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**Directive leading questions and preparation techniques effects on
witness accuracy**

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Abstract

The use of leading questions during cross-examination can undermine the accuracy and completeness of evidence presented in court. Further, increasing numbers of general witnesses are arriving in court unprepared for the experience. In this study, 60 mock witnesses from England and Wales were allocated to one of three preparation conditions; a) those who received no familiarisation with the cross-examination process, b) those who received a guidance booklet on cross-examination procedures, and c) those who underwent an alternative rapport-building protocol. The participants observed a hit-and-run scenario video clip before being cross-examined with either a) non-directive leading questions or b) directive leading questions. The results showed that directive leading questioning styles were most detrimental to witness accuracy. Neither familiarisation with the types of questions typically employed during cross-examination nor the rapport-building protocol were found to be effective as a preparation strategy to increase accurate responses compared against a control group. Consideration of the impact of directive leading question styles on all witnesses in court seems necessary.

Directive leading questions and preparation technique effects on witness accuracy

Introduction

In many court cases, it is common for the decision to convict or acquit defendants to rest on the evidence of eyewitnesses to ‘prove’ the guilt or innocence of the criminally accused (Kebbell & Johnson, 2000) to the standard of beyond reasonable doubt. In England and Wales, the burden of proving the guilt of the defendant lies on the prosecution who must show proof of the case they allege beyond reasonable doubt in order to obtain a conviction (Mazzacuva, 2014). In order to maximise the likelihood that a guilty perpetrator is convicted and an innocent defendant is acquitted, it is imperative that witness testimony is as accurate as it can be (Garrett, 2011). However, it is well documented that inaccuracies in witness testimony have been implicated in at least 75% of DNA exoneration cases (Garrett, 2011; Innocence Project, 2017).

One important element of the justice system is the court process, particularly the way information is obtained and tested and how it might mislead witnesses into providing less than accurate information. For example, during cross-examination, witnesses’ accounts are challenged by the opposing party, typically using more suggestive question styles, which can include leading questions. Leading questions are those that are phrased in such a way as to suggest or imply the answer that is being sought and are deliberately framed to elicit a simple confirmation or denial (i.e., a yes/no response) in the hope that the witness will adopt the cross-examiner’s formations as their own (Harris, 1984; Kebbell & Johnson, 2000). Research conducted has reliably

demonstrated how leading questions can significantly reduce the accuracy of testimony (e.g., Andrews, Lamb, & Lyon, 2015; Fogliati & Bussey, 2014; Hanna, Davies, Crothers, & Henderson, 2012; Jack & Zajac, 2014; Wheatcroft & Ellison, 2012). Other researchers have identified how more directive leading (Wheatcroft & Woods, 2010) questioning styles can be particularly detrimental to witness accuracy compared to their non-directive leading equivalents (Wheatcroft, Caruso, Krumrey-Quinn, 2015). Directive leading questions are those which are more assertive in nature and are more likely to include interrogative tags such as, “The car was red, wasn’t it?” Conversely, non-directive leading questions typically ask for the same target information but without the added pressure to respond in a particular way (i.e., “Was the car red?”). Research has also shown how the use of leading questions can weaken confidence-accuracy (C-A) relationships compared to when simplified alternatives to questions are used (Kebbell & Giles, 2000; Wheatcroft, Wagstaff & Kebbell, 2004). This is especially important given that a number of court officials, including jurors, rely heavily on a witness’s level of subjective confidence to judge the accuracy of the evidence provided. One way to assist witnesses has been to consider preparing them to court processes.

Despite an initial cautious view, witness preparation has received greater prominence in England and Wales in light of the Court of Appeal judgement endorsing its practice. In the case of *R v Momodou* (2005) the Court held that pre-trial arrangements to familiarise witnesses with the general process of testifying were permissible and could improve the manner in which a witness gives evidence (Ellison & Wheatcroft, 2010). Though some research has considered the efficacy of preparing witnesses for cross-examination (e.g., Baxter, Boon & Marley, 2006; Righarts, O’Neill, & Zajac, 2013; Wheatcroft & Ellison, 2012), more work is still required to determine

what kinds of preparation might be most beneficial. Moreover, despite the use of rapport-building protocols in police investigations (Collins, Lincoln & Frank, 2002; Hershkowitz, Lamb, Katz & Malloy, 2013; Kieckhafer, Vallano & Schreiber Compo, 2014), it has not yet been established whether using rapport-based preparation could be of any benefit to witnesses prior to giving evidence in court. Additionally, the different styles of leading questions used (e.g., directive and non-directive) require further investigation as to whether such questions assist or degrade accurate responses and the relationship between confidence-accuracy (C-A). The present study will address these points.

Questioning Styles in the Courtroom

During cross-examination, the witness is questioned by the prosecution with the aim of establishing creditworthiness of the testimony provided (Wheatcroft, 2017). The examiner constructs a competing interpretation, or re-analysis of evidence, in such a way as to aim to effectively discredit a witness's account (Ellison, 2007; Ellison & Wheatcroft, 2010). The process is associated with forms of questioning that are unlimited as to the type of questions allowed; at least with those who are not vulnerable (Hobbs, 2003; Wheatcroft & Wagstaff, 2003; Wheatcroft, Wagstaff & Kebbell, 2004). In England and Wales, the courts have made forward steps using guiding principles in the questioning of children and vulnerable witnesses (Cahill, Lamb & Wheatcroft, 2019). The principles of questioning have been developed by the Inns of Court College of Advocacy (ICCA) and are elaborated upon later in the paper. However, leading questions are seen by the legal profession as important in probing the accuracy of evidence to expose unreliable and dishonest witnesses with their use based upon the

notion that such questioning styles serve to calibrate or assess the memory of witnesses (Wheatcroft, 2017).

As noted earlier, research has sought to identify and define different forms of leading questions to assist in understanding the effect they have in the courtroom, and to determine whether comparative differences in accurate responses from witnesses are evident from the different forms used (Wheatcroft et al., 2015). One might expect therefore that when directive leading questions are used in traditional cross-examination procedures, overall accuracy will be reduced. Thus, the standard legal procedures adopted during traditional cross-examination with ordinary witnesses (i.e., those not classed as a child or vulnerable witness) may not provide the optimum conditions needed for providing the most accurate testimony. In England and Wales, a national training programme developed by the Bar Council and ICCA was launched in 2016 for advocates dealing with children and vulnerable witnesses involved in sexual offence cases. In this respect, the revised guidance recognises directive leading questions as detrimental to the accuracy of the testimony provided (see Cahill, Lamb & Wheatcroft, 2019), and that this is particularly acute for those who are vulnerable. However, given the evidence base prior to the introduction of the training programme it is likely that those individuals who are not classed as vulnerable will continue to remain susceptible to directive forms of leading questions in the absence of any assistance. The present research will investigate this issue further.

Confidence and Accuracy (C-A) Relationship

It is also important that appropriate levels of confidence are applied to accurate responses. Court officials, including judges and juries, rely heavily on a witness's level

of subjective confidence to judge the accuracy of the evidence provided, and is one of the main factors driving perceptions of witness credibility (Fox & Walters, 1986; Lindsay, Wells & O'Connor, 1989; Sah, Moore, & MacCoun, 2013). In general, the belief held is that if a witness appears to be confident, they are more likely to be correct than a witness showing a lack of confidence in their statements. Whilst some researchers have found robust positive relationships between confidence and accuracy (e.g.; Sporer, Penrod, Read, & Cutler, 1995; Teoh & Lamb, 2010), other research has demonstrated this relationship can often be weak, making it difficult to determine the accuracy of the testimony provided from the level of certainty expressed (Kebbell & Giles, 2000; Luus & Wells, 1994; Wheatcroft et al., 2004). Others have indicated how the use of confusing and leading question styles can weaken C-A relationships compared to when simplified alternatives are used (Kebbell & Gilles, 2000; Kebbell & Johnson, 2000). Nevertheless, and jurists are often unaware of the impact of this on evidence, and as such, the drawing of false inferences from witness confidence continues to remain worryingly high (Kebbell, Evans & Johnson, 2010).

Research exploring the confidence-accuracy (C-A) relationship has typically been concerned with comparing the accuracy of confident witnesses to the accuracy of less confident witnesses (i.e., between-subjects confidence-accuracy). However, it is the within-subjects C-A (W-S C-A) relationship that has important implications for the evaluation of witness testimony in court. W-S C-A is a calculation that concerns a witness's ability to correctly discriminate between the accuracy of various statements they are making (Wheatcroft et al., 2004). In other words, confident statements made by a witness are more likely to be accurate than less confident statements made by the same witness (Smith, Ellsworth & Kassin, 1989). Indeed, W-S C-A judgments have

been found to be a more reliable measure of C-A relationships (Perfect, Watson & Wagstaff, 1993). Nevertheless, research has shown how the use of suggestive forms of leading question during cross-examination can significantly weaken W-S CA relationships, especially when questions are asked that include more difficult target items (Wheatcroft et al, 2004). Presumably, the suggestive style of questioning casts doubt on testimony, meaning the witness is less able to apply an appropriate level of confidence to their statements due to that uncertainty. If a witness is confident but their statement is inaccurate (or if a witness is not at all confident but their statement is accurate) miscarriages of justice may be more likely to occur, because of the importance placed on such confidence judgements. This undoubtedly poses major difficulties for accurate fact-finding (Kebbell, Wagstaff & Covey, 1996; Wheatcroft, Wagstaff & Kebbell, 2004). Despite this, research has tended to overlook the potential impact the directive form of leading question can have on W-S C-A relationships together with the impact on the evaluation of evidence provided by witnesses.

Witness Preparation and Rapport-Building Protocols

Familiarising witnesses to cross-examination procedures may provide a means of mitigating the adverse effects of questioning techniques favoured by trial advocates, whilst simultaneously allowing witnesses to maintain greater control over their testimony (Ellison & Wheatcroft, 2010). As noted earlier, in England and Wales, the Courts have more recently endorsed this practice in a criminal context, acknowledging the heavy demands placed on witnesses within an adversarial system and approving the rights of barristers to prepare witnesses on conduct appropriate to the courtroom and, more specifically, how to give effective evidence (*R v. Momodou*, 2005). Familiarisation aims to acquaint witnesses with the standard questioning techniques

employed by lawyers during the course of cross-examination and provide them with practical advice on how best to approach the interaction (Bond & Solon, 1999; Carson, 1990; Ellison & Wheatcroft, 2010). Whilst training regimes can take various approaches to familiarisation, broadly speaking witnesses are provided with information about the basic rationale of cross-examination, to request clarification where appropriate, and never to answer a question that they do not understand (Ellison & Wheatcroft, 2010; Wheatcroft, 2017a; Wheatcroft & Woods, 2010).

Pre-trial preparation has been shown to have some beneficial impact on the ability of inexperienced witnesses to provide more accurate testimony, reduce errors to complex questions, and encourage witnesses to seek clarification from the examiner (Baxter, Boon & Marley, 2006; Ellison & Wheatcroft, 2010; Wheatcroft, 2017; Wheatcroft & Ellison, 2012). Indeed, research tends to suggest that briefing witnesses prior to cross-examination can increase the accuracy of the testimony provided. Warning witnesses about the possibility of an examiner's use of misleading information during cross-examination has also been found to result in a low compliance to suggestion effect (Greene, Flynn & Loftus, 1982). Others have found that briefing witness prior to cross-examination can increase witness confidence (Penrod & Cutler, 1995). Importantly, research has demonstrated that familiarising witnesses about the use of directive leading questions during cross-examination allowed for significantly greater W-S C-A relationships compared with a non-directive equivalent condition, presumably because the pre-trial preparation used helped witnesses to apply an appropriate level of confidence to their answer (Wheatcroft & Woods, 2010). Overall, such studies lend support to those who suggest that witness preparation is essential for the improvement of witness evidence in court (Wheatcroft, 2017a).

There is very little empirical work however that has considered the efficacy of preparing witnesses for cross-examination and its impact on witness accuracy and the C-A relationship. Further, more work needs to be carried out to establish what kind of preparation has the best outcome. The rapport-building process has been successfully used as a technique to aid in the accuracy of witness statements given at the police interview stage. Indeed, major investigative interviewing protocols such as cognitive approaches (see Wheatcroft & Wagstaff, 2014 for review) recommend that investigators build rapport with cooperative witnesses at the start of a police interview in an attempt to increase the accuracy of witness recall (Vallano & Schreiber Compo, 2015). In the 2011 guidelines outlined by the Ministry of Justice for achieving best evidence (ABE) in criminal proceedings, it is stated it is essential for a rapport stage prior to formal questioning to allow the witness to have some familiarity with the personnel who will be involved in the interview. Additionally, the National Institute of Child Health and Human Development (NICHD) protocol recommends building rapport to improve the quality and informativeness of investigative interviews with children. In a review of studies designed to evaluate the usefulness of the NICHD protocol, the researchers found it to improve the quality of information obtained (Lamb, Orbach, Hershkowitz, Esplin & Horowitz, 2007). Other studies have also shown how establishing rapport between the interviewer and witness is likely to improve the accuracy of the information provided in adults (Collins, Lincoln, & Frank, 2002; Hershkowitz, Lamb, Katz & Malloy, 2013; Kieckhaefer, Vallano & Schreiber Compo, 2013; Metzler, 1989; Vallano & Schreiber Compo, 2015). Despite its frequent usage, both as a term and in practice, there has been little consideration of how rapport is defined and operationalised. However, one study conducted by Vallano, Evans, Schreiber Compo and Kieckhaefer

(2015) found that a majority of law enforcement interviewers define rapport as a positive relationship involving trust and communication. Further, law enforcement interviewers reported building rapport with adult witnesses and suspects in a similar manner, often by using verbal techniques (e.g., discussing common interests via small talk) and non-verbal techniques (e.g., displaying understanding via empathy and sympathy). In this context, one might argue the primary function of rapport is to encourage a detailed account by enabling the witness to feel comfortable, important and listened to. As a result, a by-product of effective rapport may thereby be increased accuracy. How a rapport building strategy might compare with familiarisation to the cross-examination procedure has not been previously examined. Neither has whether rapport-building is useful in the context of cross-examination. Whilst this is different to those carried out during investigative interviews, it nevertheless may be important. Furthermore, as far as the researchers are aware, no such examination has been made of the C-A relationship in respect of rapport building protocols.

The Present Study: Rationale and Hypotheses

In light of the above, the present study examined the impact of the use of directive leading questions on witness accuracy, confidence, and W-S C-A relationships as a result of traditional cross-examination. Specifically, the researchers wanted to determine whether the use of directive leading forms of question style were more detrimental to witness accuracy and confidence compared to a non-directive leading equivalent. Furthermore, it was important to explore whether exposure to two different pre-trial techniques could encourage more reliable testimony, and if so, what type of

preparation would be most beneficial to witness reports. With these considerations in mind, the present study was designed to test two key hypotheses:

- (1) The use of directive leading questions will reduce witness accuracy, confidence, and weaken the W-S C-A relationship compared to the use of non-directive leading questions.
- (2) Preparation of witnesses will facilitate significantly higher levels of accurate responses and confidence levels, and strengthen the W-S C-A relationship compared to non-prepared witnesses.

Method

Design

A 2 x 3 between-subjects factorial design was employed. The independent variables were questioning style (non-directive vs directive leading) and preparation type (no preparation, specific-cross guidance, or process-orientated rapport). The dependent variables measured were accuracy (i.e., number of questions answered correctly), confidence (i.e., how certain participants were about the answers they provided), and W-S C-A (i.e., participant ability to correctly discriminate between level of confidence for questions answered correctly and incorrectly).

Participants

Participants were recruited from both the general public and student populations (n=60). The inclusion criteria for the study required individuals to be 18 years old or above. Thirty participants contributed to the directive leading question condition, with ten of these participants contributing to the no preparation condition, ten contributing to the specific-cross guidance condition, and ten contributing to the process-orientated rapport condition. A further thirty participants contributed to the non-directive leading question condition, with ten of these participants contributing to the no preparation

condition, ten contributing to the specific-cross guidance condition, and ten contributing to the process-orientated rapport condition. Table 1 presents the number of male and female participants contributing to each condition and their respective mean ages.

Table 1: Gender (n), mean (M) ages and standard deviations (SD) of participants contributing to each of the main study conditions.

Questioning Style & Preparation Type	Gender (n) Male; Female	Age (years) M; SD
Directive Leading/No Preparation	4; 6	26.80; 12.69
Directive Leading/Specific-Cross Guidance	6; 4	25.32; 8.54
Directive Leading/Process-Orientated Rapport	2; 8	23.00; 3.68
Non-Directive Leading/No Preparation	3; 7	20.80; 1.93
Non-Directive Leading/Specific-Cross Guidance	2; 8	29.70; 15.03
Non-Directive Leading/No Preparation	2; 8	28.10; 15.80

Materials and Procedure

The study was approved by local Ethics Committee procedures. All participants were briefed as to the nature of the study and given the opportunity to ask questions prior to taking part; once these aspects were satisfied participants could decide whether to take part. If they agreed they completed a consent form. Following this, all participants were randomly allocated to one of the six experimental conditions before the experiment began. All participants were advised that they would observe a short video clip (approx. one minute in length) and be asked questions about what they had observed in a ‘cross-examination’ style format. The video clip showed a young man walking through a car park before being hit by a reversing car that failed to stop and drove away. Following the video event, all participants completed an unrelated filler task, which involved completing a food orientated word search. The participants in the

no preparation condition were given no further information and completed the filler task for ten minutes before being questioned. In real life, the time period between witnessing the event would be longer, typically by several months or even years. Given the study time frame however, this would not have been practical. Therefore, in keeping with much of previously reported research, a ten-minute time delay was deemed appropriate to use (e.g., Sharman & Powell, 2011; Wheatcroft & Woods, 2010; Wheatcroft, Wagstaff & Russell, 2004).

Participants in the specific-cross guidance condition completed the filler task for five minutes before being provided with a preparation booklet which they were advised to read carefully for a further five minutes. The timeframe ensured that latency to questioning was equivalent across all conditions. Each participant was advised the booklet might help assist them when answering questions during cross-examination. The document contained information about the purpose of cross-examination and practical guidance on answering questions, which included listening carefully to the question that is being asked, thinking carefully before answering a question and what to do when a question is not fully understood, or an answer is not known. The booklet also contained examples of leading questions, dealing with questions that contained more than one suggestion, and dealing with interruptions made by the examiner. Participants were also asked to answer all questions truthfully.

The process-orientated rapport condition required the experimenter to employ a rapport-building protocol until the questioning began. The examiner was advised to shake hands with the participant, offer them a seat, and introduce themselves. In addition, the experimenter discussed common interests via small talk and used non-verbal techniques (e.g., displaying understanding via empathy and sympathy). The experimenter continued to engage in a friendly manner throughout the examination and

mirrored the participant where appropriate. Those participants in the no preparation condition were greeted by a hand shake, offered a seat and then asked to introduce themselves before proceeding.

For all conditions, participants were then examined by the experimenter who adopted the role of defence advocate using a series of directive or non-directive questions requiring 'yes' or 'no' responses concerning the video clip they observed. The experimenter received training from the supervisor which consisted of familiarisation with the interview protocols and significant practice including three pilot interviews across each of the conditions to ensure, as far as possible, a standard across conditions and within and between interviews. For the process-oriented rapport-condition, the experimenter sought advice about how to achieve rapport with the witness using investigative interviewing protocols used in England and Wales (e.g., cognitive approaches (see Memon, Meissner & Fraser, 2010; Wheatcroft & Wagstaff, 2014) and ABE guidelines (see Ministry of Justice, 2011).

In the non-directive leading questioning condition participants were required to answer twenty questions. In the directive leading questioning condition, participants were also required to answer ten of the same questions as those used in the non-directive leading condition. However, the other ten (i.e., the other half of the questions) were rephrased to replicate the manner in which lawyers conduct cross-examination in court. Forms for directive leading questions were taken from Crown Court transcripts to ensure maximum ecological validity. Questions included 'the driver was not on his phone when he got into the car, was he?', and 'none of the onlookers were female, were they?' Such questions prompted the preferred answer with the added use of confirmatory tags. Following each question, participants were asked to rate how confident they were in the answer they provided on a Likert scale ranging from 1 to 6,

where (1) represented ‘not at all confident’ and (6) represented ‘absolutely certain’. Face-to-face questioning was chosen to add verisimilitude to the questioning procedure rather than the use of questionnaires (Wheatcroft & Woods, 2010). On completion of the study and a debrief session, participants were thanked and given the opportunity to ask any other questions.

Analytical Plan

The participants overall accuracy scores were calculated using a simple scoring system where one point was awarded if the participant answered questions correctly, and zero points awarded if they answered incorrectly. The scores for correctly answered questions were then added together to obtain a total sum of accuracy out of a maximum score of twenty. The participants overall confidence scores were calculated by adding up the confidence score provided for each question item. These were then added together to obtain a total sum of confidence out of a maximum score of one hundred and twenty for each participant. To calculate W-S C-A relationships, the answer to each question was coded as either correct or incorrect and the confidence score for each question was recorded. Pearson’s correlations were then performed to generate a numerical description between accuracy and confidence for each participant. The mean average of the W-S CA correlations produced was analysed in the same way as for accuracy and confidence.

The results were then analysed using a 2 (non-directive; directive leading) x 3 (no preparation; specific cross-guidance; process-orientated rapport) independent Analysis of Variance (ANOVA), conducted separately for each dependent variable (i.e. accuracy, confidence, and W-S C-A). Significant interactions were explored using appropriate post-hoc tests.

Results

Table 2 presents the means, standard deviations, and total number of participants allocated to each study condition for witness accuracy, witness confidence, and within-subjects confidence-accuracy.

Table 2: Means (M) and Standard Deviations (SD) for accuracy, confidence, and within-subjects confidence-accuracy ($W-S$ $C-A$) for questioning style (non-directive leading and directive leading) and preparation type (no preparation, specific cross-guidance, and process-orientated rapport)

Questioning Style & Preparation Type	Accuracy M; SD	Confidence M; SD	W-S C-A M; SD
No Preparation (Overall) n = 20	13.15; 2.37	78.40; 12.47	.41; .29
Non-Directive Leading n = 10	14.80; 1.55	80.40; 12.64	.34; .34
Directive Leading n = 10	11.50; 1.84	77.00; 12.74	.48; .24
Specific Cross-Guidance (Overall) n = 20	14.40; 2.72	84.65; 12.50	.38; .25
Non-Directive Leading n = 10	16.20; 2.35	88.00; 12.09	.46; .31
Directive Leading n = 10	12.60; 1.71	81.30; 12.59	.30; .17
Process-Oriented Rapport (Overall) n = 20	13.90; 2.40	84.95; 9.37	.50; .27
Non-Directive Leading n = 10	15.90; .88	84.90; 6.45	.54; .22
Directive Leading n = 10	11.90; 1.60	85.00; 11.99	.46; .31
Non-Directive Leading (Overall) n = 30	15.63; 1.75	84.43; 10.86	.45; .29
Directive Leading (Overall) n = 30	12.00; 1.72	81.10; 12.46	.41; .25

Witness Accuracy

There was a significant main effect for questioning style, $F(1, 54) = 67.72, p < .01, \eta^2_p = .56$ (a large effect size). Correct responses were found to be significantly higher

in the non-directive leading questioning group ($M = 15.63$, $SD = 1.75$) than the directive leading questioning group ($M = 12.00$, $SD = 1.72$). No main effect was found for preparation type, $F(2, 54) = 2.71$, $p = .07$, $\eta^2_p = .09$, though a trend was observed. Correct responses were found to be higher for those who received specific cross-guidance ($M = 14.40$, $SD = 2.72$) than the group who received no preparation ($M = 13.15$, $SD = 2.37$), $t(19) = -1.25$, $p < .05$. No other comparisons were significant ($p > .05$). No interaction was observed, $F(2, 54) = .21$, $p > .05$, $\eta^2_p = .01$.

Witness Confidence

There was no significant main effect for questioning style, $F(1, 54) = 1.23$, $p > .05$, $\eta^2_p = .02$, or for preparation type, $F(2, 54) = 1.84$, $p > .05$, $\eta^2_p = .06$, and no interaction was observed, $F(2, 54) = .43$, $p > .05$, $\eta^2_p = .02$.

Within Subjects Confidence-Accuracy (W-S C-A)

There was no significant main effect of questioning style, $F(1, 54) = .23$, $p > .05$, $\eta^2_p = .01$, or for preparation type, $F(2, 54) = .96$, $p > .05$, $\eta^2_p = .03$, and no interaction was observed, $F(2, 54) = 1.61$, $p > .05$, $\eta^2_p = .06$.

General Discussion

Witness Accuracy

The study sought to examine the impact of the use of directive leading questions on witness accuracy, confidence, and W-S C-A relationships as a result of traditional cross-examination. It also was interested in whether the use of directive leading forms of question styles were more detrimental to witness accuracy and confidence compared to a non-directive leading equivalent. It was also important to explore whether exposure

to different pre-trial preparation techniques could encourage more reliable testimony, and if so, what type of preparation is most beneficial to a witness.

First, in line with predictions, the use of directive leading questioning styles was significantly more detrimental to witness accuracy than their non-directive leading equivalents. A large effect size was found. Therefore, it can be expected that when directive leading questions are used as part of a cross-examination procedure, the accuracy of witness statements will be reduced. It is clear then that the use of directive forms of leading questions in traditional cross-examination does not promote the accuracy of witness evidence in court (Wheatcroft et al., 2015), nor are they likely to effectively probe the evidence obtained during examination-in-chief to expose dishonest and unreliable witnesses (DuCann, 1964). The ‘overriding objective’ of the 2014 Criminal Procedure Rules (CPR) is that ‘criminal cases be dealt with justly’, which includes ‘recognising the rights of a defendant’ and ‘respecting the interests of witnesses’. Hence, cross-examination should be conducted such that defendants and witnesses are more likely to give the most accurate accounts (Wheatcroft et al., 2015). However, the results presented here suggest this may not be the case when a traditional approach to cross examination is maintained. Further consideration of the form of questions currently permitted in the courts may therefore be necessary. For example, a distinction between directive and non-directive leading questioning styles might more usefully define the question form appropriate for use in cross-examination, with the objective that there should be no place for questions that impact negatively upon witness accuracy (Wheatcroft, 2017). In doing so, the use of directive leading questions is not allowed because of the increased likelihood of introducing errors in memory and reducing testimony accuracy. The use of non-directive leading questions might instead permit witness veracity to be tested with less risk of unreliability (Wheatcroft & Woods,

2010). What is more, as the sample in this study was non-vulnerable, the findings suggest that use of directive leading question forms are detrimental to the accuracy of the testimony provided by *all* witnesses; not just those classified as vulnerable.

Theoretically speaking, it is possible that the more suggestive style of questioning used in the directive leading form may have prompted witnesses to reconsider what they believed to be correct thereby leading to an incorrect answer. More complex tasks have been found to require greater cognitive effort, activating executive and frontal systems with the potential to lead to fewer correct responses as a result of lowered processing capacity (Wagstaff et al., 2008). The use of confirmatory tags and the more interrogative suggestive style present in directive leading questions might mean they are likely to make it more difficult for the witness to determine what is being asked of them and the most appropriate response. In turn, this is likely to limit the amount of processing capacity available to work on comprehending, understanding, formulating, and responding to questions, resulting in a greater number of errors being made (Wagstaff et al., 2008).

It is important to acknowledge that accuracy might have been further reduced had witnesses been giving evidence to a real crime. Implicit in traditional cross-examination process is the laws acceptance that witnesses are capable of giving accurate testimony under unusual and stressful conditions (Wheatcroft et al., 2015). However, stressful environments may be harmful to the memory retrieval process, especially when misleading information is introduced (Schmidt, Rosga, Schatto, Breidenstein & Schwabe, 2014). Research suggests that memory retrieval renders seemingly stable memories labile, requiring another period of stabilization (termed reconsolidation) during which memories can be modified (Hardt, Einarsson & Nader, 2010). It is thought that during this period of reconsolidation, memory is most susceptible to the

introduction of misinformation (Hupbach, Gomez, Hardt & Nadel, 2007; Schacter, Guerin & St Jaques, 2011). Reconsolidation of episodic memories also involves the hippocampus (Schmidt et al., 2014). The hippocampus is one of the brain areas that is most sensitive to stress (deKloet, Sibug, Helmerhorst & Schmidt, 2005) and studies with both rodents and human participants suggest that stress and glucocorticoids stress hormones (i.e., cortisol) impair this reconsolidation process (Maroun & Akirav, 2008; Schwabe & Wolfe, 2013). Given the high levels of stress typically encountered during cross-examination it is possible that the types of leading question styles used, and particularly those of the directive leading form, may be even more damaging to memory than is demonstrated in this paper.

When considering the effect of different types of preparation on witness accuracy, no main effect was found for preparation type, though a trend was observed. A more detailed exploration of the means showed that, although non-significant, witnesses were more accurate when they had read the specific-cross guidance booklet before cross-examination compared to those witnesses who received no preparation. Witnesses who read the guidance booklet were informed of directive leading styles of questioning, given examples of leading questioning styles, and offered suggestions as to how to deal with these should they arise. This type of witness preparation may have allowed individuals to maintain more control over the testimony they provided. Indeed, as previously acknowledged, being informed of this information may have forewarned participants that an attempt may be made to bias their responses during cross-examination (Dodd & Bradshaw, 1980), thus creating a more suspicious mind-set that enabled witnesses to detect discrepancies in the questions being asked and what they actually remembered about the event (Gudjonsson, 2005). Nevertheless, given this was a minimal trend, it is difficult for any firm conclusions to be made. Currently, findings

suggest that familiarisation is not a consistent strategy for preparing witnesses to cross-examination procedures used in court.

There is an argument that limited statistical power because of the modest sample size in the present study ($n = 60$), may have played a role in limiting the significance of some of the statistical comparisons. A post hoc power analysis using GPower (Faul & Erdfelder, 1992; Faul, Erdfelder, Lang & Buchner, 2007) revealed that for a medium effect size (.25) to be detected, a sample size of approximately one hundred would be required to obtain statistical power ($1 - \beta$) at the recommended .80 level (Cohen, 1988), $\alpha = 05$, two-tailed. Future work should therefore look to increase the size of the sample to determine whether insignificant findings remain true. In addition, the period of time in which participants were given to read through the guidance leaflet was relatively short (i.e., five minutes) in comparison to what might be more typical in a real-life situation. Thus, higher accuracy rates may have been apparent if witnesses had been exposed to a longer period of pre-trial preparation. Future work should consider comparing different exposure times in conjunction with preparation and how witness accuracy is impacted.

Similarly, the rapport-building protocol did not have any significant bearing on witness accuracy. Nevertheless, this finding does not rule out the effectiveness of rapport as a preparation technique. As previously noted, rapport-building is considered an effective technique based on its proven efficacy during police interviews with witnesses (Geiselman & Fisher, 1989; Geiselman, Saywitz & Bornstein, 1998; Minichiello, Aroni, Timewell & Alexander, 1990; Pinizzotto & Davis, 1996) and this should not be overlooked. However, cross-examination procedures are drastically different from police interviews with witnesses. Therefore, it is likely that the practicality of rapport-building during cross-examination would also vary. For example,

there might be time constraints in developing rapport between lawyers and witnesses in the real-world and issues surrounding appropriate training and techniques used to build rapport in these situations. The present research took an initial step by looking into the effectiveness of rapport-building techniques used during cross-examination. Nevertheless, going forward the use of rapport-building as a preparation technique needs to be explored more fully before any reliable conclusions can be drawn about effectiveness. The most likely reason for the non-significance of this protocol is that the rapport-building used was a generalist approach rather than specific to the task. Further research should explore using role-play between mock lawyers and witnesses and the type of training and techniques which would be most useful in building rapport during these situations.

Whilst no significant interaction was observed between witness preparation and questioning style, it is of interest that the non-directive leading/specific-cross guidance condition revealed the highest accuracy ($M = 16.20$), whereas less accurate responses were found in the directive leading/specific-cross guidance condition ($M = 12.60$). The descriptive data suggest that the use of specific cross-guidance may be most beneficial to witnesses when witnesses are subjected to more subtle styles of leading questions rather than those that impose a great deal of suggestibility to witness. Whilst this interpretation should be treated with caution, such findings do warrant further investigation. It may be that witness familiarisation provides a means of mitigating the adverse effects of leading questioning styles more generally, and only when less suggestive non-directive leading forms are employed. This adds further support to the recommendation that a revision of the types of leading question forms currently used in court with ordinary witnesses is necessary.

Witness Confidence

No difference in overall confidence was found when directive leading questions were used compared to their non-directive leading equivalent. This is somewhat unexpected given that directive leading styles are typically more suggestive than their non-directive leading counterparts. Thus, one might expect different levels of confidence to be expressed. It is important to emphasise that directive leading questions did lead to a reduction in confidence, but this was not significant. As previously noted, a post hoc power analysis indicated a larger sample size may be required to detect a medium effect size. Future research should therefore attempt to use a larger sample size to determine whether the findings may reach significance. Such an outcome could be particularly problematic given that juries and jurors often assume that a more confident witness is also a more accurate one (e.g., Brigham, 1990; Brigham & Bothwell, 1983; Penrod & Cutler, 1995). If witnesses provide similar levels of confidence to answers given in response to both directive and non-directive leading questions, yet accuracy is reduced when directive leading questions are asked, incorrect conclusions may be drawn based on common-sense confidence assumptions.

Contrary to the proposed hypothesis, neither specific cross-guidance nor process-orientated rapport resulted in greater overall confidence. This is also a surprising finding given research has identified that briefing a witness prior to cross-examination improved confidence levels (Penrod & Cutler, 1995). Further, one of the primary aims of witness preparation is to reduce stress and ensure that witnesses have some reasonable expectation of courtroom procedures (Wheatcroft & Woods, 2010). It is possible that whilst pre-trial preparation may familiarise witnesses with what to expect during cross-examination, encountering the process itself may still be

particularly overwhelming (even in a quasi-experimental setting), and that this is reflected in the confidence levels expressed. It is worth noting that the descriptive data does show that mean confidence was higher for both specific-cross guidance ($M = 84.65$) and process-orientated rapport ($M = 84.95$) compared to the no preparation condition ($M = 78.70$). In a real-life situation longer periods of pre-trial preparation may be encountered, and it is possible that longer periods of familiarisation are required before optimal benefits on some measures become apparent. Future research should therefore investigate exposure time and more specific variants of rapport.

Of course, the most relevant outcome in respect of confidence is whether confidence relates positively with accuracy for individual witnesses (Wheatcroft & Woods, 2010). In other words, the greater the levels of confidence expressed, the more accurate the answer to the question should be. Contrary to the proposed hypothesis, there was no significant effect of questioning style on witnesses W-S C-A relationships, suggesting that neither directive nor non-directive leading questions had any bearing on a witness's ability to apply appropriate levels of confidence to answers given. One reason for this may be because both styles of questioning are technically leading to some extent. Therefore, even if witnesses were reasonably certain that the answer provided was correct, the style of questioning used may have cast some doubt in the mind of the witness, and so they may have not felt able to respond with greater levels of confidence.

There was also no significant effect of preparation type on witnesses W-S C-A. The lack of relationship between confidence and accuracy found in this study could be due to the additional cognitive resources required when answering more confusing styles of questioning (Kebbell & Johnson, 2010). Whilst it is likely that directive leading questions are more difficult to comprehend than their non-directive leading

equivalent, both styles do require some reflection on what is being asked, and thus may impact upon a witness's ability to judge the credibility of their answers. It is of interest however that the descriptive data shows process-orientated rapport as demonstrating higher W-S C-A relationships ($M = .50$) than both specific cross-guidance ($M = .38$) and the no preparation condition ($M = .41$). Whilst one should of course be tentative in interpretation of the data, the results do appear to indicate that the rapport-building condition may have helped witnesses to apply more appropriate levels of confidence to answers provided. One reason for this could be that rapport-building may have put witnesses at greater ease with the process, allowing them to better reflect on the answers given. Nevertheless, at present no firm conclusions can be drawn and future work should attempt to explore this idea further.

Other Limitations and Future Directions

As already noted, post hoc power calculations indicated a larger sample size may be required to detect a medium effect size. Given that several of the findings reported here were non-significant, future research should attempt to use larger sample sizes to determine whether the outcomes remain unaffected. Furthermore, the participant pool used in the current study mostly consisted of younger adults. Of course, witnesses to a crime can be of any age and this factor should not be ignored. Future research should therefore identify whether similar findings can be found with children and older adult witnesses. Given that research has often identified poorer memory for events in children and older adult witnesses (e.g., Adams-Price, 1992; Pozzulo & Lindsay, 1998) it might be that reduced accuracy for these witnesses when using directive leading questions is particularly apparent.

In real life, the time period between witnessing the event would be longer,

typically by several months or even years. Whilst in line with previous work in the field (e.g., Sharman & Powell, 2011; Wheatcroft & Woods, 2010; Wheatcroft, Wagstaff & Russell, 2004) the present study used a short time delay of only ten minutes. It might be the case therefore that accuracy for the event was better than what would be expected than for longer time delays. Furthermore, longer periods of pre-trial preparation may also be likely to occur. For example, witnesses might be expected to be given longer to read through a pre-trial preparation booklet. Future work should look to investigate the use of longer time periods between witnessing an event and being asked questions about it, and also the use of increased periods of pre-trial preparation.

The interviewer in the present study was an experimenter on the research team and was not therefore blind to the study aims. It is unlikely that this would have impacted upon the overall findings as the experimenter received training on how to conduct the interview appropriately and in line with protocols for each of the main study conditions. Nevertheless, future work could seek to explore the effects of blind interviews.

Concluding Comments

Witnesses are an essential part of the examination process, and in many cases the evidence they provide is fundamental to the courts in finding fact; guilt or innocence. However, it is imperative that witnesses are provided with the conditions that assist them in giving their most accurate testimony in court. The results presented here suggest that adult witnesses were particularly susceptible to the more directive leading forms of questioning routinely used during traditional cross-examination and which led to a significant reduction in accurate responses. Whilst the authors are not suggesting that all styles of leading question should be omitted completely, as to do so would limit

the testing of evidence, advice is toward a refinement of the law where the more directive form of leading questioning currently permitted during traditional cross examination is revised for *all* witness, not only for children and vulnerable witnesses.

Declaration of Interest

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