memory performance is potentially useful in practice, where the interviewer might feel that looking away from the witness during particularly difficult parts of the interview would be useful to give the witness space to concentrate on recall. Furthermore, lack of predicted effects with interviewer gaze direction might suggest that face-to-face interaction is not a necessary component of an investigative interview. As Experiment 2 was the first to investigate the role of interviewer gaze direction in investigative interviewing, these are still early findings so conclusions cannot be made with certainty without further investigation and replication. However, other interviewing options where the interviewer is not physically present at all (such as remote interviews and the SAI) have also, at times, been found beneficial to recall (Gabbert et al., 2009; 2012).

As a speculation, another reason for why there was no predicted beneficial effect of facing away by the interviewer could be because this unusual position of the interviewer,

where they had their back to the witness, actually captured participants' attention as something novel, as discussed in Section 4.5 (Johnston et al., 1990). Similarly to asking the witness to fully face away, having the interviewer fully face away from the witness was chosen to ensure maximum reduction in potential distraction from the interviewer's observation and their face. However, if the interviewer's unusual position was actually distracting to participants, simply gazing away rather than fully facing away from the witness could be a more beneficial technique. Furthermore, fully facing away (rather than gazing away) from the witness might also be seen as uncomfortable or inconvenient for the interviewers themselves, in a similar way it might be to the witness. On the other hand, facing away might help the interviewer concentrate on the interview as they also tend to experience an increased cognitive load due to performing various tasks simultaneously such as listening to the witness, building/maintaining a rapport, making fast decisions on what to ask next (Hanway, 2019). Future research should therefore compare gazing away and facing away by the interviewer and the impact of these techniques on interviewer's performance. Additionally, research should look into interviewers' experience with these techniques (such as difficulty or levels of cognitive load) to draw any certain conclusions.

Overall, manipulating interviewer gaze direction in Experiment 2 did not produce the expected effects on witness memory performance, and furthermore, facing away by the interviewer did not affect how participants felt in terms of their self-awareness or the relationship with the interviewer. These findings, particularly the latter, might be useful in practice, especially in situations where the interviewer is not always physically present. These findings, however, are from one experiment only and therefore should be replicated first before drawing any certain conclusions.

8.3   Rapport-building

Building a rapport with the witness is widely accepted as an essential part of an investigative interview and a technique that can help to enhance recall (Clarke & Milne, 2001; Hirn Mueller et al., 2015; Vallano & Schreiber Compo, 2011). Indeed, moderator analyses in Chapter 6

suggested that facing away was more beneficial to closed question recall when rapport was built first compared to when there was no rapport. Additionally, when I explored the effects of rapport-building alone across Experiments 1 and 2, there were some significant beneficial effects in free recall. However, the interpretation of these results was limited by the fact that participants were not randomly assigned to the rapport conditions. So in Experiment 3, I explored these rapport conditions within one experiment, but this time there were no significant effects. These latter findings contrast with the majority of previous research on rapport-building and my predictions. Consequently, in this section, I will discuss some of the reasons for why this might have been the case.

Firstly, the baseline levels of rapport with my participants were generally good even when rapport was not built, with scores in the mid to upper parts of the scale. As already discussed in Chapter 4, the procedure that was implemented for building a rapport across my experiments was based on some of the major pieces of previous research (e.g., the bi-directional condition in Vallano & Schreiber Compo, 2011) and my own previous work (Nash et al., 2016), which have been able to enhance recall with rapport-building. However, Collins et al. (2002) report some of the largest effect sizes of rapport, and theirs is the only study so far to include a condition where rapport is intentionally compromised (abrupt rapport condition), rather than only comparing rapport to a neutral condition. Hence it may be that the difference between rapport conditions in my experiments was not large enough, and building a rapport was not significantly more beneficial than the neutral condition (where participants might have felt comfortable enough already).

Indeed, although participants' ratings of rapport with the interviewer were significantly higher when rapport was built compared to no rapport, the difference in scores was still relatively small. This might suggest that building a rapport did not improve participants' perceptions of the interviewer and the interaction to a great extent, but it could also mean that the measure was not sensitive enough to detect these differences between conditions. The measure was one that has been used in previous research in this field, where significant benefits of rapport were observed (e.g., Vallano & Schreiber Compo, 2011). The measure

used in my experiments was also chosen as it seemed most comprehensive, asking the witness to rate both the interaction and the interviewer on various aspects, but currently there is not one agreed-on scale to be used when measuring rapport in this field. There has recently been a concern within the literature about the lack of consistent definition and operationalisation of rapport with studies often using different definitions and measures (Vallano & Schreiber Compo, 2015). This, in turn, can lead to inconsistent findings that cannot always be generalised to the field. Therefore, it can be difficult to compare findings to results of previous studies that often vary in their procedure and measurement of rapport. Moreover, recently, despite the overall agreement of beneficial effects of rapport and its recommendation in practice, there has been research that has found only limited benefits of rapport-building (Sauerland et al., 2018). The study manipulated rapport levels, including none, minimal and extensive conditions, but the measure of participants' perceptions of the interview only included three questions – one about atmosphere of the interview, one about friendliness of the experimenter and one about how comfortable participants felt – therefore again highlighting the need for a standardised measure of rapport. The authors suggest that rapport-building is potentially a valuable technique for investigative interviewing but the data to support this claim are currently mixed and inconclusive.

Overall, it appears that rapport-building is potentially a beneficial technique for improving witness recall in investigative interviewing, but research studies need to come to a consensus on a standardised procedure and measure to be used when building a rapport. A systematic review and meta-analysis might be useful here to summarise the research most effectively in order to make future recommendations. In addition, it is essential to conduct further research and replication to confirm existing findings and extend them further perhaps to more realistic situations where rapport might be naturally compromised. Currently, recommendations to use rapport in practice are based on relatively few research studies (see also Abbe & Brandon, 2013).

8.4   Eye-closure

Finally, witness eye-closure was included in Experiments 4 and 5 in order to directly compare facing away to this technique. As already discussed in previous sections, asking the witness to face or gaze away from the interviewer is often recommended as an alternative to eye-closure. However, I found minimal evidence that facing away would be an effective technique for investigative interviewing so the next step was to compare facing away to eye-closure in order to determine with more certainty whether the effect of the former was indeed smaller than the effect of the latter.

In theory, both techniques should be of equal benefit to memory performance. As described in Chapter 5, their facilitative effects might be explained with the general cognitive load or modality-specific interference hypotheses. The former suggests that closing or averting the eyes frees up general cognitive resources, which can be used for remembering, as there is no longer a need to monitor the environment. The latter hypothesis suggests that closing or averting the eyes helps to visualise the information due to no longer monitoring the environment, therefore leading to better recall of visual details in particular. Indeed, in Experiment 4, both gaze aversion methods led to reports of more correct details during free recall, compared to a control interview, but there was no interaction that would suggest that one technique was more effective than the other. These results are in support of the above theoretical hypotheses (although since there were no auditory details to recall, it is not possible to separate which hypothesis is more likely to explain the results), suggesting that closing the eyes or facing away from the interviewer allowed participants to focus on remembering details instead of focusing on the interviewer. Furthermore, the positive findings of facing away and eye-closure are promising in practice, particularly as free recall or asking open-ended questions rather than closed questions are recommended when interviewing a witness (Geiselman et al., 1984; MacDonald, Snook, & Milne, 2017). It is also encouraging that both techniques improve recall to a similar extent, providing some indication that facing away could be used as an alternative for witness eye-closure.

However, these positive results in Experiments 4 are not supported by my previous findings with facing away in Experiments 1-3 and are also against the generally non-significant results of Experiment 5, using both techniques. Overall, despite previous research on witness eye-closure showing benefits of the technique to memory performance (e.g., Perfect et al., 2008; Vredeveldt et al., 2015), the effects of eye-closure in Experiments 4 and 5 were minimal. Although in my experiments I followed a similar general procedure that has been used in other previous research in the laboratory and found positive effects, one reason for the lack of predicted beneficial effects with eye-closure (or facing away) could be that the interviewer's presence or the environment were not distracting enough. In a more realistic interviewing environment (rather than a controlled laboratory set-up), witnesses would naturally have more distractors around them, which might in turn make the facing away and eye-closure techniques more effective. For example, Vredeveldt, Hitch, and Baddeley (2011) only found eye-closure to be beneficial to recall when it was compared against a high-distraction condition of hearing or seeing Hebrew words. On the other hand, they found no difference between eye-closure and looking at a blank screen. To my knowledge, only one study has examined witness eye-closure in real police interviews (Vredeveldt et al., 2015). The authors found that witnesses of serious crimes who closed their eyes did not recall more information overall, but the information they reported was judged to be more forensically relevant. Future research should continue to explore the effects of eye-closure in real police interviews to confirm and extend these existing findings in the environment where the technique is normally used.

Furthermore, as discussed in discussion section of Chapter 5, the effects of eye-closure have not always been consistent across different contexts. For example, the study by Vredeveldt et al. (2015) described in the previous paragraph did not find eye-closure to increase the amount of information recall, but the information that witnesses provided was judged to be more forensically relevant. Furthermore, Vredeveldt and Penrod (2013) found a benefit of eye-closure to correct free recall when witnesses were interviewed inside but not outside, following a live event. Summarising results across studies using a systematic review

and meta-analysis might therefore be a useful way to assess the overall effect size of eye-closure on witness recall.

Overall, in Experiments 4 and 5 where facing away and eye-closure were directly compared, I did not find a significant difference between the two techniques. Both enhanced the number of correctly reported details during free recall in Experiment 4. However, there were no other benefits to recall. Therefore, it might be reasonable to conclude that facing away can be a suitable alternative for witness eye-closure, but both techniques were not consistently found to benefit recall.

8.5   Overall limitations

Overall, one concern with conducting mock investigative interviews in the laboratory setting is that the findings may lack ecological validity. For one, participants in my experiments were mostly undergraduate students who would not be as motivated to recall every detail of an event as someone who witnessed a real crime. Although they might still try hard to remember, there is no consequence to them if they do not produce extensive reports. As discussed in Chapter 7, participants were free to stop recalling at any point or say "don't know" to any question so there is no guarantee that they put a maximum amount of effort into every task. In Experiment 5, I attempted to increase participants' motivation by letting participants know that they can find out their overall score at the end, but this did not lead to any differences between conditions. Another approach could have been to avoid telling participants that it is fine when they cannot remember any more in order to encourage them to report more information, but the intention of my thesis was to test out techniques that could be implemented in practice where witnesses would be advised to avoid guessing and stop when they cannot remember any more. Therefore, I have based the witness instructions on those recommended for the CI. Of course, the best solution for witness motivation would be to study witnesses of real crimes (similarly to Vredeveldt et al., 2015) or perhaps include a staged live event and lead participants to believe that they are providing real eyewitness

reports. For example, Perfect et al. (2008) included a staged event in their Experiments 4 and 5 and found beneficial effects of eye-closure (but the authors also found these effects in their other experiments, using video events).

Further to the previous point, not only was a video event used in my experiments rather than a staged event, but the videos tended to be relatively short. Videos of similar length have been used in previous research that has found a benefit of witness eye-closure (Vredeveldt et al., 2012; 2013; 2015), but it could still be argued that two to three minute videos are not comparable to witnessing and being part of an event in the real world. Having a lot of details to remember (rather than a short video) might have brought out the benefits of gaze aversion techniques further as the task becomes more difficult. This idea was tested in Experiment 5 by manipulating task difficulty with a picture memory task in order to objectively control the amount of information that participants witnessed and still no differences between conditions were found. However, using a longer event with more details might be a more ecologically valid approach to increasing difficulty when exploring investigative interviewing techniques.

In addition to richer information, witnesses of real crimes usually experience a longer time delay between the event and the interview, compared to the 10-minute delay in Experiments 1-4. The delay in my experiments was similar to or even longer than those used previous studies that have looked at investigative interviewing techniques in the laboratory setting, with some using delays of only two minutes (Vredeveldt et al., 2012; Vredeveldt & Sauer, 2015; Wagstaff et al., 2011). However, in a real police interview, the delay before the interview is conducted can be up to several days or weeks, usually due to the fact that police might not have the time or resources to interview witnesses immediately. This delay would normally have a negative impact on recall of the event as the quality and quantity of information decay over time and reports might become more prone to errors (for example, from discussing the event with other witnesses; Gabbert et al., 2016). In this case again, employing interviewing techniques might show some benefit as participants are struggling to remember the details and need extra help. As described before, Vredeveldt et al. (2013), for

example, only found a beneficial effect of witness eye-closure one week after witnessing the event and no effect two minutes after. Therefore, another ecologically valid approach for investigating witness gaze direction might have been to include a longer time delay between the event and the interview.

Another limitation with how the interviews in my experiments were conducted could be to do with the fact that, as I was the interviewer in all experiments, I was not blind to the study hypotheses when conducting these interviews. Therefore, I could have unintentionally influenced participants' behaviour, for example by unconsciously putting in more effort in the interviews where the witness would be facing away in order to achieve better recall. However, none of the extra measures that were included at the end (such as rapport measure, situational self-awareness) reflected any differences between conditions. Similarly, if this were the case that I was unknowingly influencing participants' responses, I might have seen more differences between the conditions. Instead, although there were some small benefits of witness gaze direction in closed questioning, I did not find any main effects of interviewer gaze direction or rapport-building that I predicted. Nevertheless, in a real police interview, the interviewer would not be looking for differences between witnesses and instead might be more equally invested in all witnesses performing similarly well. Therefore, this limitation should be addressed in future work to ensure with certainty that knowledge of study hypotheses does not influence the findings in this case.

Overall, although it might not always be ecologically valid, controlled laboratory research is often the first necessary step in testing out theories or techniques that could be used in practice due to their low risk and cost. Furthermore, I followed procedures set out in previous research, also conducted in similar environment. Therefore, the laboratory environment is unlikely to be the reason for the lack of predicted effects but rather the effects of facing away could potentially be larger in a real police interview. This is something that should be addressed by future research based on my suggestions in this section.

8.6   Future directions

In the five experiments reported in this thesis, I aimed to provide a comprehensive investigation of witness gaze direction when employed during an investigative interview. However, there are still questions that can be raised for future research.

In addition to my suggestions so far, future research could also explore other types of details that might be affected by witness gaze direction during recall. For example, extending my findings in free recall, the next step might be to look at details that are forensically relevant. Forensically relevant details are generally details that might be considered useful or relevant in an investigation or court (Vredeveldt et al., 2015). This approach might provide more ecologically valid results as forensically relevant details are the ones that would be most likely to be considered in a real-world investigation. Indeed, as described before, in their study, Vredeveldt et al. (2015) found that asking witnesses of serious crimes to close their eyes while recalling the events was only beneficial to recall of forensically relevant details. Identifying these details involves coding the data according to whether a particular detail is judged to be forensically relevant or not. This coding, therefore, is something that can potentially be done on the free recall data that I have collected from experiments in this thesis or within a new dataset.

Moreover, the effect of witness gaze direction on auditory details could also be explored. The video-clips used throughout my experiments were silent or only had general background noise as I decided to only focus on visual details in this initial investigation of the witness gaze direction effect. This decision was made as recall of visual details is most likely to be improved by facing away due to predictions from both the general cognitive load and the modality-specific interference hypotheses. However, this approach does not allow for differentiation between the two hypotheses. According to the modality-specific hypothesis, there should be a larger benefit to recall of visual details compared to auditory ones. As I did not measure auditory recall in my experiments, it is not possible to explore whether facing away might have benefited visual recall more relative to auditory, supporting the idea of

visualisation of the witnessed event. On the other hand, according to the general cognitive load hypothesis, both types of recall should benefit from a technique such as facing away from the interviewer. Therefore, by not including auditory details, it is not possible to explore whether facing away might have benefited auditory recall on its own (even though it did not benefit visual recall in my experiments). Overall, further research to include auditory recall would be needed to provide a more comprehensive account of the effects of facing away during investigative interviewing and provide more information on the possible theoretical mechanisms behind this technique.

In addition, I have already mentioned that facing away could be explored with real witnesses or participants who witness a realistic live event, but the technique should also be studied with other interviewers. All my experiments were carried out by the same interviewer so replicating the experiments with a different interviewer would help to ensure that the effects found can be generalised across various situations and are not limited to a specific interviewer. The effects or the lack thereof that I found across my experiments might be due to something within the nature of the specific interviewer, for example the extent to which they naturally engaged in conversation with participants or even something about the way the interviewer looked such as having some noticeable characteristics. For these examples, naturally talkative interviewers might naturally build rapport even without consciously attempting to do so and having a noticeable visible characteristic might distract the witness further, compared to a face-to-face interview without such characteristics. In addition, in a real police interview, the witness might be interviewed more than once by different people or even by several people at the same time. Therefore, it is important to understand how my findings with facing away from the interviewer would generalise to these situations. It could be that facing away from the interviewer(s) in these cases might be a beneficial technique as the environment becomes more distracting with several people present or changing during the interview. Facing away might be helpful as the witness would no longer need to keep up with the communication signals from different or new interviewers. However, the latter point could also be a disadvantage to the witness as they might feel particularly unsure or

uncomfortable if they cannot observe various interviewers and get accustomed to them. The effect of different interviewers might also be particularly interesting for interviewer gaze direction and whether a different interviewer might have a different impact on participants' performance.

Overall, the findings from my experiments raise ideas about other forms of interview that remove social elements of the interaction. The findings from my experiments support the idea that face-to-face interaction might not have to be an essential component of a successful investigative interview when police resources are scarce, and that lack of eye contact should not have a significantly detrimental effect on recall. Direct eye contact is often not possible in interviews conducted via videoconference software such as Skype, but the findings from my experiments show further promise and should encourage further research into and implementation of remote interviewing techniques as currently the number of studies is limited. Remote interviews are currently mainly used in court hearings rather than in information gathering interviews (Justice.gov.uk; Nash et al., 2014). In addition, as participants of a remote interview are naturally prevented from maintaining direct eye contact with each other due to the positioning of the camera and the screen, remote interviews could provide a natural way to test out further and implement witness gaze aversion that does not involve unconventional seating positions (such as facing away) or any specific instructions. As explained earlier, other forms of interviews (such as the SAI) are already beginning to be implemented as an addition to face-to-face interviews with no detriment and sometimes a benefit to witness reports (Hope et al., 2011). These techniques are particularly important as they can often allow the interview to be conducted sooner than waiting for a face-to-face meeting and conducting a high-quality initial interview can protect witnesses against misinformation later (Gabbert et al., 2016).

Moreover, the idea that removing face-to-face interaction from an interview should not significantly disrupt witness performance can open up avenues for new research into techniques to help in situations where it might not be possible to interview the witness soon after the event in person. For example, as well as remote interviews conducted via Skype,

phone interviews might be another option that is worth exploring. There is already some research that has looked at improving witness memory for events reported in a police call centre by asking more open-ended questions, compared to a regular call where mainly closed questions are asked (Pescod, Wilcock, & Milne, 2013). However, to my knowledge, it is not yet clear how phone interviews might compare to a regular face-to-face interview or various forms of remote interviews. If phone interviews are comparable to the other techniques, then it would be another way to elicit initial information from witnesses that does not require extensive resources, perhaps prior to the main interview.

8.7   Conclusion

In conclusion, the experiments reported in this thesis show minimal evidence that witnesses' gaze direction affected their memory performance during investigative interviews. These findings were despite the recommendations within the Cognitive Interview manual, asking the witness to look toward a blank wall or another field if they are not comfortable closing their eyes. Overall, rather than suggesting that witness gaze aversion has no effect on recall in investigative interviews, it might be more justifiable to conclude that the effects of it in this field are smaller than previous literature in other fields has proposed so far. Nonetheless, to provide legal psychologists and practitioners a scientifically robust rather than an over-exaggerated assessment of the benefits of witness gaze aversion, it is essential that non-significant findings such as mine feature alongside the positive findings in the cumulative literature (Nelson, Simmons, & Simonsohn, 2018). Situated within the broader literature on other forms of gaze aversion, these findings caution us against overestimating the benefits of eyewitness gaze aversion as a tool for investigative interviewing. Interviewers should continue to employ techniques explored in this thesis, but perhaps they should not expect consistent benefits across their interviews.

References

Abbe, A., & Brandon, S. E. (2013). The Role of Rapport in Investigative Interviewing: A Review: The role of rapport in investigative interviewing. *Journal of Investigative Psychology and Offender Profiling*, *10*(3), 237–249. https://doi.org/10.1002/jip.1386

Abbe, A., & Brandon, S. E. (2014). Building and maintaining rapport in investigative interviews. *Police Practice and Research*, *15*(3), 207–220. https://doi.org/10.1080/15614263.2013.827835

Abeles, D., & Yuval-Greenberg, S. (2017). Just look away: Gaze aversions as an overt attentional disengagement mechanism. *Cognition*, *168*, 99–109. https://doi.org/10.1016/j.cognition.2017.06.021

Alison, L., & Alison, E. (2017). Revenge versus rapport: Interrogation, terrorism, and torture. *American Psychologist*, *72*(3), 266–277. https://doi.org/10.1037/amp0000064

Alison, L., Alison, E., Noone, G., Elntib, S., Waring, S., & Christiansen, P. (2013). Whatever you say, say nothing: Individual differences in counter interrogation tactics amongst a field sample of right wing, AQ inspired and paramilitary terrorists. *Personality and Individual Differences*, *68*, 170–175. https://doi.org/10.1016/j.paid.2014.04.031

Argyle, M., & Dean, J. (1965). Eye-contact, distance and affiliation. *Sociometry*, 289-304. https://doi.org/10.2307/2786027

Beattie, G. W. (1981). A further investigation of the cognitive interference hypothesis of gaze patterns during conversation. *British Journal of Social Psychology*, *20*(4), 243-248. https://doi.org/10.1111/j.2044-8309.1981.tb00493.x

Baddeley, A. (2003). Working memory and language: An overview. *Journal of communication disorders*, *36*(3), 189-208. https://doi.org/10.1016/S0021-9924(03)00019-4

Baddeley, A. D. (2002). Is working memory still working?. *European psychologist*, *7*(2), 85-97. https://doi.org/10.1027//1016-9040.7.2.85

Belletier, C., & Camos, V. (2018). Does the experimenter presence affect working memory?: Presence and working memory. *Annals of the New York Academy of Sciences*, *1424*(1), 212–220. https://doi.org/10.1111/nyas.13627

Belletier, C., Davranche, K., Tellier, I. S., Dumas, F., Vidal, F., Hasbroucq, T., & Huguet, P. (2015). Choking under monitoring pressure: being watched by the experimenter reduces executive attention. *Psychonomic Bulletin & Review*, *22*(5), 1410–1416. https://doi.org/10.3758/s13423-015-0804-9

Benia, L. R., Hauck-Filho, N., Dillenburg, M., & Stein, L. M. (2015). The NICHD Investigative Interview Protocol: A Meta-Analytic Review. *Journal of Child Sexual Abuse*, *24*(3), 259–279. https://doi.org/10.1080/10538712.2015.1006749

Brandon, S. E., Wells, S., & Seale, C. (2018). Science-based interviewing: Information elicitation. *Journal of Investigative Psychology and Offender Profiling*, *15*(2), 133–148. https://doi.org/10.1002/jip.1496

Brown, C., Lloyd-Jones, T. J., & Robinson, M. (2008). Eliciting person descriptions from eyewitnesses: A survey of police perceptions of eyewitness performance and reported use of interview techniques. *European Journal of Cognitive Psychology*, *20*(3), 529–560. https://doi.org/10.1080/09541440701728474

Buchanan, H., Markson, L., Bertrand, E., Greaves, S., Parmar, R., & Paterson, K. B. (2014). Effects of social gaze on visual-spatial imagination. *Frontiers in Psychology*, *5*, 671. https://doi.org/10.3389/fpsyg.2014.00671

Button, K. S., Ioannidis, J. P. A., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S. J., & Munafò, M. R. (2013). Power failure: Why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience*, *14*(5), 365–376. https://doi.org/10.1038/nrn3475

Centofanti, A. T., & Reece, J. (2006). The cognitive interview and its effect on misleading postevent information. *Psychology, Crime & Law*, *12*(6), 669–683. https://doi.org/10.1080/10683160600558394

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In M. Liebowitz & R.G. Heimberg (Eds.), *Social phobia: Diagnosis, assessment, and treatment*, (pp. 69-93). New York, NY: Guilford Press.

Clarke, C., & Milne, R. (2001). *A national evaluation of the PEACE Investigative Interviewing Course*. London: Home Office.

Clifford, B. R., & George, R. (1996). A Field evaluation of training in three methods of witness/victim investigative interviewing. *Psychology, Crime & Law*, *2*(3), 231–248. https://doi.org/10.1080/10683169608409780

Coelho, E., George, N., Conty, L., Hugueville, L., & Tijus, C. (2006). Searching for asymmetries in the detection of gaze contact versus averted gaze under different head views: a behavioural study. *Spatial Vision*, *19*(6), 529–545. https://doi.org/10.1163/156856806779194026

Collins, K., Doherty-Sneddon, G., & Doherty, M. J. (2014). Practitioner perspectives on rapport building during child investigative interviews. *Psychology, Crime & Law*, *20*(9), 884–901. https://doi.org/10.1080/1068316X.2014.888428

Collins, R., Lincoln, R., & Frank, M. G. (2002). The effect of rapport in forensic interviewing. *Psychiatry, psychology and law*, *9*(1), 69-78. https://doi.org/10.1375/pplt.2002.9.1.69

Colomb, C., Ginet, M., Wright, D., Demarchi, S., & Sadler, C. (2013). Back to the real: Efficacy and perception of a modified cognitive interview in the field. *Applied Cognitive Psychology*, *27*(5), 574-583. https://doi.org/10.1002/acp.2942

Colquhoun, D. (2014). An investigation of the false discovery rate and the misinterpretation of p-values. *Royal Society Open Science*, *1*(3), 140216–140216. https://doi.org/10.1098/rsos.140216

Conty, L., & Grèzes, J. (2011). Look at me, I'll remember you: The Perception of Self-Relevant Social Cues Enhances Memory and Right Hippocampal Activity. *Human Brain Mapping*, *33*(10), 2428–2440. https://doi.org/10.1002/hbm.21366

Conty, L., Gimmig, D., Belletier, C., George, N., & Huguet, P. (2010). The cost of being watched: Stroop interference increases under concomitant eye contact. *Cognition*, *115*(1), 133–139. https://doi.org/10.1016/j.cognition.2009.12.005

Conty, L., N'Diaye, K., Tijus, C., & George, N. (2007). When eye creates the contact! ERP evidence for early dissociation between direct and averted gaze motion processing. *Neuropsychologia*, *45*(13), 3024–3037.

https://doi.org/10.1016/j.neuropsychologia.2007.05.017

Conty, L., Tijus, C., Hugueville, L., Coelho, E., & George, N. (2006). Searching for asymmetries in the detection of gaze contact versus averted gaze under different head views: a behavioural study. *Spatial vision*, *19*(6), 529-546.https://doi.org/10.1163/156856806779194026

Dando, C. J., Wilcock, R., Behnkle, C., & Milne, R. (2011). Modifying the cognitive interview: countenancing forensic application by enhancing practicability. *Psychology, Crime & Law*, *17*(6), 491–511. https://doi.org/10.1080/10683160903334212

Dando, C., Wilcock, R., & Milne, R. (2008). The cognitive interview: Inexperienced police officers' perceptions of their witness/victim interviewing practices. *Legal and Criminological Psychology*, *13*(1), 59–70. https://doi.org/10.1348/135532506X162498

Dando, C., Wilcock, R., & Milne, R. (2009a). The cognitive interview: the efficacy of a modified mental reinstatement of context procedure for frontline police investigators. *Applied Cognitive Psychology*, *23*(1), 138–147. https://doi.org/10.1002/acp.1451

Dando, C., Wilcock, R., Milne, R., & Henry, L. (2009b). A modified cognitive interview procedure for frontline police investigators. *Applied Cognitive Psychology*, *23*(5), 698–716. https://doi.org/10.1002/acp.1501

Davidson, J. R. T., Miner, C. M., De Veaugh-Geiss, J., Tupler, L. A., Colket, J. T., & Potts, N. L. S. (1997). The Brief Social Phobia Scale: A psychometric evaluation. *Psychological Medicine*, *27*(1), 161–166. https://doi.org/10.1017/S0033291796004217

Davis, M. R., McMahon, M., & Greenwood, K. M. (2005). The efficacy of mnemonic components of the cognitive interview: towards a shortened variant for time-critical investigations. *Applied Cognitive Psychology*, *19*(1), 75–93. https://doi.org/10.1002/acp.1048

Doherty-Sneddon, G., & McAuley, S. (2000). Influence of Video-Mediation on Adult±Child

Interviews: Implications for the Use of the Live Link with Child Witnesses. *Applied Cognitive*

Psychology, 14, 379-392.

Doherty-Sneddon, G., & Phelps, F. G. (2005). Gaze aversion: A response to cognitive or social

difficulty? *Memory & Cognition, 33*(4), 727–733. https://doi.org/10.3758/BF03195338

Doherty-Sneddon, G., Bonner, L., & Bruce, V. (2001). Cognitive demands of face monitoring:

Evidence for visuospatial overload. *Memory & Cognition*, *29*(7), 909–919.

https://doi.org/10.3758/BF03195753

Doherty-Sneddon, G., Bonner, L., & Bruce, V. (2001). Cognitive demands of face monitoring:

Evidence for visuospatial overload. *Memory & Cognition*, *29*(7), 909–919.

https://doi.org/10.3758/BF03195753

Doherty-Sneddon, G., Bruce, V., Bonner, L., Longbotham, S., & Doyle, C. (2002). Development of

gaze aversion as disengagement from visual information. *Developmental psychology*, *38*(3),

438-445.

Doherty-Sneddon, G., Bruce, V., Bonner, L., Longbotham, S., & Doyle, C. (2002). Development of

gaze aversion as disengagement from visual information. *Developmental Psychology*, *38*(3),

438–445. https://doi.org/10.1037/0012-1649.38.3.438

Doherty-Sneddon, G., Riby, D. M., & Whittle, L. (2012). Gaze aversion as a cognitive load

management strategy in autism spectrum disorder and Williams syndrome: Gaze behaviour

in WS and ASD. *Journal of Child Psychology and Psychiatry*, *53*(4), 420–430.

https://doi.org/10.1111/j.1469-7610.2011.02481.x

Eastvold, A. D., Belanger, H. G., & Vanderploeg, R. D. (2012). Does a Third Party Observer Affect

Neuropsychological Test Performance? It Depends. *The Clinical Neuropsychologist*, *26*(3),

520–541. https://doi.org/10.1080/13854046.2012.663000

Ehrlichman, H. (1981). From gaze aversion to eye-movement suppression: An investigation of the

cognitive interference explanation of gaze patterns during conversation. *British Journal of*

Social Psychology, *20*(4), 233-241. https://doi.org/10.1111/j.2044-8309.1981.tb00492.x

Ehrlichman, H., & Barrett, J. (1983). 'Random' saccadic eye movements during verbal-linguistic and visual-imaginal tasks. *Acta Psychologica*, *53*(1), 9–26. https://doi.org/10.1016/0001-6918(83)90013-6

Ehrlichman, H., & Micic, D. (2012). Why Do People Move Their Eyes When They Think? *Current Directions in Psychological Science*, *21*(2), 96–100. https://doi.org/10.1177/0963721412436810

Ehrlichman, H., Micic, D., Sousa, A., & Zhu, J. (2007). Looking for answers: Eye movements in non-visual cognitive tasks. *Brain and Cognition*, *64*(1), 7–20. https://doi.org/10.1016/j.bandc.2006.10.001

Einstein, G. O., Earles, J. L., & Collins, H. M. (2002). Gaze Aversion: Spared Inhibition for Visual Distraction in Older Adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *57*(1), 65–73. https://doi.org/10.1093/geronb/57.1.P65

Fisher, R. P., & Geiselman, R. E. (1992). *Memory enhancing techniques for investigative interviewing: The cognitive interview*. Springfield, IL: Charles C Thomas Publisher.

Fisher, R. P., Geiselman, R. E., & Amador, M. (1989). Field test of the cognitive interview: Enhancing the recollection of actual victims and witnesses of crime. *Journal of Applied Psychology*, *74*(5), 722–727. https://doi.org/10.1037/0021-9010.74.5.722

Freud, S. (1913/2001). On beginning the treatment (Further recommendations on the technique of psycho-analysis I). In J. Strachey (Ed., Trans.). *The standard edition of the complete psychological works of Sigmund Freud. Case history of Schreber, paper on technique and other works* (pp. 121-144). London: Vintage.

Gabbert, F., Hope, L., & Fisher, R. P. (2009). Protecting eyewitness evidence: Examining the efficacy of a self-administered interview tool. *Law and Human Behavior*, *33*(4), 298–307. https://doi.org/10.1007/s10979-008-9146-8

Gabbert, F., Hope, L., Carter, E., Boon, R., & Fisher, R. P. (2016). The role of initial witness accounts within the investigative process. In *Communication in investigative and legal contexts* (pp. 107-131). Chichester: Wiley. https://doi.org/10.1002/9781118769133.ch6

Gabbert, F., Hope, L., Fisher, R. P., & Jamieson, K. (2012). Protecting Against Misleading Post-event Information with a Self-Administered Interview: Protecting against misinformation. *Applied Cognitive Psychology*, *26*(4), 568–575. https://doi.org/10.1002/acp.2828

Gavett, B. E., Lynch, J. K., & McCaffrey, R. J. (2005). Third party observers: The effect size is greater than you might think. *Journal of Forensic Neuropsychology*, *4*(2), 49-64. https://doi.org/10.1300/J151v04n02_05

Gavett, B., & Mccaffrey, R. (2007). The influence of an adaptation period in reducing the third party observer effect during a neuropsychological evaluation. *Archives of Clinical Neuropsychology*, *22*(6), 699–710. https://doi.org/10.1016/j.acn.2007.05.002

Gawrylowicz, J., Memon, A., & Scoboria, A. (2014). Equipping witnesses with transferable skills: the Self-Administered Interview ©. *Psychology, Crime & Law*, *20*(4), 315–325. https://doi.org/10.1080/1068316X.2013.777961

Geiselman, R. E., Fisher, R. P., Firstenberg, I., Hutton, L. A., Sullivan, S., Avetissian, I., & Prosk, A. (1984). Enhancement of eyewitness memory: An empirical evaluation of the cognitive interview. *Journal of Police Science and Administration*, *12*, 74-80.

George, N., & Conty, L. (2008). Facing the gaze of others. *Neurophysiologie Clinique/Clinical Neurophysiology, 38*(3), 197–207. https://doi.org/10.1016/j.neucli.2008.03.001

Glenberg, A. M. (1997). What memory is for. *Behavioral and Brain Sciences*, *20*(01). https://doi.org/10.1017/S0140525X97000010

Glenberg, A. M., Schroeder, J. L., & Robertson, D. A. (1998). Averting the gaze disengages the environment and facilitates remembering. *Memory & Cognition*, *26*(4), 651–658. https://doi.org/10.3758/BF03211385

Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini Meta-Analysis of Your Own Studies: Some Arguments on Why and a Primer on How: Mini Meta-Analysis. *Social and Personality Psychology Compass*, *10*(10), 535–549. https://doi.org/10.1111/spc3.12267

Goodman-Delahunty, J., & Howes, L. M. (2016). Social persuasion to develop rapport in high-stakes interviews: qualitative analyses of Asian-Pacific practices. *Policing and Society*, *26*(3), 270–290. https://doi.org/10.1080/10439463.2014.942848

Govern, J. M., & Marsch, L. A. (2001). Development and Validation of the Situational Self-Awareness Scale. *Consciousness and Cognition*, *10*(3), 366–378. https://doi.org/10.1006/ccog.2001.0506

Griffiths, A., Milne, B., & Cherryman, J. (2011). A Question of Control? The Formulation of Suspect and Witness Interview Question Strategies by Advanced Interviewers. *International Journal of Police Science & Management*, *13*(3), 255–267. https://doi.org/10.1350/ijps.2011.13.3.219

Hamilton, A. F. de C. (2016). Gazing at me: the importance of social meaning in understanding direct-gaze cues. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *371*(1686), 20150080. https://doi.org/10.1098/rstb.2015.0080

Hanway, P. (2019). *Cognitive load at interview: The interviewer's perspective*. Retrieved from https://www.crestsecurityreview.com/article/cognitive-load-at-interview-the-interviewers-perspective

Helminen, T. M., Pasanen, T. P., & Hietanen, J. K. (2016). Learning under your gaze: the mediating role of affective arousal between perceived direct gaze and memory performance. *Psychological Research*, *80*(2), 159–171. https://doi.org/10.1007/s00426-015-0649-x

Hershkowitz, I. (2011). Rapport Building in Investigative Interviews of Children. In M. E. Lamb, D. J. La Rooy, L. C. Malloy, & C. Katz (Eds.), *Children's Testimony* (pp. 109–128). Chichester: Wiley. https://doi.org/10.1002/9781119998495.ch6

Hester, R., & Garavan, H. (2005). Working memory and executive function: The influence of content and load on the control of attention. *Memory & cognition*, *33*(2), 221-233. https://doi.org/10.3758/BF03195311

Hirn Mueller, D., Schreiber Compo, N., Molina, J., Bryon, A., & Pimentel, P. S. (2015). Productive and counterproductive interviewing techniques: Do law enforcement investigators know the difference? *Psychology, Public Policy, and Law*, *21*(3), 295–308. https://doi.org/10.1037/law0000047

Holliday, R. E., & Albon, A. J. (2004). Minimising misinformation effects in young children with cognitive interview mnemonics. *Applied Cognitive Psychology*, *18*(3), 263–281. https://doi.org/10.1002/acp.973

Holliday, R. E., Humphries, J. E., Milne, R., Memon, A., Houlder, L., Lyons, A., & Bull, R. (2012). Reducing misinformation effects in older adults with cognitive interview mnemonics. *Psychology and Aging*, *27*(4), 1191–1203. https://doi.org/10.1037/a0022031

Holmberg, U., & Madsen, K. (2014). Rapport Operationalized as a Humanitarian Interview in Investigative Interview Settings. *Psychiatry, Psychology and Law*, *21*(4), 591–610. https://doi.org/10.1080/13218719.2013.873975

Hope, L. (2018, February 12). *What Sources Mean When They Say 'I Don't Know'.* Retrieved from https://crestresearch.ac.uk/resources/i-dont-know-overview-poster/

Hope, L., Gabbert, F., & Fisher, R. P. (2011). From laboratory to the street: Capturing witness memory using the Self-Administered Interview: The Self-Administered Interview. *Legal and Criminological Psychology*, *16*(2), 211–226. https://doi.org/10.1111/j.2044-8333.2011.02015.x

Horwitz, J. E., & McCaffrey, R. J. (2008). Effects of a third party observer and anxiety on tests of executive function. *Archives of Clinical Neuropsychology*, *23*(4), 409-417. https://doi.org/10.1016/j.acn.2008.02.002

Ioannidis, J. P. A. (2005). Why Most Published Research Findings Are False. *PLoS Medicine*, *2*(8), e124. https://doi.org/10.1371/journal.pmed.0020124

Ioannou, S., Morris, P., Mercer, H., Baker, M., Gallese, V., & Reddy, V. (2014). Proximity and gaze influences facial temperature: a thermal infrared imaging study. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.00845

Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. *Psychological bulletin*, *114*(1), 3-28.

Johnston, V., Brubacher, S. P., Powell, M., & Fuller-Tyszkiewicz, M. (2019). Patterns of Nonverbal Rapport Behaviors Across Time in Investigative Interviews with Children. *Journal of Nonverbal Behavior*. https://doi.org/10.1007/s10919-019-00306-1

Johnston, W. A., Hawley, K. J., Plewe, S. H., Elliott, J. M., & DeWitt, M. J. (1990). Attention

capture by novel stimuli. *Journal of Experimental Psychology: General*, *119*(4), 397-411.

Justice.gov.uk (2017, January, 30). *Video conferencing in courts*. Retrieved from

https://www.justice.gov.uk/newsite/courts/video-conferences

Kajimura, S., & Nomura, M. (2016). When we cannot speak: Eye contact disrupts resources

available to cognitive control processes during verb generation. *Cognition*, *157*, 352–357.

https://doi.org/10.1016/j.cognition.2016.10.002

Kebbell, M. R., Milne, R., & Wagstaff, G. F. (1999). The cognitive interview: A survey of its

forensic effectiveness. *Psychology, Crime & Law*, *5*(1–2), 101–115.

https://doi.org/10.1080/10683169908414996

Kehrer, C. A., Sanchez, P. N., Habif, U., Rosenbaum, G. J., & Townes, B. D. (2000). Effects of a

Significant-Other Observer on Neuropsychological Test Performance. *The Clinical

Neuropsychologist*, *14*(1), 67–71. https://doi.org/10.1076/1385-4046(200002)14:1;1-8;FT067

Kieckhaefer, J. M., Vallano, J. P., & Schreiber Compo, N. (2014). Examining the positive effects of

rapport building: When and why does rapport building benefit adult eyewitness memory?

Memory, *22*(8), 1010–1023. https://doi.org/10.1080/09658211.2013.864313

Köhnken, G., Milne, R., Memon, A., & Bull, R. (1999). The cognitive interview: A meta-analysis.

Psychology, Crime & Law, *5*(1–2), 3–27. https://doi.org/10.1080/10683169908414991

Köhnken, G., Milne, R., Memon, A., & Bull, R. (1999). The cognitive interview: A meta-analysis.

Psychology, Crime & Law, *5*(1–2), 3–27. https://doi.org/10.1080/10683169908414991

Konkle, T., Brady, T. F., Alvarez, G. A., & Oliva, A. (2010). Conceptual distinctiveness supports

detailed visual long-term memory for real-world objects. *Journal of Experimental Psychology:

General*, *139*(3), 558–578. https://doi.org/10.1037/a0019165

Krzywinski, M., & Altman, N. (2013). Points of significance: Power and sample size. *Nature

Methods, 10*, 1139-1140.

Kuivaniemi-Smith, H. J., Nash, R. A., Brodie, E. R., Mahoney, G., & Rynn, C. (2014). Producing

facial composite sketches in remote Cognitive Interviews: a preliminary investigation.

Psychology, Crime & Law, 20(4), 389–406. https://doi.org/10.1080/1068316X.2013.793339

Kyriakidou, M., Blades, M., & Carroll, D. (2014). Inconsistent findings for the eyes closed effect in children: the implications for interviewing child witnesses. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.00448

Langton, S. R., & Bruce, V. (2000). You must see the point: automatic processing of cues to the direction of social attention. *Journal of Experimental Psychology: Human Perception and Performance*, *26*(2), 747-757. http://dx.doi.org/10.1037/0096-1523.26.2.747

LaPaglia, J. A., Wilford, M. M., Rivard, J. R., Chan, J. C. K., & Fisher, R. P. (2014). Misleading Suggestions can Alter Later Memory Reports even Following a Cognitive Interview: The Cognitive Interview and suggestibility. *Applied Cognitive Psychology*, *28*(1), 1–9. https://doi.org/10.1002/acp.2950

Larsson, A. S., & Lamb, M. E. (2009). Making the most of information-gathering interviews with children. *Infant and Child Development*, *18*(1), 1–16. https://doi.org/10.1002/icd.573

Larsson, A. S., Granhag, P., & Spjut, E. (2003). Children's recall and the cognitive interview: do the positive effects hold over time? *Applied Cognitive Psychology*, *17*(2), 203–214. https://doi.org/10.1002/acp.863

Lawrence, H., Akehurst, L., Leach, A.-M., Cherryman, J., Vrij, A., Arathoon, M., & Vernham, Z. (2017). 'Look This Way': Using Gaze Maintenance to Facilitate the Detection of Children's False Reports: Maintaining gaze to detect children's lies. *Applied Cognitive Psychology*, *31*(1), 69–80. https://doi.org/10.1002/acp.3303

Lenoble, Q., Janssen, S. M. J., & El Haj, M. (2019). Don't stare, unless you don't want to remember: Maintaining fixation compromises autobiographical memory retrieval. *Memory*, *27*(2), 231–238. https://doi.org/10.1080/09658211.2018.1501068

Lindsay, D. S. (2015). Replication in Psychological Science. *Psychological Science*, *26*(12), 1827–1832. https://doi.org/10.1177/0956797615616374

Lyyra, P., Astikainen, P., & Hietanen, J. K. (2018). Look at them and they will notice you: Distractor-independent attentional capture by direct gaze in change blindness. *Visual Cognition*, *26*(1), 25–36. https://doi.org/10.1080/13506285.2017.1370052

MacDonald, S., Keeping, Z., Snook, B., & Luther, K. (2017). Do Not Lie to Me, or Else: the Effect of a Turncoat Warning and Rapport Building on Perceptions of Police Interviewers. *Journal of Police and Criminal Psychology*, *32*(3), 263–277. https://doi.org/10.1007/s11896-016-9219-4

MacDonald, S., Snook, B., & Milne, R. (2017). Witness Interview Training: a Field Evaluation. *Journal of Police and Criminal Psychology*, *32*(1), 77–84. https://doi.org/10.1007/s11896-016-9197-6

Mares, I., Smith, M. L., Johnson, M. H., & Senju, A. (2016). Direct gaze facilitates rapid orienting to faces: Evidence from express saccades and saccadic potentials. *Biological Psychology*, *121*, 84–90. https://doi.org/10.1016/j.biopsycho.2016.10.003

Markson, L., & Paterson, K. B. (2009). Effects of gaze-aversion on visual-spatial imagination. *British Journal of Psychology*, *100*(3), 553–563. https://doi.org/10.1348/000712608X371762

Mastroberardino, S., Natali, V., & Candel, I. (2012). The effect of eye closure on children's eyewitness testimonies. *Psychology, Crime & Law*, *18*(3), 245–257. https://doi.org/10.1080/10683161003801100

Meissner, C. A., Kelly, C. E., & Woestehoff, S. A. (2015). Improving the Effectiveness of Suspect Interrogations. *Annual Review of Law and Social Science*, *11*(1), 211–233. https://doi.org/10.1146/annurev-lawsocsci-120814-121657

Memon, A., Meissner, C. A., & Fraser, J. (2010). The Cognitive Interview: A meta-analytic review and study space analysis of the past 25 years. *Psychology, Public Policy, and Law*, *16*(4), 340–372. https://doi.org/10.1037/a0020518

Meskin, B. B., & Singer, J. L. (1974). Daydreaming, reflective thought, and laterality of eye movements. *Journal of Personality and Social Psychology*, *30*(1), 64–71. https://doi.org/10.1037/h0036556

Milne, R. (2004). *The enhanced cognitive interview: A step-by-step guide*. Portsmouth: University of Portsmouth.

Milne, R., & Bull, R. (2002). Back to basics: a componential analysis of the original cognitive interview mnemonics with three age groups. *Applied Cognitive Psychology*, *16*(7), 743–753. https://doi.org/10.1002/acp.825

Mitchell, K. J., & Johnson, M. K. (2000). Source monitoring: Attributing mental experiences. In E.

　　Tulving & F.I.M. Craik (Eds), *The Oxford handbook of memory* (pp. 179-195). New York, NY:

　　Oxford University Press.

Myllyneva, A., & Hietanen, J. K. (2015). There is more to eye contact than meets the eye.

　　Cognition, *134*, 100–109. https://doi.org/10.1016/j.cognition.2014.09.011

Myllyneva, A., & Hietanen, J. K. (2016). The dual nature of eye contact: to see and to be seen.

　　Social Cognitive and Affective Neuroscience, *11*(7), 1089–1095.

　　https://doi.org/10.1093/scan/nsv075

Nash, R. A., Houston, K. A., Ryan, K., & Woodger, N. (2014). Remembering remotely: would

　　video-mediation impair witnesses' memory reports? *Psychology, Crime & Law*, *20*(8), 756–

　　768. https://doi.org/10.1080/1068316X.2013.857669

Nash, R. A., Nash, A., Morris, A., & Smith, S. L. (2016). Does rapport-building boost the

　　eyewitness eyeclosure effect in closed questioning? *Legal and Criminological Psychology*,

　　21(2), 305–318. https://doi.org/10.1111/lcrp.12073

Natali, V., Marucci, F. S., & Mastroberardino, S. (2012). Long-Term Memory Effects of Eye

　　Closure on Children Eyewitness Testimonies: Eye closure and children memory. *Applied*

　　Cognitive Psychology, *26*(5), 730–736. https://doi.org/10.1002/acp.2853

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's Renaissance. *Annual Review*

　　of Psychology, *69*(1), 511–534. https://doi.org/10.1146/annurev-psych-122216-011836

Nord, C. L., Valton, V., Wood, J., & Roiser, J. P. (2017). Power-up: A Reanalysis of 'Power

　　Failure' in Neuroscience Using Mixture Modeling. *The Journal of Neuroscience*, *37*(34),

　　8051–8061. https://doi.org/10.1523/JNEUROSCI.3592-16.2017

Nuzzo, R. L. (2016). Statistical Power. *PM&R*, *8*(9), 907–912.

　　https://doi.org/10.1016/j.pmrj.2016.08.004

 Open Science Collaboration. (2015). Estimating the reproducibility of psychological

　　science. *Science*, *349*(6251), aac4716. https://doi.org/10.1126/science.aac4716

Paas, F. G. (1992). Training strategies for attaining transfer of problem-solving skill in statistics: A cognitive-load approach. *Journal of educational psychology, 84*(4), 429-434. http://dx.doi.org/10.1037/0022-0663.84.4.429

Paas, F. G. W. C., van Merriënboer, J. J. G., & Adam, J. J. (1994). Measurement of Cognitive Load in Instructional Research. *Perceptual and Motor Skills*, *79*(1), 419–430. https://doi.org/10.2466/pms.1994.79.1.419

Patterson, D. (2011). The Impact of Detectives' Manner of Questioning on Rape Victims' Disclosure. *Violence Against Women*, *17*(11), 1349–1373. https://doi.org/10.1177/1077801211434725

Paulo, R. M., Albuquerque, P. B., & Bull, R. (2013). The Enhanced Cognitive Interview: Towards a Better Use and Understanding of This Procedure. *International Journal of Police Science & Management*, *15*(3), 190–199. https://doi.org/10.1350/ijps.2013.15.3.311

Perfect, T. J., Andrade, J., & Eagan, I. (2011). Eye closure reduces the cross-modal memory impairment caused by auditory distraction. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *37*(4), 1008–1013. https://doi.org/10.1037/a0022930

Perfect, T. J., Andrade, J., & Syrett, L. (2012). Environmental Visual Distraction during Retrieval Affects the Quality, Not the Quantity, of Eyewitness Recall: Visual distraction. *Applied Cognitive Psychology*, *26*(2), 296–300. https://doi.org/10.1002/acp.1823

Perfect, T. J., Wagstaff, G. F., Moore, D., Andrews, B., Cleveland, V., Newcombe, S., Brisbane, K., Brown, L. (2008). How can we help witnesses to remember more? It's an (eyes) open and shut case. *Law and Human Behavior*, *32*(4), 314–324. https://doi.org/10.1007/s10979-007-9109-5

Pescod, L., Wilcock, R., & Milne, R. (2013). Improving Eyewitness Memory in Police Call Centre Interviews. *Policing*, *7*(3), 299–306. https://doi.org/10.1093/police/pat013

Phelps, F. G., Doherty-Sneddon, G., & Warnock, H. (2006). Helping children think: Gaze aversion and teaching. *British Journal of Developmental Psychology*, *24*(3), 577–588. https://doi.org/10.1348/026151005X49872

Pollock, E., Chandler, P., & Sweller, J. (2002). Assimilating complex information. *Learning and Instruction*, *12*(1), 61–86. https://doi.org/10.1016/S0959-4752(01)00016-0

Powell, M. B. (2000). Pride: The Essential Elements of a Forensic Interview with an Aboriginal Person. *Australian Psychologist*, *35*(3), 186–192. https://doi.org/10.1080/00050060008257477

Powell, M. B. (2002). Specialist Training in Investigative and Evidential Interviewing: Is it Having Any Effect on the Behaviour of Professionals in the Field? *Psychiatry, Psychology and Law*, *9*(1), 44–55. https://doi.org/10.1375/pplt.2002.9.1.44

Powell, M. B., Fisher, R. P., & Wright, R. (2005). Investigative interviewing. In Brewer, N. & Williams, K.D (Eds)., *Psychology and law: An empirical perspective* (pp.11-42). New York, NY: Guilford Press.

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*(4), 283–292. https://doi.org/10.1080/15614263.2012.704170

Ritter, S. M., Abbing, J., & van Schie, H. T. (2018). Eye-Closure Enhances Creative Performance on Divergent and Convergent Creativity Tasks. *Frontiers in Psychology*, *9*, 1315. https://doi.org/10.3389/fpsyg.2018.01315

Roberts, K. P., Lamb, M. E., & Sternberg, K. J. (2004). The effects of rapport-building style on children's reports of a staged event. *Applied Cognitive Psychology*, *18*(2), 189–202. https://doi.org/10.1002/acp.957

Sauerland, M., Brackmann, N., & Otgaar, H. (2019). Rapport: Little effect on children's, adolescents', and adults' statement quantity, accuracy, and suggestibility. *Journal of Child Custody*, 1–18. https://doi.org/10.1080/15379418.2018.1509759

Saywitz, K. J., Geiselman, R. E., & Bornstein, G. K. (1992). Effects of cognitive interviewing and practice on children's recall performance. *Journal of Applied Psychology*, *77*(5), 744-756. http://dx.doi.org/10.1037/0021-9010.77.5.744

Saywitz, K. J., Larson, R. P., Hobbs, S. D., & Wells, C. R. (2015). Developing Rapport with Children in Forensic Interviews: Systematic Review of Experimental Research: Developing

rapport with children. *Behavioral Sciences & the Law*, *33*(4), 372–389.

https://doi.org/10.1002/bsl.2186

Schreiber Compo, N., Hyman Gregory, A., & Fisher, R. (2012). Interviewing behaviors in police

investigators: A field study of a current US sample. *Psychology, Crime & Law*, *18*(4), 359-

375. http://dx.doi.org/10.1080/1068316X.2010.494604

Senju, A., & Hasegawa, T. (2005). Direct gaze captures visuospatial attention. *Visual Cognition*,

12(1), 127–144. https://doi.org/10.1080/13506280444000157

Senju, A., & Johnson, M. H. (2009). The eye contact effect: Mechanisms and development.

Trends in Cognitive Sciences, *13*(3), 127–134. https://doi.org/10.1016/j.tics.2008.11.009

Smeets, T., Candel, I., & Merckelbach, H. (2004). Accuracy, Completeness, and Consistency of

Emotional Memories. *The American Journal of Psychology*, *117*(4), 595-610.

https://doi.org/10.2307/4148994

Smith, S. M., & Vela, E. (2001). Environmental context-dependent memory: A review and meta-

analysis. *Psychonomic Bulletin & Review*, *8*(2), 203–220.

https://doi.org/10.3758/BF03196157

Stein, L. M., & Memon, A. (2006). Testing the efficacy of the cognitive interview in a developing

country. *Applied Cognitive Psychology*, *20*(5), 597–605. https://doi.org/10.1002/acp.1211

Taylor, D. A., & Dando, C. J. (2018). Eyewitness Memory in Face-to-Face and Immersive Avatar-

to-Avatar Contexts. *Frontiers in Psychology*, *9*, 507.

https://doi.org/10.3389/fpsyg.2018.00507

Tickle-Degnen, L., & Rosenthal, R. (1990). The Nature of Rapport and Its Nonverbal Correlates.

Psychological Inquiry, *1*(4), 285–293. https://doi.org/10.1207/s15327965pli0104_1

Uchiyama, T., & Mitsudo, H. (2019). No Benefit of Eye-Closure Rehearsal in a Unimodal

Recognition Memory Test for Word Items: Eye-closure and recognition memory. *Japanese

Psychological Research*. https://doi.org/10.1111/jpr.12248

Vallano, J. P., & Compo, N. S. (2011). A comfortable witness is a good witness: rapport-building

and susceptibility to misinformation in an investigative mock-crime interview. *Applied

Cognitive Psychology*, *25*(6), 960–970. https://doi.org/10.1002/acp.1789

Vallano, J. P., & Schreiber Compo, N. (2015). Rapport-building with cooperative witnesses and criminal suspects: A theoretical and empirical review. *Psychology, Public Policy, and Law*, *21*(1), 85–99. https://doi.org/10.1037/law0000035

Vertegaal, R., Slagter, R., Van der Veer, G., & Nijholt, A. (2001). Eye gaze patterns in conversations: there is more to conversational agents than meets the eyes. In *Proceedings of the SIGCHI conference on Human factors in computing systems*, 301-308. https://doi.org/10.1145/365024.365119

Vredeveldt, A., & Penrod, S. D. (2013). Eye-closure improves memory for a witnessed event under naturalistic conditions. *Psychology, Crime & Law*, *19*(10), 893–905. https://doi.org/10.1080/1068316X.2012.700313

Vredeveldt, A., & Perfect, T. J. (2014). Reduction of environmental distraction to facilitate cognitive performance. *Frontiers in psychology*, *5*, 860. https://doi.org/10.3389/fpsyg.2014.00860

Vredeveldt, A., & Sauer, J. D. (2015). Effects of eye-closure on confidence-accuracy relations in eyewitness testimony. *Journal of Applied Research in Memory and Cognition*, *4*(1), 51–58. https://doi.org/10.1016/j.jarmac.2014.12.006

Vredeveldt, A., Baddeley, A. D., & Hitch, G. J. (2012). The Effects of Eye-Closure and "Ear-Closure" on Recall of Visual and Auditory Aspects of a Criminal Event. *Europe's Journal of Psychology*, *8*(2), 284–299. https://doi.org/10.5964/ejop.v8i2.472

Vredeveldt, A., Baddeley, A. D., & Hitch, G. J. (2013). The effectiveness of eye-closure in repeated interviews. *Legal and Criminological Psychology*, *19*(2), 282–295. https://doi.org/10.1111/lcrp.12013

Vredeveldt, A., Hitch, G. J., & Baddeley, A. D. (2011). Eyeclosure helps memory by reducing cognitive load and enhancing visualisation. *Memory & Cognition*, *39*(7), 1253–1263. https://doi.org/10.3758/s13421-011-0098-8

Vredeveldt, A., Tredoux, C. G., Kempen, K., & Nortje, A. (2015). Eye Remember What Happened: Eye-Closure Improves Recall of Events but not Face Recognition: Eye-closure and face recognition. *Applied Cognitive Psychology*, *29*(2), 169–180. https://doi.org/10.1002/acp.3092

Vredeveldt, A., Tredoux, C. G., Nortje, A., Kempen, K., Puljević, C., & Labuschagne, G. N. (2015). A field evaluation of the Eye-Closure Interview with witnesses of serious crimes. *Law and Human Behavior*, *39*(2), 189–197. https://doi.org/10.1037/lhb0000113

Vrij, A., & Granhag, P. A. (2014). Eliciting Information and Detecting Lies in Intelligence Interviewing: An Overview Of Recent Research: Lie detection in intelligence settings. *Applied Cognitive Psychology*, *28*(6), 936–944. https://doi.org/10.1002/acp.3071

Wagstaff, G. F., Brunas-Wagstaff, J., Cole, J., Knapton, L., Winterbottom, J., Crean, V., & Wheatcroft, J. (2004). Facilitating Memory with Hypnosis, Focused Meditation, and Eye Closure. *International Journal of Clinical and Experimental Hypnosis*, *52*(4), 434–455. https://doi.org/10.1080/00207140490889062

Wagstaff, G. F., Wheatcroft, J., Cole, J. C., Brunas-Wagstaff, J., Blackmore, V., & Pilkington, A. (2008). Some cognitive and neuropsychological aspects of social inhibition and facilitation. *European Journal of Cognitive Psychology*, *20*(4), 828–846. https://doi.org/10.1080/09541440701469749

Wais, P. E., Rubens, M. T., Boccanfuso, J., & Gazzaley, A. (2010). Neural Mechanisms Underlying the Impact of Visual Distraction on Retrieval of Long-Term Memory. *Journal of Neuroscience*, *30*(25), 8541–8550. https://doi.org/10.1523/JNEUROSCI.1478-10.2010

Walsh, D., & Bull, R. (2012). Examining Rapport in Investigative Interviews with Suspects: Does its Building and Maintenance Work? *Journal of Police and Criminal Psychology*, *27*(1), 73–84. https://doi.org/10.1007/s11896-011-9087-x

Wang, Y., Newport, R., & Hamilton, A. F. D. C. (2011). Eye contact enhances mimicry of intransitive hand movements. *Biology letters*, *7*(1), 7-10. https://doi.org/10.1098/rsbl.2010.0279

Westera, N. J., & Powell, M. (2015). Improving Communicative Practice: Beyond the Cognitive Interview for Adult Eyewitnesses. In G. Oxburgh, T. Myklebust, T. Grant, & R. Milne (Eds.), *Communication in Investigative and Legal Contexts* (pp. 335–357). https://doi.org/10.1002/9781118769133.ch15

Wright, A. M., & Holliday, R. E. (2005). Police officers' perceptions of older eyewitnesses. *Legal and Criminological Psychology*, *10*(2), 211–223. https://doi.org/10.1348/135532505X37001

Wright, R., & Powell, M. B. (2007). What makes a good investigative interviewer of children? A comparison of police officers' and experts' perceptions. *Policing: An International Journal of Police Strategies & Management*, *30*(1), 21-31.

Yantz, C. L., & McCaffrey, R. J. (2009). Effects of parental presence and child characteristics on children's neuropsychological test performance: Third party observer effect confirmed. *The Clinical Neuropsychologist*, *23*(1), 118–132. https://doi.org/10.1080/13854040801894722

Yates, J. L., & Nasby, W. (1993). Dissociation, affect, and network models of memory: An integrative proposal. *Journal of Traumatic Stress*, *6*(3), 305-326. https://doi.org/10.1002/jts.2490060303

Zajonc, R. B. (1965). Social facilitation. *Science*, *149*(3681), 269-274.

Zajonc, R. B., & Sales, S. M. (1966). Social facilitation of dominant and subordinate responses. *Journal of Experimental Social Psychology*, *2*(2), 160-168.