

Does the Post-Identification Feedback Effect Persist in Eyewitnesses Viewing Multiple-Perpetrator Line-ups?

By

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## Abstract

Eyewitness testimonies are integral pieces of evidence in criminal justice investigations. This is because justified conviction and appropriate sentencing can flow from eyewitness testimony. However, research has demonstrated that eyewitness testimony is often unreliable, even more so, the testimony of eyewitnesses who have witnessed multiple perpetrator crimes. This is because eyewitnesses to multiple perpetrator crimes have the challenging tasks of recalling the crime scene, correctly identifying the perpetrators involved in the crime, and assigning the correct role to each perpetrator. Eyewitnesses in the current study viewed a mock crime video comprising one, two, or five perpetrators and were instructed to answer a number of crime-related questions and identify the perpetrator/s from the line-up. The line-ups were presented sequentially (with one perpetrator in each line-up) for eyewitnesses who viewed the multiple perpetrator crimes. Additionally, these eyewitnesses were required to pair each perpetrator to the role they played in the crime. Analysis of the sample ( $N = 226$ ) revealed that the accuracy of eyewitnesses decreased as the number of perpetrators increased.

The ‘post-identification feedback’ effect has not yet been studied in multiple perpetrator crimes. Single perpetrator research demonstrates that any suggestion that the eyewitness chose the correct person from the line-up inflates eyewitness confidence. We hypothesized that the effect would also persist in eyewitnesses who viewed multiple perpetrator crimes. We analysed 199<sup>1</sup> of the 226 eyewitnesses and found that post-identification feedback did not significantly affect eyewitness identification and role confidence. Interestingly, we found that the number of

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<sup>1</sup>27 of the eyewitnesses were excluded because they did not complete their feedback rating or responded “Do not know” to a line-up, thus making it impossible to elicit an identification confidence rating from them.

perpetrators viewed significantly affects confidence ratings, such that as the number of perpetrators increases, confidence in identification and role pairing decreases.

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## **Eyewitness Identification in the Criminal Justice System**

Eyewitness identification is a critical piece of evidence that influences criminal justice proceedings. Eyewitnesses provide important information about the crime, and most importantly, the perpetrators that were involved in the crime. Criminal investigations employ the line-up procedure, from which eyewitnesses can identify suspects or perpetrators. The criminal justice system values eyewitness testimony to a large extent (Albright, 2017). However, eyewitness testimonies have proven to be unreliable, and have led to wrongful convictions of innocent people. Advances in science, such as the advent of DNA testing, have shed light on the fallibility of eyewitness identification. By 2017, the Innocence project (through DNA evidence) had helped exonerate approximately 362 people in the U.S. The majority (70%) of those wrongful convictions were due to mistaken eyewitness identification (Innocence Project, 2017). These numbers highlight just how detrimental an eyewitness misidentification can be to criminal proceedings, and most importantly, innocent people.

### **The Post-Identification Feedback Effect**

The post-identification feedback is a response that suggests that the eyewitness made a correct or incorrect identification. The feedback can be anything to the effect of, “Good, you identified the suspect” (Wells et al., 2003). But it can also be administered in other, more subtle forms, such a simple head nod/shake (Gurney et al., 2013). The post-identification feedback distorts the eyewitness’ memory of the crime, thus influencing the appearance of credibility and accuracy of the eyewitness, which is the evidence a judge or jury (in some other countries) use to make decisions in courts. (Oregon v. Lawson, SC S059306, 2012). A study published (N=156) by Douglas et al. (2010) investigates whether the post-identification feedback would affect how eyewitnesses were evaluated. Interestingly, when judged against those who did not receive

feedback, receiving confirmatory post-identification feedback resulted in eyewitnesses being judged as more accurate and confident.

The post-identification feedback significantly increases retrospective certainty/confidence of inaccurate eyewitnesses (Wells & Bradfield, 1999). Wells et al. (2003) found that when 253 inaccurate eyewitnesses were given confirming feedback, they reported higher (64%), distorted ratings on confidence. The opposite was true in eyewitnesses who did not receive feedback (37%). Interestingly the post-identification feedback even increases confidence, to a lesser extent, in accurate eyewitnesses. Bradfield et al. (2002) found that accurate eyewitnesses who received feedback had an average confidence rating of 87%, in comparison to 81% for those that did not receive feedback. Similar to Wells et al 2003, the inaccurate eyewitnesses who did not receive feedback in the Bradfield et al. (2002) study, had lower confidence ratings (49.35%) than those who received feedback (67.76%). Bradfield et al., (2002) suggest that inaccurate eyewitnesses present a higher post-identification feedback effect because their confidence is low from the outset, whereas accurate eyewitnesses' already higher scores may hit a ceiling. Furthermore, the extent to which accurate eyewitnesses demonstrate the post-identification feedback effect depends on their pre-existent confidence. Therefore, those who reported the lowest level of confidence will have a larger confidence inflation.

Gurney et al. (2014) explored non-verbal post-identification feedback and found that after eyewitnesses viewed a CCTV crime footage, and then responded to 20 structured-interview questions about the event, during which some received a head nod (confirmatory feedback) or headshake (disconfirmatory feedback), it was shown that eyewitnesses who received a head nod reported more confidence than those who received a headshake. The meta-analysis by Steblay et al. (2014) proves that the post-identification feedback effect is robust against interference across

multiple studies. Furthermore, the effect persists even when the credibility of feedback is undermined, by following it with a declaration that the feedback was a mistake of some sort. In Lampinen et al., 2007, participants were told, irrespective of their choice, that the computer-generated the feedback at random. The authors reported a decline in confidence (measured on a scale of 1-7) when the post-identification feedback was undermined ( $M = 4.16$ ), compared to a condition without the corrective interference ( $M = 5.3$ ). On further investigation, the researchers found that the feedback effect is still preserved when they compared the condition that received the feedback and subsequent remedial intervention, versus the no feedback condition. Therefore, these studies show that even when remedial attempts are administered to correct the effect, they are not sufficient to completely eradicate the effect. In their study, Wright and Skagerberg's (2007) demonstrated that post-identification feedback affects real eyewitnesses. In that study, eyewitnesses to real crimes viewed line-up parades and reported higher ( $M = 8.60$ ,  $SD = 2.08$ ) identification ease when they knew that they had chosen the suspect (which was lower before they knew the outcome), than when they were informed that they had picked a filler ( $M = 2.75$ ,  $SD = 1.66$ ).

## **Theories Underlying the Post-Identification Feedback**

### ***Cue-accessibility Framework***

This theory posits that eyewitnesses do not consider testimony-relevant judgements (such as ease of identification, good view of the perpetrator) during their actual identification. However, the consideration of these testimony-relevant judgements arises when eyewitnesses are questioned about them (Charman & Wells, 2011; Neuschatz et al., 2007; Quinlivan et al., 2010). Therefore, based on the above theory, if eyewitnesses are made to think about their confidence before making an identification, they should be insusceptible to increase in confidence in

retrospective judgements as a function of the feedback. The literature confirms evidence for this theory. A study by Wells and Bradfield (1999), ( $N = 156$ ) compared the feedback effect between participants who were given instructions to think about confidence before feedback and those who were instructed to think about confidence after feedback. They found that the feedback effect ( $d = 0.4$ ) seen in the “no thought prior to the feedback” condition, was diminished in the “thought prior to the feedback” condition ( $d = 0.12$ ). This is termed a ‘prophylactic effect’ as it seeks to lessen the strength of the feedback and ask eyewitnesses to think about their identification directly after identification, and before they receive any feedback. The cue-accessibility framework gives rise to another theory called, the inferential framework, which provides a fully-fledged conceptualization of this theory.

### ***Inferential Framework***

The CCC (Competition/Collaboration Conceptualization) framework implies that eyewitnesses will have an ephoric experience, irrespective of intensity (recognition) and may progress towards inferential (reasoning) strategies when viewing a line-up. Furthermore, a concession on the part of the other is in favour of the other. An ephoric experience is a subjective feeling of familiarity between the learnt stimuli and a person’s memory (Charman & Wells, 2011). Therefore, when presented with a line-up, the eyewitness should have a stronger ephoric experience when the actual suspect is present in the line-up. For example, Quinlivan et al. (2012) presented eyewitnesses with a target-present line-up. They found that when the confidence of accurate eyewitnesses was measured immediately after receiving confirmatory feedback, they did not present with inflated confidence. Interestingly though, after a one-week delay, the same accurate eyewitnesses demonstrated an increase in confidence commonly observed following confirmatory feedback. This finding makes sense because eyewitnesses saw

the line-up shortly after they viewed the event video, and the memory for the event was still new. However, as time progressed, memory for the event gradually diminished (leading to a weaker ecphoric experience), therefore rendering eyewitnesses more reliant on confirmatory feedback (Quinlivan et al., 2009). This is an important finding because, in real life, eyewitnesses wait several weeks before they view a line-up, making them susceptible to the feedback they may receive from police officers.

In the case that eyewitnesses are presented with target-absent line-ups, they will not have an ecphoric experience. Therefore, they will be motivated by something non-memorial to make inferences about their retrospective confidence at the time of identification. For example, in Quinlivan et al. (2016), eyewitnesses ( $N=211$ ) were presented with unbiased instruction<sup>2</sup> target-absent line-up (rendering all choosers inaccurate) after viewing a crime video. Before the line-up, eyewitnesses received a subtle alert for their attention, “I could tell that you were paying attention to the video” or their inclination to pick, “Surely you are going to be able to pick the person out of the line-up”, a combination of the two, or no warning. Firstly, they found that people who received the pick suggestion chose someone from the line-up more often than those who did not. More importantly, they found that the pick suggestion resulted in eyewitnesses demonstrating a significantly higher certainty in their line-up decision. These two processes – inferential and ecphoric experience – either augment each other (leading to an increased choice of one line-up

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<sup>2</sup> In unbiased line-up protocols, eyewitnesses are not forced to make an identification. Researchers typically use biased line-ups instructions to study the post-identification feedback effect, therefore forcing the eyewitness to choose someone from the line-up. This is because fundamentally, the post-identification feedback effect is of particular interest when an eyewitness has identified someone from the line-up, than when they have rejected the line-up.

member over others) or compete (leading to contradictory line-up decisions). Non-memorial cues can influence confidence, and the extent to which they do is largely dependent on the strength of eyewitnesses' ephoric experience (Charman & Wells, 2011). When eyewitnesses have a weak ephoric experience, they rely on non-memorial cues (e.g., post-identification feedback, biased line-up instructions) to make decisions or infer their retrospective confidence in their identification decisions (Skagerberg & Wright, 2009; Wells & Bradfield, 1998).

Charman et al., (2010) have theorized a three-stage process, called SCIF (Selective Cue Integration Framework) of how this happens. During the assessment stage, eyewitnesses gauge the extent to which their internal cues are strengthened. Eyewitnesses may at this point make an identification which they are not entirely confident in. Therefore, if their memorial cues are not strong, eyewitnesses will actively seek external, non-memorial cues to validate their identification decision (search stage). This is predictable from the theory of confirmation bias, which purports that people seek evidence that supports what they already believe (Nickerson, 1998). The post-identification feedback may serve as such evidence. As further support for this theory of confirmation bias, the literature suggests that when eyewitnesses are given disconfirmatory feedback, it does not deflate their confidence to the extent that confirmatory feedback inflates confidence, because it goes against what the eyewitness already believes to be correct (Stebly et al., 2014). Finally, if the external cue is found to be reliable, it is used to infer one's confidence (evaluation stage). Therefore, the degree to which internal cues of the eyewitness are weak (weak ephoric experience), they will rely more on external cues, such as the post-identification feedback (Bradfield et al., 2002).

## Multiple Perpetrator Eyewitness Identification

The published research on eyewitness identification memory has focused mostly on single-perpetrator crimes. However, there is a paucity (less than 20 published papers) of research studies that investigate identification accuracy in multiple perpetrator crimes (Nortje, 2018). I will discuss some of these papers in this literature review. Statistics show that many crimes are committed by multiple perpetrators (Horry et al., 2014). Between the years 2003 and 2008, there was a 6% increase (19-25%) in crimes that involved four or more perpetrators in the UK (Home Office Research Development Statistics, 2009). In South Africa, a similar pattern was observed. In the 2017/2018-year, 88.2% of carjacking involved perpetrators that operated in groups of two to four. In 77.1% of the cases involving robbery at residential properties, the perpetrators operated in groups of two to four (similar to robberies in non-residential premises), while single offenders were involved in 16% of the cases (South African Police Service: Annual Crime Report, 2018). These figures demonstrate the prevalence of multiple-perpetrator crimes in the world, and in South Africa, where this current study was conducted.

The literature, although sparse, demonstrates a running pattern of low identification accuracy in eyewitnesses of multiple-perpetrator crimes. Therefore, as the number of perpetrators increases, identification accuracy decreases. For instance, Megreya and Bindemann (2011) tested identification accuracy for the main perpetrator<sup>3</sup>, and found that eyewitnesses in the single perpetrator condition correctly identified the perpetrator 59% of the time, in comparison to 29% in the double-perpetrator condition. Similarly, in Clifford and Hollin (1981), eyewitnesses

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<sup>3</sup> This study explored and found that the gender of the target does not affect identification accuracy.

Therefore, the results are presented generally.

viewed a non-violent incident (direction seeking) involving one, three and five perpetrators. Only 30% and 20% of eyewitnesses reliably identified the main perpetrator in the three perpetrators and five perpetrator conditions respectively, as compared to the one perpetrator condition (37.6%). Interestingly, they also found that accuracy was lower when eyewitnesses viewed a violent crime (mugging). Furthermore, Wells and Pozzulo (2006) found that identification is more inclined towards the accomplice, and not the main perpetrator, after witnessing a two-culprit theft crime video. A PhD dissertation by Nortje (2018) tested absolute accuracy (correctly identifying all the perpetrators in the different line-ups) for up to 10 perpetrators. The study found that in the one perpetrator condition, 52.5% of eyewitnesses correctly chose the perpetrator from a line-up or correctly rejected the line-up. However, the percentage of eyewitnesses who made correct line-up decisions across all line-ups in the two, five and 10 perpetrators conditions decreased to 15%, 2.5% and 0% respectively respectively.

Eyewitnesses of multiple-perpetrator crimes are also tasked with recalling all the roles played in the criminal event (Hobson & Wilcock, 2011), and pairing each role to a specific perpetrator. This is a component exclusive to multiple perpetrator crimes; in single-perpetrator crimes, there can only be one role, and the eyewitness crime statement would contain this information. Therefore, it is also implied that the single perpetrator is responsible for the entire criminal activity as it occurred. This remains a critical piece of evidence in a criminal investigation proceeding because it underlies the principle of sentencing, as courts give different sentences for different criminal offences. Furthermore, it serves as a tool to gauge eyewitness reliability (correctly recollecting the events of the crime) and facilitates the allocation of criminal investigation resources, by providing a blueprint for the developing investigation (Hobson et al., 2012).

Notably, as the number of perpetrators increases, accuracy for perpetrator identification and role pairing also decreases (Nortje et al., 2017). Hobson and Wilcock, (2011) demonstrated that role-pairing accuracy decreased from 72.4% in the one perpetrator condition to 71.4% and 65.4% in the two and five perpetrators conditions respectively. Similarly, Nortje (2018) found that within the one perpetrator condition, all eyewitnesses correctly recalled the role of the perpetrator. In the two perpetrators and five perpetrators condition, 73.3% and 53.3% of eyewitnesses correctly paired the perpetrator to their respective role of one perpetrator to another perpetrator.

### **Theories that underlie Multiple-Perpetrator Identification**

#### ***Cognitive Overload***

The cognitive overload theory suggests that people can attend to and process a limited number of stimuli at a time (Cartwright-Finch & Lavie, 2007). This is consistent with the theory of short-term memory that posits people are only able to store seven bits of information at a time. Working memory is defined as an active sub-system of short-term memory which is responsible for manipulating information in short-term memory (Cowan, 1988; Kail & Hall, 2001). When the bits of information relevant to the crime (e.g., faces and events that occur) exceed that limit, they compete for the viewer's attention, interfering with the optimal encoding of all crime elements (Bindemann et al., 2005; Megreya & Bindemann, 2011). Megreya and Burton (2006a) evaluated whether the visual short-term memory (STM) measure was associated with overall accuracy on a face matching task. They found a weak-moderate association,  $r(28) = .493, p < .01.$ , between short-term memory, and overall accuracy on a face-matching task. Notably, hits and misidentifications catalysed the demonstrated positive association. Megreya and Burton 2006 (b) showed that the double perpetrator disadvantage, which falls under cognitive overload theory to

some extent, is not only demonstrated in eyewitness memory research, but also facial processing paradigms. They presented participants ( $n=22$ ), with either one face or two faces to memorize, until they reached a subjective threshold for subsequent recognition. The faces were presented alongside 10 target faces to eliminate the memory component. The results demonstrated a two-face disadvantage at encoding: participants who studied a single face correctly identified the target face 70% of the time. This declined to 53.9% when participants who studied two faces were required to match one of them to the target faces. This substantial drop further reiterates the point that one extra face poses a great disadvantage to the eyewitness who later must recognize a person from a line-up.

### ***Source Monitoring***

The process of remembering from which source a specific memory originates is important for both identification and role accuracy. Multiple-perpetrator crimes comprise a flow of events, occurring within the same time and context (Hobson & Wilcock, 2011), and as such, are remembered as a single coherent unit. Johnson et al. (1993), suggest that when information originates from the same context, it makes it difficult to tease out separate details. Therefore, having to single-out perpetrators and their distinctive roles whilst viewing different line-ups proves difficult because the information was not stored in that fashion.

## **The Current Study**

### **Rationale and Aim**

No published studies have looked at the post-identification feedback effect in multiple perpetrator crimes. But a general hypothesis is that as the number of perpetrators increases, the level of confidence decreases, specifically due to the increasing difficulty of the task. An unpublished master's dissertation (Owens 2009) found that as the number of perpetrators

increased, the overall confidence in identification accuracy decreased. Furthermore, she found a positive correlation ( $r = .152, p = .004$ ) between number of perpetrators viewed and the difficulty experienced during identification, such that as the number of perpetrators increased, the more difficult it became for eyewitnesses to make an identification, thus leading to lower confidence ratings in their identification decisions.

While multiple studies have investigated various aspects of the subject area, none of them have investigated this particular aspect. Research has demonstrated the post-identification feedback effect in single perpetrator crimes. However, there is no research reviewing the feedback effect in multiple perpetrator crimes. Hence, this current study used a sample to examine the post-identification feedback effect between eyewitnesses who received feedback and those who did not across different perpetrator conditions (one, two and five perpetrators).

The research demonstrates that post-identification feedback has a robust effect on, and significantly inflates, the confidence of eyewitnesses. However, the existing research on the post-identification effect focuses on single-perpetrator crime eyewitness identification, rendering it a poorly studied factor in multiple-perpetrator identification research. Therefore, there is a need to fill this gap in the literature. Multi-perpetrator identification is a complex and difficult task for eyewitnesses (Clifford & Hollin, 1981). The existing literature in multiple-perpetrator research demonstrates that when the number of perpetrators increases, the precision of line-up identification accuracy decreases (e.g., Clifford & Hollin, 1981). In addition to having to identify perpetrators from identification parades, eyewitnesses are also tasked with recalling the correct roles as they occurred in the crime and pairing them to the respective perpetrator (Wells & Pozzulo, 2006). There have not been any published studies on the confidence of eyewitnesses who have had to identify multiple perpetrators from line-up parades. This minor dissertation

seeks to investigate whether the post-identification feedback effect is present in eyewitnesses who view multiple perpetrator line-ups. Particularly, it is of interest whether the effect will be, to a significant degree, higher in eyewitnesses who view multiple perpetrator crime, in comparison to single-perpetrator crime eyewitnesses. Lastly, we are interested in whether post-identification feedback will result in higher role pairing confidence. This rationale also applies to the hypotheses stated below.

### **Hypotheses**

- Hypothesis 1: eyewitnesses who received post-identification feedback will report higher confidence ratings, in comparison to those who did not.
  - Hypothesis 1b: The post-identification feedback will result in higher confidence ratings in identification accuracy for the multi-perpetrator conditions (two and five perpetrators condition), than the control condition (one perpetrator condition). The inferential framework theory states that when eyewitnesses have weak memories of the crime and there is uncertainty in identification accuracy, they become more reliant on external non-memorial cues (i.e. post-identification feedback) to infer their post-identification confidence. Previous research has demonstrated a decrease in accuracy as the number of perpetrators increases. Therefore, we can infer that the eyewitnesses in the two and five perpetrators condition will have weaker memory traces, therefore rendering them more reliant on the post-identification feedback.
- Hypothesis 2: There will be more correct line-up decisions in the control condition (one-perpetrator condition) in comparison to the multiple-perpetrator conditions.

- Hypothesis 3: Eyewitnesses who receive post-identification feedback will report higher confidence in their role recollection decisions than eyewitnesses who do not. Previous research has revealed that the post-identification feedback does not only influence retrospective confidence in identification, but also confidence in other crime-relevant judgments (e.g. a good view of crime and perpetrators, and ease of identification). Therefore, we can infer that the feedback effect will persist when eyewitnesses rate their confidence in role-pairing accuracy.

## **Ethics**

The Department of Psychology's Ethics Committee at the University of Cape Town approved the study for data collection on 23 October 2018 (PSY2018-062). Please see Appendix K for reference. Data collection commenced in November 2021 on Qualtrics (the participants were not informed entirely about the research design owing to the nature of the research. For the researcher to study the effects of post-identification feedback entirely and without any interference or contamination, deception is necessary. If the participants were made aware of the confirmation feedback, it would have influenced their behaviour and their subsequent confidence ratings. Participants were led to believe that they were taking part in a study about non-verbal behaviour and personality. Participants were notified about their right to withdraw, at any given point, their consent to participate, without any punishment imposed on them. After the data was collected, participants were sent a debriefing form, that clarified the nature of the study to the participants, and why the study necessitated deception (Appendix I). They were allowed to discuss and ask questions if any. Personal identifying information was not used, as participants were allocated random participant numbers. Participants were asked to indicate their interest in the final research output, which would be made available to them once available. There is a risk

for minimal harm due to the nature of the study: participants viewed a mock-crime video, although non-violent and victimless. If participants were at any point distressed because of the study, they would have been referred to the Student Wellness Counselling Service at UCT.

## **Methods**

It is important to note that the methods and materials (i.e. line-ups and mock-crime videos) used in the current study were developed through an extensive collaboration between Carrie Allen (Allen, 2021) and me. Therefore, our descriptions of the processes followed overlap.

### ***Design and Setting***

This study is a three (one, two and five perpetrators) X two (biased versus unbiased instruction) X two (Target Absent versus Target Present) X two (feedback versus no feedback) between-subjects factorial design. The first variable is the number of perpetrators presented to eyewitnesses in the mock crime video (one perpetrator, two perpetrators and five perpetrators). The one perpetrator condition acts as a control condition, against which to compare the identification accuracy of the other two conditions. The second factor is instruction type, with two levels: biased instructions (forced to make an identification) vs. unbiased instruction (not forced to make an identification) line-up. Although it was not a main hypothesis of this current study, the decision to include both instruction types was important. This is because the type of line-up instruction (biased or unbiased line-up) has been shown to influence confidence ratings (Charman et al., 2018; Leippe et al., 2009; Malpass & Devine, 1981). For example, an eyewitness who does not choose a person from a line-up, after being told that the person may or may not be in line-up, may report higher levels of confidence. However, an eyewitness who does not recognize someone from the line-up and is forced to make an identification, may report lower levels of confidence. Therefore, it was important to include this factor, considering that it may

have had a main or interaction effect, along the other factors, on the reported confidence ratings. The third factor is line-up presentation, with two levels: target present (the target is present in the line-up) and target-absent (the target is not present in the line-up). The last factor is the post-identification feedback, with two levels: one condition received the confirmatory feedback versus the condition that did not receive any feedback. The feedback was administered after the eyewitness had selected someone from the line-up. Some eyewitnesses who viewed multiple perpetrator crimes received feedback after every identification. Furthermore, eyewitnesses in the multiple perpetrator condition were instructed to pair each perpetrator to the role that they played in the crime. The current study uses a two and five perpetrator condition: adding 1 perpetrator into the multiple perpetrator research indicates how one additional face at encoding may decrease identification (Megreya & Burton, 2006b). Furthermore, Nortje et al., (2017) demonstrated that the role recall and pairing performance of eyewitnesses began to plummet at five perpetrators. Eyewitnesses were randomly assigned to one of 24 conditions formed by the combination of factors (see Appendix C). Line-ups were presented simultaneously (with one line-up for each perpetrator or foil).

### ***Dependent Variables***

The current study had four outcome variables: identification accuracy, confidence in identification accuracy, role pairing accuracy, and role pairing confidence. We also explored identification accuracy in four different ways. Firstly, we analysed whether eyewitnesses correctly identified all perpetrators from the target present line-up/s<sup>4</sup> or correctly rejected the

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<sup>4</sup> Target present line-ups are line-ups in which the perpetrator is present.

target-absent line-up/s<sup>5</sup>, and the outcome was termed *absolute accuracy*. Secondly, we measured the proportion of eyewitnesses who correctly identified a perpetrator from at least 1 line-up (out of the 1 or 2 or 5 line-ups they saw) or correctly rejected at least one line-up (out of the 1, 2 or 5 line-ups they saw) and termed the outcome *at least one correct*. Furthermore, perpetrator accuracy was measured by the proportion of correct responses (0-100%) that eyewitnesses correctly identified from the line-up/s, and we termed the outcome as the proportion of correct responses. The proportion of possible correct varies across all the perpetrator conditions. For example, eyewitnesses in the two perpetrators condition could either score 0 (0%), 1 (50%) or 2 (100%). Lastly, line-up accuracy was measured as ‘hits’ (correctly identifying the perpetrator in a target-present line-up) and ‘correct rejections’ (correctly rejecting a target-absent line-up). Line-up inaccuracy was measured as ‘miss’ (choosing a filler from a target present line-up), ‘incorrect rejection’ (incorrectly rejecting a target present line-up), and ‘false alarm’ (choosing a filler in a target-absent line-up), as well as “Don’t know.”

The second outcome variable was confidence in the line-up identification or rejection accuracy. This was measured on a scale of 0-100%, 0 being not confident at all and 100 being absolutely confident. Only eyewitnesses who chose someone from a target present line-up or rejected a target-absent line-up were included in the analysis. In all perpetrator conditions, eyewitnesses who clicked “I do not know” were excluded from the analysis. The third outcome variable was perpetrator role pairing accuracy, analysing whether eyewitnesses correctly paired

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<sup>5</sup> Target present line-ups are line-ups in which the perpetrator is absent. Owing to that the post-identification feedback is of more interest in inaccurate eyewitnesses, previous studies on the post-identification feedback effect have opted for target present line-ups.

each perpetrator to the role they played in the mock-crime video. This variable was only relevant to witnesses who viewed the two and five perpetrators videos. Furthermore, role pairing accuracy was only analysed in participants who correctly identified the perpetrators in the target present line-up. This is because eyewitnesses who made incorrect identifications are, by selecting the incorrect person from the line-up, assigning an incorrect role. The last variable is the level of confidence in identification and subsequent role pairing. Witnesses graded their post-identification confidence on a scale of 0-100%. Witnesses also graded their role pairing confidence on a scale of 0-100%.

### ***Participants***

Participants were recruited using convenience and snowball sampling. Participants were recruited using an advert (See Appendix D) posted on UCT's SRPP (Student Research Participation Program) Vula Site and an email invitation sent by UCT's Department of Student Affairs. Furthermore, advertisements were posted on social media platforms such as WhatsApp, Instagram, Facebook, and Twitter to recruit more participants. Participants were entered into a draw to win one of three Takealot vouchers valued at R750, R500, and R250. A random draw was conducted using Microsoft Excel.

The sample identified as female = 69.03%, male = 29.20%, non-binary = 1.33%, and one person (0.44%) did not specify. The sample further identified as follows: 58.85 % as Black, 19.91% as White, 14.60. % as Coloured, 4.87% as Indian, and 1.77% as Other.

I received 531 responses on Qualtrics. 46 participants stopped before they could provide information on their demographics, and the device they would be using to complete the survey. five participants indicated that they were not ready to proceed. 121 participants did not give their consent to participate. Therefore, a total of 359 participants were left. At the end of the

experiment, participants were required to state how many times they watched the mock-crime video. Those who watched the mock-crime video more than once were also excluded from the analysis, as real-life eyewitnesses do not get the opportunity to witness a particular crime more than once. The one perpetrator condition had 116 participants, 18 of whom stopped at an unspecified point during the experiment. Furthermore, six participants recognized someone in the mock-crime video, and two watched the video more than once, leaving this condition with 90 participants. The two perpetrators condition had 121 participants, 22 of which stopped at an unspecified point during the experiment. Furthermore, 12 participants recognized someone from the line-up and six people watched the video more than once, leaving 81 people in this condition. The five perpetrators condition had 122 participants and 49 stopped midway through the experiment. 13 participants recognized someone from the mock crime video and five watched the video more than once, leaving this condition with 55 people.

## **Materials**

### ***Encoding Stage***

**Mock Crime Video.** The mock crime videos depict a non-violent event. The perpetrators steal valuables contained in a car at a UCT parking lot. The FBI reported that during the year 2015, 61.7% of people detained for property crimes were male (Uniform Crime Reporting (UCR), 2015). In South Africa, males comprised a large percentage (98.9%) of offenders of car hijacking (South African Police Service: Annual Crime Report, 2017). Therefore, males depict the perpetrators in all the crime videos. South Africa has a longstanding history of forced and legally sanctioned discrimination. The Apartheid regime segregated South African blacks and whites along racial lines. Therefore, the contact between black and white south Africans was limited because they lived in different areas, and congregated (e.g., church, school, and social events) in

different places. Thus, this history presents South Africa as a suitable environment to explore the own-race bias. In eyewitness memory research, the own-race bias refers to the idea that eyewitnesses are more accurate at identifying perpetrators that belong to their own racial group. The idea is based on the notion that eyewitnesses are exposed, for the most part, to members of their ingroups. The resulting perceptual familiarity therefore makes it easier for them to distinguish and recognize/identify those faces from a line-up. Logically, this means that when an eyewitness has had substantial contact/exposure with members of a racial group/groups different to their own, the presence of an own-race bias should be somewhat diminished. A study ( $n=150$ ) comprising of 50 black and 50 white students from the University of Cape Town in South Africa, as well as 50 white students from the University of Bristol in the United Kingdom explored the own-race bias. They found that both white and black participants were more accurate at recognizing white faces than they were at recognizing black faces. Therefore, white faces were recognized more accurately (Wright et al., 2003). It is important to note that the own-race bias has been demonstrated in South African black and white non-student participants (Wright et al., 2001). The former finding could be due to that the black students had increased exposure to their white peers at the university, therefore making it easier for them to recognize white faces. In lieu of the finding by Wright et al. (2003), we decided that White South African males should be the actors in the mock crime videos. The videos were filmed in colour (Full HD) and have no sound (see Figure 1 for example). The perpetrators are not wearing any distinctive clothing.

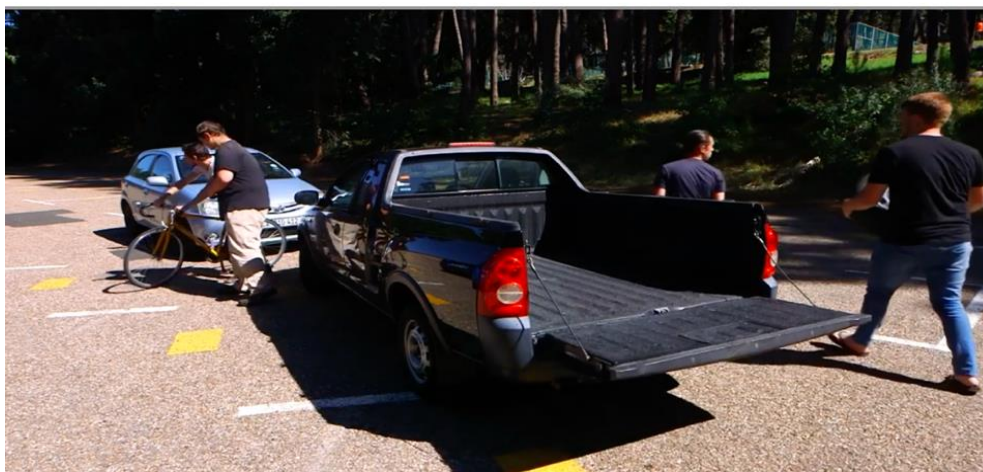
The one perpetrator video is approximately 15 seconds long and shows the perpetrator leaving the getaway car and approaching the victim's car (a two-seater van). He then unlocks, opens the passenger door, and steals a backpack from the passenger seat. He then returns to the getaway car. The perpetrator was in close view for five seconds. The mock crime videos were

lengthened by 15 seconds for every additional perpetrator, such that the two perpetrators and five perpetrators' videos are 30 and 75 seconds long respectively. Furthermore, the faces of the perpetrators are in the camera frame for five seconds to allow the witness enough time for encoding. This control was used to ensure that witnesses had equal encoding time for all the perpetrators. The two perpetrators video shows the second perpetrator leaving the getaway car, soon after perpetrator one, and walking to the boot of the car. He then proceeds to steal a box before returning to the getaway car. In the five perpetrators video (see Figure 1), perpetrator three leaves the getaway car and proceeds to the back of the target vehicle, steals the tyre from the boot, and returns to the getaway vehicle. Perpetrator four leaves the getaway car and steals the bicycle that is next to the target car, before cycling off the scene. Lastly, perpetrator five acts as the lookout. Two versions of the video were filmed for each perpetrator condition, with different actors depicting the same perpetrator roles to control for the effects of actor distinctiveness or memorability. Each of the perpetrators played a distinct role (see Appendix B), which was kept consistent in all the videos.

To generate the role descriptions, four participants watched the mock crime video and were instructed to describe what each perpetrator did. Subsequently, their descriptions were averaged to generate a modal role description for each perpetrator, such that when at least two or more of the four witnesses agreed on a role descriptor, it was used as the modal role description.

**Figure 1**

*Screenshot of the mock crime video*



*Note.* A scene from version 1 of the 5-perpetrators video

***Recognition Stage***

**Identification Line-ups.** There is no official procedure stipulating how to construct line-ups for multi-perpetrators. A book titled, *Commentary on the Criminal Procedure Act*, details 18 rules that are appropriate when conducting identification parades in South Africa. However, only four of those rules are applicable to the administration of multiple-perpetrator line-ups. Rule five states that an identification line-up should comprise of eight to 10 people, and that a larger number is more desirable. Rule six states that an identification line-up should not comprise more than one suspect, and that if more than one suspect is present in the line-up, then the suspects should resemble each other in their appearance, and the number of people in the line-up should range from 12 to 16. Rule eight expands on the idea of general appearance by stating suspects in the line-up should be of the same build, height, age, and be similarly dressed. Rule seven states if an eyewitness is to view two line-ups, then the suspect should not be present in both those line-

ups (Nortje et al., 2020; MBLH, 2019). The current study used and adjusted these rules and the guidelines published in Malpass, Tredoux and McQuiston-Surrett (2007) (See Appendix J).

To ensure that the pictures taken on the day were like the ones on the eyewitness database, a freelance experienced photographer familiar with the guidelines, was hired to take pictures on the day of the video filming. Photos are in colour and show the face and neck area of the perpetrators. An independent sample comprised of eight participants was recruited to generate physical descriptions of the perpetrators. The participants were shown a photograph of each perpetrator for five seconds and completed a short distractor task for approximately five minutes. Thereafter, they were instructed to provide a physical description of all eight perpetrators<sup>6</sup>. These descriptions were assessed and averaged by Carrie Allen and me, and a modal description was produced for each perpetrator. Similar to the role modal descriptions, the modal descriptions comprised physical descriptors that 50% or more of the mock witnesses agreed upon. A second sample ( $n=8$ ) was recruited to choose six photographs from a large database belonging to the UCT Eyewitness Group, which closely resembled the modal descriptions generated for each perpetrator. The sample was instructed not to choose the same photograph more than once. The sample was required to rate, on a scale of 0-10, how closely the picture they chose matched the modal description. The most frequently selected photographs for each perpetrator were used as foils/fillers in their line-ups. In the case of a tie, the photo with the highest ratings was chosen for the respective perpetrator (see figure 2 below and Appendix L for examples of the line-ups).

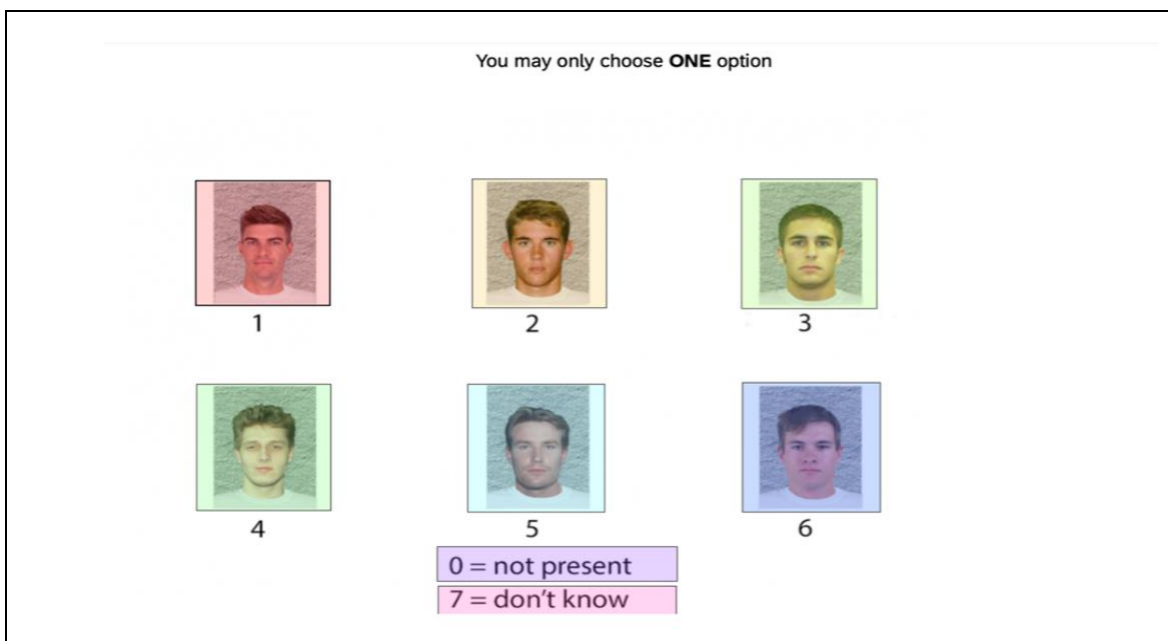
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<sup>6</sup> Ten actors were required to film two different versions of the five perpetrators mock crime video. However, we only managed to recruit eight actors due to the complex logistics that surrounded the filming of the video. Therefore, to make up for the 5<sup>th</sup> perpetrator in each video, two of the actors appeared in both the videos.

Photos were edited using Adobe Photoshop Software. Pictures of foils resembled the perpetrator in age, similar hair length, and a plain white t-shirt, against a grey backdrop. In target-present line-ups, the target was present, in a sequence of fillers. This was consistent for each of the eight perpetrators. None of the fillers appeared more than once in the line-ups because this may have suggested that he was the perpetrator. For the target-absent line-up, the target was replaced by a foil who was an innocent suspect. Therefore, the innocent suspect was present, with five fillers. This was kept consistent for each of the eight perpetrators. The line-up was in the form of six colour-printed photographs of the same size. The line-ups were presented simultaneously (one line-up for each perpetrator) on the computer screen in front of the eyewitnesses. At the bottom of every photograph were the numbers one-six, to represent the number of each person in the line-up. Eyewitnesses clicked on the number that matches the person they identify as the perpetrator.

## Figure 2

### *Screenshot of a Line-Up*



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*Note.* This is a target present, unbiased instructions line-up, for perpetrator one and he appears in line-up position one. This view is in Qualtrics survey software.

## **Procedure**

The full experiment was mounted on Qualtrics survey software (<https://www.qualtrics.com>) and data was collected on that platform. Participants clicked on the anonymous link (auto-generated) provided to access the study. The opening page contained instructions on what to do (Appendix E). See figure 3 for an illustration of the procedure. I conducted a pilot study with 22 participants to obtain feedback on the experiment and ensure that the online survey worked well before being released for official data collection. Participants were solicited from the eyewitness memory group at UCT, as well as from personal networks. Participants shared their experiences, as well as any challenges they encountered whilst trying to complete the online survey. Once these were all noted, I fixed the errors in Qualtrics survey builder mode and released the online survey to the larger student population. Figure 3 illustrated the procedure for the two perpetrators condition.

## ***Demographics***

Participants then answered a question about which device they used to complete the study. However, no participants were excluded based on their answer to that question. Participants completed the consent form (Appendix F) followed by the demographic details (name, surname, race, gender, age, and citizenship) and email address.

## ***Encoding Task***

For the encoding task, participants were randomized to one of 96 experimental conditions. Although there were 24 primary experimental cell conditions, an additional version of the video was filmed for each perpetrator condition, with different actors depicting the same

perpetrator roles to control for the effects of actor distinctiveness. Therefore, an additional 24 conditions were created for the second version of the videos. Furthermore, two versions of each line-up were constructed, with the perpetrators being in a different line-up position to control for serial position effects. Therefore, an additional 48 conditions were created where perpetrators and foils were placed in different positions.

Participants watched a mock-crime video of a theft. The perpetrator/s took part in a car property theft crime. (See Appendix B). Encoding was incidental – participants were not informed that they would have to recall the event and faces at a later stage. Therefore, participants were told that they were watching a video to answer questions on non-verbal behaviour and personality. For the five minutes filler task, participants answered short and easy questions about their memory and attentional capacity. Subsequently, they were required to answer a few statement questions about the criminal event (see Appendix G). Statement questions are standard procedure when questioning eyewitnesses about the criminal event. However, their answers to these statement questions were not used for the analysis. Participants completed a distractor task, which took approximately 20-25 minutes, to control for possible rehearsal of events seen in the video, and to mimic real-world situations where witnesses do not view a line-up immediately after witnessing a crime. The distractor task was a geographical knowledge questionnaire.

### ***Recognition Task***

For the recognition test, participants were randomized to one of 96 conditions: Line-up presentation protocols are detailed in Appendix H. The line-up protocols were kept consistent between target-present and target-absent line-up presentation. Participants in the feedback condition who made an identification or rejected the line-up were immediately given post-

identification feedback and subsequently asked to rate their confidence on a scale of 0-100% (see figure 2). Participants in the no-feedback condition, who made an identification or rejected the line-up were immediately asked to rate their confidence on a scale of 0-100%. Witnesses who chose someone from the line-up were asked to select, from a list of roles, the specific role they played in the criminal event; participants were expected to select the role that each perpetrator had, as they make their decision. Witnesses in the two perpetrators condition were required to choose roles from a list of six options, whilst witnesses in the five perpetrators condition had 11 options to choose from, including a “Don’t Know” option (See Appendix M). Confidence ratings (0-100%) in role pairing were solicited from witnesses. We do not have a negative feedback protocol, because the research aimed to investigate inflation in confidence, owing to confirmatory feedback. Furthermore, the no feedback condition serves as a baseline for confidence levels when no feedback is administered. Participants were also required to answer an additional question on ease-difficulty of identifying suspects from the line-up. Participants were sent (via email) a debriefing form once they had completed the experiment.

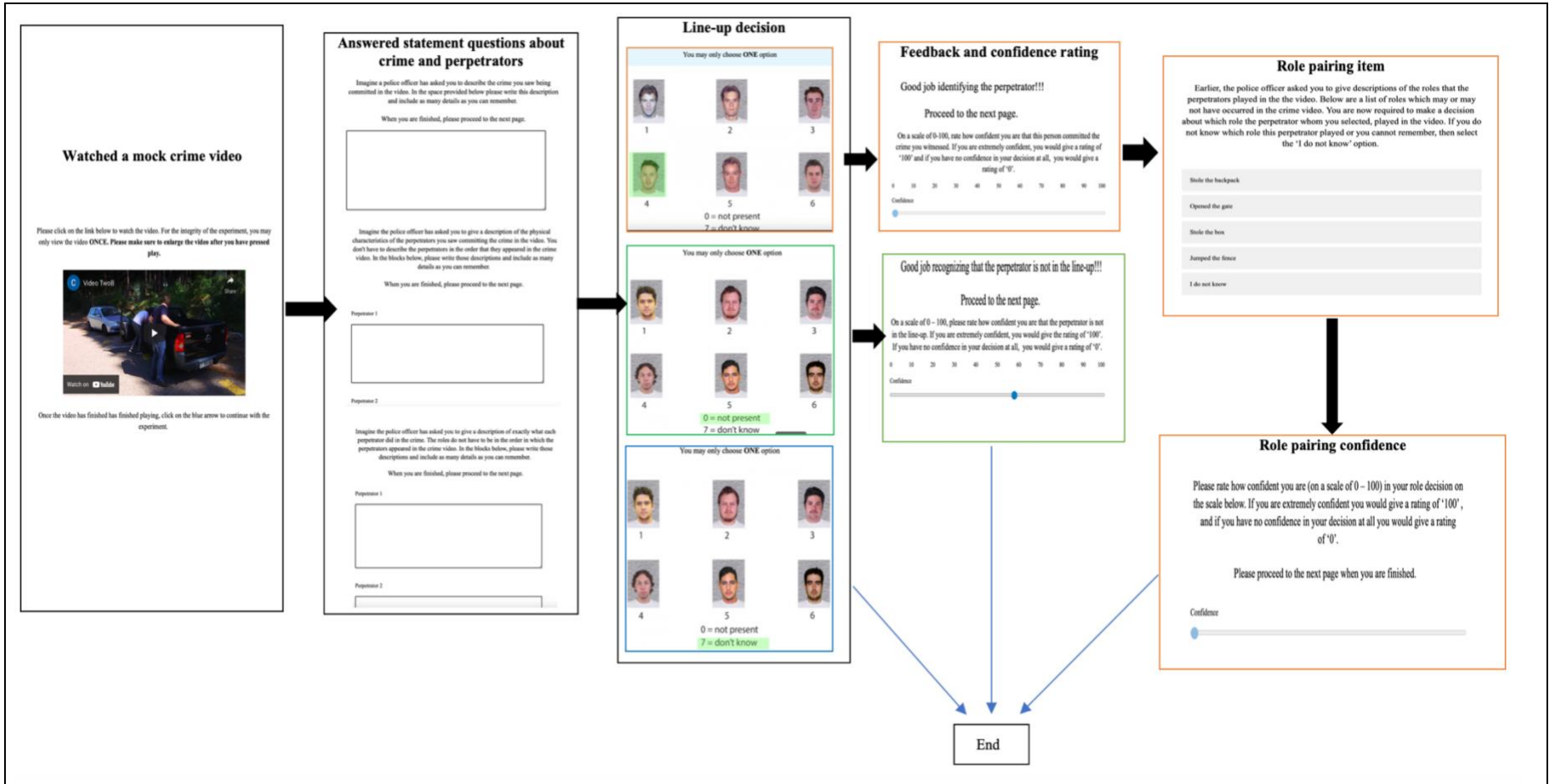
The line-ups were presented simultaneously (one line-up for each perpetrator), and participants were required to make their identification decision before viewing the next line-up (two and five perpetrators conditions). Participants were shown the line-up only once and were not allowed to go back and view any of the line-ups for a second time. This is consistent with the classic recommended technique from Lindsay & Wells (1985).

### **Data management plan**

After data collection was completed, the raw data from Qualtrics was subsequently exported to Microsoft Excel spreadsheets for cleaning and organizing. The data was anonymised, such that the participants were allocated random participant numbers. Therefore, only the

researchers can link performance data to a specific participant. Subsequently, data was transferred to Statistical Package for Social Sciences 27 (SPSS 27) Software for analysis (IBM Corp, 2020). All the raw data and personal identifying information, as contained in the Microsoft Excel Spreadsheets, is kept secure in a locked zipped folder, to which only the principal investigator has access.

Procedure Example for Two Perpetrators



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*Note.* Procedure for the two perpetrators condition and possible outcomes when witnesses made a positive<sup>7</sup> identification, rejected a line-up, or did not know who the perpetrator was. The confirmatory feedback administration is illustrated. In the no feedback condition, witnesses are required to rate their confidence immediately after making an identification.

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<sup>7</sup> Positive identification refers to eyewitnesses choosing anyone from the line-up. In target absent line-ups, any positive identification is incorrect because the perpetrator is not present in the line-up.

## Results

In this study, eyewitnesses were randomly assigned to different experimental conditions. Therefore, eyewitnesses completed different tasks that included: written statements about the crime and perpetrators, role recollections, short and long distractor tasks, perpetrator identifications, identification confidence ratings, role pairing accuracy and confidence in role pairing. Furthermore, some eyewitnesses were administered feedback whilst some were not. Some witnesses were given biased instructions, whilst some were given unbiased instructions. Lastly, some eyewitnesses viewed target present line-ups whilst others viewed target-absent line-ups. I used Statistical Package for Social Sciences version 27 (SPSS 27) software (IBM Corp, 2020) for the analysis of the data.

**Hypothesis 1: Witnesses who received post-identification feedback will report higher confidence ratings, in comparison to those who did not.**

*Hypothesis 1b: The post-identification feedback will result in higher confidence ratings in identification accuracy for the multi-perpetrator conditions (two and five perpetrators condition), than the control condition (one perpetrator condition).*

After viewing each line-up, witnesses were required to rate their confidence, on a scale from 0-100, in their line-up decisions (including those who had rejected the line-up). Eyewitnesses who selected “don’t Know” were not required to provide confidence ratings and were therefore excluded from the analysis of average confidence across line-up conditions. Therefore, if a witness in the two perpetrators or five perpetrators conditions selected “don’t know” for one or more line-ups, their confidence ratings were excluded altogether. Those who did not respond to all line-ups they viewed or omitted their confidence ratings were also excluded from the analysis. Therefore, in the one perpetrator condition, three eyewitnesses were excluded

from the analysis. A further 11 and 13 eyewitnesses were excluded from the analyses of the two perpetrators and five perpetrators conditions, bringing the total number of excluded eyewitnesses to 27 across all perpetrator groups.

To test identification confidence across all perpetrator conditions, we ran a factorial analysis of variance with the number of perpetrators viewed, feedback condition, line-up instructions and target presence as independent variables and identification confidence (0-100%) as the continuous outcome variable. We approached the modelling by looking at the most complex sets of interactions and testing whether these were necessary. For instance, if the four-way interaction was not significant, we would consider the model with all the three-way interactions (i.e., without the four-way interaction). If in turn, none of the three-way interactions were significant, we would move to the model with the two-way interactions. All models contained lower-order effects that were implied by the interactions. We continued in this way until we obtained a significant set of interactions or main effects. That became our final model.

For the measure of identification confidence, we rejected the models with four-way, three-way and two-way interactions as none were significant within each of these sets. Therefore, we considered the model that contained the main effects only (see Table A1). The main effect for number of perpetrators viewed was significant ( $F(1,193) = 19.67$ ,  $p < .001$ ). Follow up post-hoc comparisons (see Table 2) showed that the confidence ratings were significantly lower in the five perpetrators condition ( $M = 45.84$ ,  $SD = 20.96$ ) than in the one perpetrator and two perpetrators conditions ( $M = 70.79$ ,  $SD = 22.05$ ;  $M = 65.58$ ,  $SD = 20.26$ , ( $F(2,193) = 19.67$ ,  $p < .01$ ).

There were no significant main effects for feedback and other independent variables. Lastly, I ran analyses for two-way and three-way interactions and none of them were significant.

Therefore, we reject hypothesis 1: feedback did not have a significant effect on identification accuracy confidence.

**Table 2**

*Multiple Post-Hoc Comparisons Between the Perpetrator Groups*

(I) Number of Perpetrators Viewed	(J) Number of Perpetrators Viewed	Mean Difference (I-J)	Std. Error	p.	95% Confidence Interval	
					Lower Bound	Upper Bound
One perpetrator	Two perpetrators	5.36	3.399	.258	-2.67	13.39
	Five perpetrators	26.03*	3.978	<.001	16.63	35.43
Two perpetrators	One perpetrator	-5.36	3.399	.258	-13.39	2.67
	Five perpetrators	20.67*	4.132	<.001	10.91	30.43
Five perpetrators	One perpetrator	-26.03*	3.978	<.001	-35.43	-16.63
	Two perpetrators	-20.67*	4.132	<.001	-30.43	-10.91

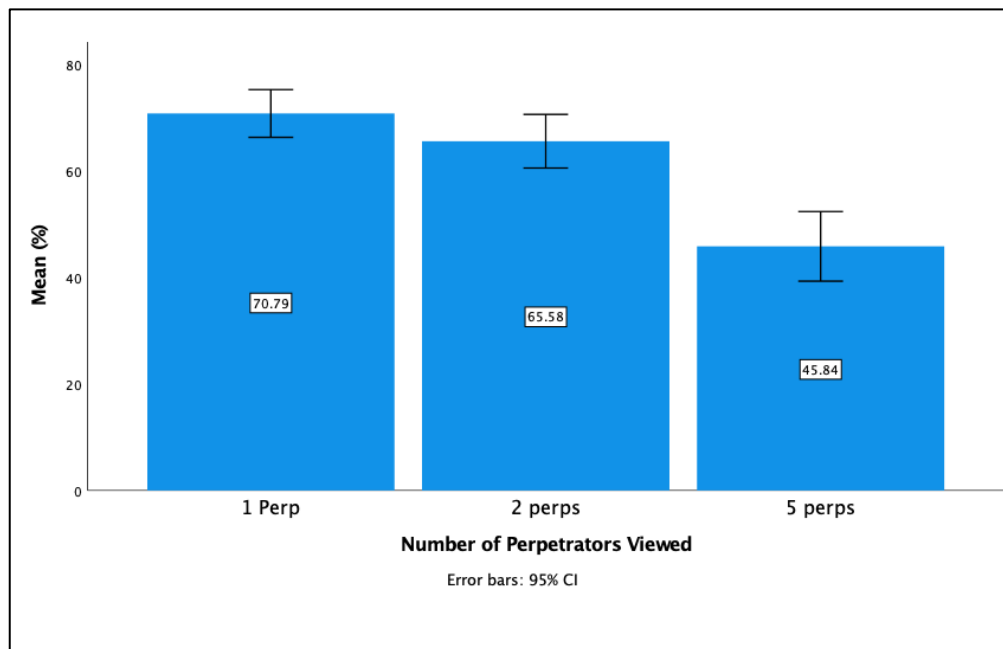
Based on observed means.

The error term is Mean Square (Error) = 448.276.

\*. The mean difference is significant at the 0.05 level

**Figure 4**

*Identification Confidence Means Across the Three Perpetrators Conditions*



**Hypothesis 2: There will be more correct line-up decisions in the control condition (one-perpetrator condition) in comparison to the multiple-perpetrator conditions.**

*Perpetrator identification accuracy*

To test absolute accuracy (whether eyewitnesses correctly identified all the perpetrators across the perpetrator conditions), we ran a logistic regression with the number of perpetrators viewed, feedback condition, line-up instructions and target presence as independent variables and outcome 1 (yes), 0 (no) as the outcome binary variable. We approached the modelling by looking at the most complex sets of interactions and testing whether these were necessary. For instance, if the 4-way interaction was not significant, we would consider the model with all the three-way interactions (i.e., without the four-way interaction). If in turn, none of the three-way interactions were significant would move to the set of models with the two-way interactions. All models contained lower-order effects that were implied by the interactions. We continued in this way until we obtained a significant set of interactions or main effects. That became our final model.

For the measure of absolute accuracy, we rejected the models with four-way, three-way and two-way interactions as none were significant within each of these sets. We, therefore, considered the model that contained the main effects only (see Table 3). The two main effects for number of perpetrators viewed, and target presence were significant (Chi-square (2) = 13.70,  $p < .001$ ); (Chi-square (1) = 19.28,  $p < .001$ ). The follow up post-hoc comparisons (see Table A2) showed that significantly more eyewitnesses (%) in the one perpetrator condition ( $M = 30$ ,  $SD = 46$ ) achieved absolute accuracy than in the two and five perpetrators conditions ( $M = 7$ ,  $SD = 26$ );  $M = 0$ ,  $SD = 48$ , (Chi-square (2) = 13.70,  $p < .001$ ). Lastly, the post hoc test (see Table A3) on target presence or absence revealed that absolute accuracy was significantly higher (%) in

witnesses who viewed target present line-ups ( $M = 27$ ,  $SD = 45$ ) than in eyewitnesses who viewed target-absent line-ups ( $M = 3$ ,  $SD = 35$ , Chi-square (1) = 19.28,  $p < .001$ ).

**Table 3**

*Test of Model Effects on Absolute Accuracy*

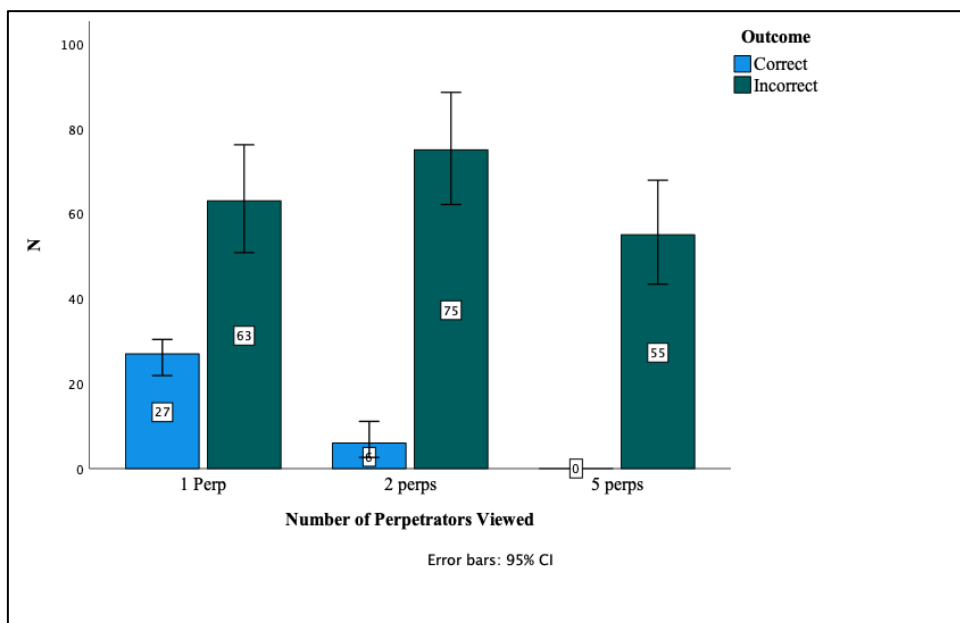
Source	Type III		
	Wald Chi-Square	df	<i>p.</i>
(Intercept)	.000	1	.998
Number of Perpetrators Viewed	13.698	2	.001
Feedback or No Feedback	.081	1	.776
Biased or Unbiased Instructions	.242	1	.623
Target Present or Target Absent	19.278	1	<.001

Dependent Variable: Outcome Category

Model: (Intercept), Number of perpetrators viewed, Feedback or No Feedback, Biased or Unbiased Instructions, Target Present or Target Absent

**Figure 5**

*Overall Accuracy (n) of Witnesses Across all Perpetrator Conditions.*



To further understand accuracy, we tested accuracy rates for when eyewitnesses made at least one correct identification. Therefore, if an eyewitness made at least one hit or correct rejection (across all the line-ups they viewed), this was counted as at least one correct identification. For example, if an eyewitness in the 2 perpetrators condition correctly identified both perpetrators, this counted as at least one correct line-up identification. Therefore, 1 or more correct identifications or rejections counted as “at least one correct.” We ran a logistic regression with the number of perpetrators viewed, feedback condition, line-up instructions and target presence as independent variables and “at least one correct” 1 (yes), 0 (no) as the binary variable. As with the first model, we approached the modelling by looking at the most complex sets of interactions and testing whether these were necessary. For instance, if the four-way interaction was not significant, we would consider the model with all the three-way interactions (i.e., without the four-way interaction). If in turn, none of the three-way interactions were significant would move to the model with the two-way interactions. All models contained lower-order effects that were implied by the interactions. We continued in this way until we obtained a significant set of interactions or main effects. That became our final model.

For the measure of at least one identification, we rejected the models with four-way, three-way and two-way interactions as none were significant within each of these sets. We, therefore, considered the model that contained main effects only (see table A4). One main effect for target presence was significant (Chi-square (1) = 50.81,  $p < .001$ ); follow up post-hoc comparisons (see table 4) showed that the proportion of eyewitnesses who made at least one correct identification was higher in eyewitnesses who viewed target present line-ups ( $M = .63$ ,  $SD = .49$ ) than in witnesses who viewed target-absent line-ups ( $M = .13$ ,  $SD = .34$ , Chi-square (1) =

50.81,  $p < .001$ ). Therefore, viewing a target present line-up is more likely to result in at least one correct identification.

**Table 4**

*The Proportion of Eyewitnesses Who Made At least One Correct Line-up Decision*

		Proportion of Correct Responses	
Type of Line-up	<i>n</i>	<i>M (SD)</i>	
Target Absent	119	.13(.34)	
Target Present	107	.63(.49)	

Lastly, we analysed the proportion of possible correct responses across all perpetrator conditions. The proportion of possible correct identifications varies across the perpetrator conditions. For example, witnesses in the two perpetrators condition could either score 0 (0%), 1 (50%) or 2 (100%). We approached the analysis by first calculating the mean proportion of correct responses in each perpetrator condition. Table A6 shows the proportion of correct identifications or correct rejections across all perpetrator groups. We ran an ANOVA (see Table 5), with the number of perpetrators as the independent variable and the proportion of correct responses as the outcome variable, to investigate whether these differences were significant. The ANOVA revealed that the differences were significant. Follow up post-hoc comparisons (see Table A7) showed that eyewitnesses who viewed five perpetrators significantly achieved the lowest proportion of correct responses ( $M = 0.12$ ,  $SD = 0.17$ ) in comparison to the one perpetrator and two perpetrators conditions ( $M = .28$ ,  $SD = .45$ ;  $M = .25$ ,  $SD = .32$ ,  $(F(2,223) = 3.42, p < .01)$ ).

**Table 5***Effect of Number of Perpetrators Viewed on Proportion of Correct Responses*

Source	Type III Sum of Squares	df	Mean Square	F	<i>p.</i>
Corrected Model	.851 <sup>a</sup>	2	.425	3.417	.035
Intercept	10.095	1	10.095	81.102	<.001
Number of Perpetrators Viewed	.851	2	.425	3.417	.035
Error	27.757	223	.124		
Total	40.480	226			
Corrected Total	28.607	225			

a. R Squared = .030 (Adjusted R Squared = .021)

We calculated the line-up decisions of witnesses across all perpetrator conditions. Hits were defined as the number of correct identifications made in a target-present line-up. Therefore, every correct identification was counted as one hit. False alarms were defined as the number of incorrect identifications made in a target-absent line-up; therefore, every identification counted as one false alarm. Witnesses in the one perpetrator condition had more hits (26.67%) than witnesses in the two and five perpetrators condition, who obtained 19.75% and 8.73% hits respectively. However, the one perpetrator condition had slightly more false alarms (45.56%) than witnesses in the two perpetrators (40.12%) and five perpetrators (43.27%) conditions.

The number of perpetrators viewed was a significant main effect in two of the three inferential statistics investigations. The pattern of results as seen in descriptive and inferential statistics demonstrated that as the number of perpetrators increased, identification accuracy decreased. Therefore, we accept hypothesis 2.

**Hypothesis 3: Witnesses who receive post-identification feedback will report higher confidence in their role pairing than the witnesses who do not.**

### ***Role Pairing***

All eyewitnesses in the two and five perpetrator conditions were required to pair the perpetrator to the role they played in the crime. Eyewitnesses in the one perpetrator were not required to pair the perpetrator to a role because the mock crime comprised only one role. Eyewitnesses in the two perpetrators condition were required to choose roles from a list of six options, whilst witnesses in the five perpetrators condition had 11 options to choose from, including a “Don’t Know” option (Appendix M). After choosing, they were instructed to rate their confidence in the identification decision. Only witnesses who correctly identified perpetrators from the line-ups were included in the analysis. Therefore, if an eyewitness in the five perpetrators condition correctly identified two perpetrators only two of their role pairings were analysed. If an eyewitness did not correctly identify anyone, they were completely excluded from the analysis.

### ***Role Pairing Accuracy***

The role pairing accuracy of 27 and 14 eyewitnesses were analysed in the two perpetrators and five perpetrators conditions respectively. As explained above, only eyewitnesses who correctly identified perpetrators from the line-ups were included in the analysis. This is because eyewitnesses who incorrectly identified a foil from the line-up are, by extension, incorrect in the role they assign to the foil. For example, if an eyewitness in the five perpetrators condition correctly identified two perpetrators, only their role pairings for those two perpetrators were analysed. If a witness did not correctly identify anyone, they were completely excluded from the analysis.

To calculate overall role accuracy, I calculated the proportion of eyewitnesses who made correct identifications (Hits) in the multiple perpetrator conditions. Subsequently, I calculated how many of those eyewitnesses correctly paired the perpetrator/s to the correct role/s. Therefore, absolute perpetrator-role pairing accuracy was analysed. In the current study, eyewitnesses who viewed the one perpetrator crime were not required to role pair because there was only the possibility of one role. In the two perpetrators condition ( $n=27$ ), 22 eyewitnesses made one hit, and five made two hits. 20 (91%) of the 22 eyewitnesses who had one hit correctly paired the perpetrator to their respective role. Of the five eyewitnesses who had two hits, only three (60%) of them correctly paired the two perpetrators to their respective roles. Overall (in the two perpetrators condition) 23/27 (85%) eyewitnesses correctly paired the perpetrator/s they correctly identified to their respective role/s.

In the five perpetrators condition ( $n=14$ ), least nine eyewitnesses made one correct identification, and five eyewitnesses made at least two correct identifications. Of the nine eyewitnesses who had one hit, only four (44%) correctly paired the perpetrator to their respective role. Of the five eyewitnesses who had two hits, three (60%) of them correctly paired the two perpetrators to their respective roles. Overall (in the five perpetrators condition) 3/5 (60%) eyewitnesses correctly paired the perpetrator/s they correctly identified to their respective role/s.

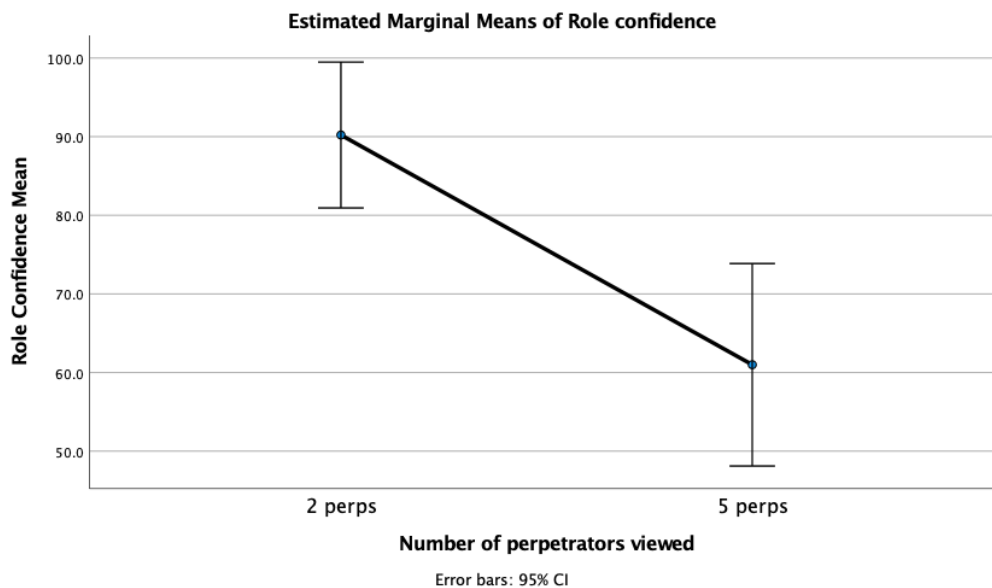
### ***Role Pairing Confidence***

We ran a univariate general linear model with role confidence as a dependent variable, feedback condition and the number of perpetrators viewed as independent variables. However, a significant main effect was obtained for the number of perpetrators viewed,  $F(1,39) = 13.89$ ,  $p < .01$ . Eyewitnesses in the two perpetrators condition had significantly higher role pairing confidence ratings ( $M = 90$ ;  $SD = 17.16$ ) than eyewitnesses in the five perpetrators condition ( $M$

= 61;  $SD = 33.36$ ). This was a moderate difference (Partial Eta Squared = .26). There was no significant main effect for feedback, therefore we reject hypothesis 3. Therefore, feedback did not make eyewitnesses more confident in their role identifications.

## Figure 6

*Profile Plot for Overall Confidence Between the Two and Five Perpetrators Conditions*



## Discussion

The main aim of this study was to determine whether the post-identification feedback effect increased as the number of perpetrators viewed increased from one to two to five. We hypothesized that post-identification confidence would be (1) significantly higher in eyewitnesses who received feedback and (2) the post-identification feedback effect would be significantly higher in eyewitnesses who viewed the multiple perpetrator crime i.e., post-decision confidence would be higher for these witnesses. Wells & Bradfield (1999) explored the post-identification feedback effect in inaccurate eyewitnesses who viewed a single perpetrator crime ( $n=156$ ). They found that feedback significantly inflated confidence to 73%, in comparison to eyewitnesses who

did not receive confirming feedback (48%). Subsequent studies have also found similar results (Wells et al., 2003) and have demonstrated a feedback effect in eyewitnesses who make accurate and inaccurate line-up decisions (Bradfield et al., 2002; Charman et al., 2010; Lampinen et al., 2007 and Quinlivan et al., 2010). Although most of the one perpetrator studies found significant effects for feedback, the current study did not find any significant main effects for feedback. The studies mentioned above all have higher participant sample sizes ( $n = 156$  to  $404$ ), whereas the current study had a sample size of 87 participants in the one perpetrator group. Therefore, the current study perhaps lacks the statistical power to find significant results.

On examination of the mean differences, it became evident that identification confidence decreased as the number of perpetrators increased, with the two five perpetrators conditions having lower confidence ratings than the one perpetrator condition, even when they received feedback. This is evidence against the hypothesis that the multiple perpetrator conditions will have significantly higher confidence ratings due to the post-identification feedback. This is contrary to the theories that posit that eyewitnesses who find it more difficult to identify perpetrators rely heavily on external cues (i.e., post-identification feedback) when they report retrospective confidence, and thus report higher post-identification confidence. For example, the inferential framework theory suggests that when eyewitnesses have a strong euphoric experience (e.g., recognize the perpetrator from the line-up), they are less likely to rely on external factors to validate their decision. However, in the case that they see a target-absent line-up (one where the perpetrator is absent) or they cannot recognize anyone in the line-up, they have a weak euphoric experience. Therefore, they tend to rely on external, non-memorial cues to make retrospective inferences about their decisions. The latter would better explain eyewitnesses in the multiple perpetrators conditions who are faced with the difficult task of having to correctly identify two

and five perpetrators. Thus, there would be an expectation for those eyewitnesses to report higher confidence ratings. However, the results demonstrate that this is not the case: the post-identification feedback did not result in significantly higher confidence ratings in the multiple perpetrators conditions.

One plausible explanation for the failure of confidence ratings to change as a function of feedback as the number perpetrators increase could be the believability or perceived credibility of the feedback administered. It is important to note the three-stage process theorized by Charman et al. (2010). The theory suggests that external, non-memorial cues (i.e. the post-identification feedback) are only used to infer confidence if the eyewitness deems them as credible. We can infer that as the number of perpetrators increased, eyewitnesses also found the identification task increasingly difficult. Furthermore, the feedback was computer generated and administered after every identification or line-up rejection. Perhaps eyewitnesses recognized that it was unlikely that all their line-up decisions were correct. Therefore, eyewitnesses may have rejected the feedback due to its dubious credibility. No previous studies have investigated the feedback effect in eyewitnesses who view multiple-perpetrator line-ups. Therefore, there is no comparative analysis to other studies.

The second aim of the study was to analyse whether the number of perpetrators viewed significantly affects identification accuracy. We hypothesized that eyewitnesses would be less accurate when they viewed more perpetrators at encoding. Therefore, eyewitnesses would be less accurate as the number of perpetrators increases from one to two to five. This hypothesis was confirmed, as 30% of eyewitnesses who viewed the single-perpetrator crime were absolutely accurate, whilst only 7% and 0% of eyewitnesses who viewed two perpetrators and five perpetrators respectively were absolutely correct (i.e., identified all perpetrators). The results for

this were statistically significant. The literature has consistently demonstrated that as the number of perpetrators increases, identification accuracy decreases. For instance, Megreya and Bindemann (2011) ( $n=534$ ) compared recognition performance between participants who viewed a single-perpetrator or multiple-perpetrator crime and found that more participants incorrectly identified someone from the line-up in the two perpetrators condition than the one-perpetrator condition (71% versus 46%), as compared to 92.6% and 70% in this current study. Our inaccuracy figures may be higher due to more difficult encoding or recognition materials. Nortje (2018) found a significant drop in accuracy as soon as one more perpetrator was added. This is consistent with what we found in this study as accuracy dropped from 30% in the one perpetrator condition to 7% in the two perpetrators conditions. This is consistent with research on the double perpetrator disadvantage. Nortje (2018) also noted a significant drop in accuracy at the five perpetrators mark. As stated above, in the current study, no eyewitness correctly identified all five perpetrators from a line-up. This contrasts with other studies. For example, in Clifford and Hollin, (1981), eyewitnesses were presented with target-absent and target-present line-ups after viewing a violent (mugging) or nonviolent incident (direction seeking). Only 30% and 20% of eyewitnesses (in the nonviolent incident) reliably identified all the culprits in the three perpetrators and five perpetrators conditions, respectively, as compared to one perpetrator condition (37.6%). Furthermore, Nortje (2018) also found that only 2.50% of their study's eyewitnesses were able to identify all five perpetrators.

Various theories underlie multiple-perpetrator identification accuracy. Firstly, there is an account that relies on 'perceptual load', which suggests that people can only cognitively attend to a limited number of items at a time. A multiple perpetrator crime is an eventful crime, with multiple perpetrators performing multiple roles, and that information may overwhelm the

eyewitness' attentional capacities, and interfere with the optimal encoding of each face. Megreya and Burton, (2006b) presented 22 participants with either a single-target face or a double-target face to study until they reached a subjective threshold for later recognition. The results demonstrated a two-face disadvantage at encoding. Participants who viewed a single target face correctly identified the target face 59.5% (in comparison to 30% in this study) of the time. This declined to 34% in the double-target condition (in comparison to 7% in the current study). This significant drop further reiterates the point that a minimal addition poses a great disadvantage to the eyewitness who later must recognize a person from a line-up, which is called the double perpetrator disadvantage.

Although it was not part of our main hypotheses, we also found that the line-up presentation had a significant effect on two out of three investigations of identification accuracy: absolute accuracy and when eyewitnesses had made at least one correct identification. Thus, when perpetrators were present in the line-ups, eyewitnesses made significantly more correct identifications, than when eyewitnesses saw target-absent line-ups. This is unsurprising because eyewitnesses who are presented with target-absent line-ups have a higher chance of incorrectly identifying someone from the line-up, in comparison to eyewitnesses who see target-present line-ups (Brewer & Wells, 2006). It is important to note that filler identifications (in target-absent line-ups) may also be higher because eyewitnesses in TA line-ups have weaker memory matches to line-up members and are more willing to choose someone from the line-up. Furthermore, eyewitnesses who view target present line-ups may have more correct identification because of two factors: a strong ephoric experience or memory trace to the perpetrator in comparison to the fillers, and a willingness to choose someone from the line-up (Clark, 2008).

The third aim of the study was to investigate whether post-identification feedback would result in higher confidence in role pairing decisions. Hobson and Wilcock (2011) demonstrated that when the number of perpetrators increases, the precision of the subsequent role pairing decreases. The accuracy decreased from 72.4% in the one perpetrator condition to 71.4% and 65.4% in the two and five perpetrators conditions respectively. Similarly, Nortje et al., (2017) found that as the number of perpetrators increases, accuracy for perpetrator identification and role pairing also decreases. In the current study, eyewitnesses who viewed the one perpetrator crime were not required to role pair because there can only be one role in single perpetrator crimes. Therefore, it is implied that the single perpetrator is responsible for the entire criminal activity. However, the eyewitnesses in the two and five perpetrators conditions were required to correctly pair the perpetrators they correctly chose to their respective roles. 85% of eyewitnesses in the two perpetrators condition paired the perpetrator/s to their correct role/s. This is higher than the 73.3% and 71.4%% reported in Nortje (2018) and Hobson and Wilcock (2011). This may be due to the that the roles in this study were more distinct and easier to remember. Furthermore, in the five perpetrators condition, 50% of the eyewitnesses correctly paired the perpetrators to their respective roles, in comparison to the 53,3% reported in Nortje's paper. It is important to note that when eyewitnesses have selected the correct perpetrator, their perpetrator-role pairing accuracy rates are higher, in comparison to the rates of identification accuracy. For example, if an eyewitness in the two perpetrators condition correctly identified both perpetrators, this counted as at least one correct line-up identification. Therefore, one or more correct identifications or rejections counted as "at least one correct."

No known studies have looked at the confidence of eyewitnesses in their role pairing. The hypothesis that post-identification feedback would result in higher confidence ratings in role

pairing was based on the premise that feedback does not only influence retrospective confidence in identification, but also confidence in other crime-relevant judgments such as view of crime/perpetrators, and ease of identification. Our statistical analyses showed that it did not. This is unsurprising considering that in the current study the post-identification feedback also did not influence identification confidence. However, the number of perpetrators significantly affected the role pairing confidence: as the number of perpetrators increased, the role pairing confidence decreased. This is unsurprising considering the complexity of the five perpetrators condition; eyewitnesses had more role options from which to choose and pair with each perpetrator. Therefore, they had less confidence in their role-pairing decisions.

### **Conclusion**

Eyewitness testimony is an integral part of criminal justice proceedings. However, the vast research on eyewitness memory has unequivocally demonstrated the unreliability of eyewitness testimony in many circumstances, and its susceptibility to bias. Notably, most of the research on eyewitness testimony has focused on single-perpetrator crimes. Therefore, research that explores eyewitness testimony for multiple perpetrator crimes is limited. Although limited, the research has demonstrated that eyewitnesses are less accurate as the number of perpetrators increases. This is an important finding because research has shown that most crimes are committed by multiple perpetrators. Eyewitnesses to multiple perpetrator crimes are faced with multiple tasks: they must recall the crime as it happened, the perpetrators that committed the crime, and pair the perpetrators to their respective roles. Therefore, the inherent complexity of multiple perpetrator crimes (number of perpetrators, events that occur and roles played) explains the decrease in accuracy as the number of perpetrators increases. We hypothesized that in the multiple perpetrator conditions (two and five perpetrators conditions) witnesses would make

significantly fewer accurate identifications than in the control condition. Our results showed a significant effect of the number of perpetrators viewed on the accuracy of eyewitnesses: witnesses in the two perpetrators and five perpetrators conditions performed significantly worse than those in the control condition. Therefore, the hypothesis was confirmed.

The post-identification feedback affects how eyewitnesses rate their post-identification feedback; eyewitnesses who received post-identification feedback report significantly higher levels of confidence. However, this phenomenon has not been studied in eyewitnesses who view multiple perpetrators. Therefore, the main aim of this study was to test whether the post-identification feedback effect persisted in eyewitnesses who viewed multiple perpetrator crimes. Although descriptive analyses showed slight increases in confidence in the eyewitnesses who received feedback, inferential statistics found no significant effect of feedback on confidence. Therefore, the hypothesis that post-identification feedback confidence ratings would be significantly inflated in the multiple perpetrator groups was disconfirmed. However, as the number of perpetrators increased, confidence in identification decisions decreased, with eyewitnesses in the five perpetrators condition reporting the lowest confidence, even when they received feedback. On further testing, we found that the number of perpetrators viewed significantly affects post-identification confidence.

Role recall and pairing are important pieces of evidence as they affect sentencing in criminal justice proceedings. The courts may convict perpetrators of different crimes based on the role they played. Furthermore, the convictions may be weighed differently by criminal law, and therefore in comparison, some roles may carry heavier or lesser sentences. Although we hypothesized that the post-identification feedback would increase role pairing confidence, as it

appears to influence other retrospective judgments unrelated to the identification, this hypothesis was not supported.

### **Limitations and Recommendations**

The data collection was initially planned to take place face-to-face in the ACSENT lab in the Department of Psychology at the University of Cape Town. However, due to COVID-19 restrictions, the study was converted to an online survey that participants could access from home. Therefore, the experimenter had little to no control over some important research aspects such as ensuring that participants follow the instructions, access to a high-quality mock crime video, access to a decent device to complete the experiment, and access to a working internet connection. These are all factors that could have possibly influenced the willingness of people to participate, the eligibility of responses, and the performance of the participants who participated. Furthermore, this may have contributed to the noticeable difference in sample sizes amongst the three perpetrator conditions as some participants dropped out midway, did not follow instructions, and thus had to be excluded from the analyses. Therefore, we recommend that future studies should attempt to conduct or replicate this research in face-to-face laboratory experiments.

It is also worth mentioning that one of the actors was distinctive looking, owing to his visible fringe. Therefore, it was challenging to find foils and fillers that were identical to him on all important facial parameters. However, due to the difficulty in finding actors and coordinating times at which all parties involved could be present for filming, we decided to continue filming with him. We did not test line-up fairness in this study. Therefore, we cannot report for certain that his line-up was not biased against him. However, an unpublished manuscript by Allen, 2021

which used the same materials as the current study, found that the line-up may have been biased towards him. Furthermore, I will consider testing line-up fairness when I publish my results.

Another possible limitation is the believability of feedback administered. The current study administered feedback after every identification. This may have negatively affected the perceived credibility of the feedback. Therefore, future studies could administer general feedback after eyewitnesses have made all their identifications. However, the feedback should suggest that some, instead of all identifications were correct, and then require participants to rate their identification confidence for each perpetrator.

The current study had a 20 to 25 minutes delay between the crime and identification. This is not entirely ecologically valid; in real-life criminal investigations, eyewitnesses can wait several months before they are summoned to view a criminal line-up. Additionally, our videos and line-ups account for many factors (e.g., distinct roles, time spent in full view of the camera, matching clothes, and removal of any obvious elements that may bias against a perpetrator) that may not be easy to control in crimes and subsequent investigations. Therefore, future studies should try to mimic some elements to mimic real-life situations.

Furthermore, the current study used sequential line-ups with one perpetrator represented in each line-up. Constructing a line-up and organizing its viewing in real life is a challenging task. It may not always be possible to commit the time and resources required to find facially matched foils and fillers for each perpetrator. Therefore, police investigators may be faced with having to construct and administer line-ups with more than one perpetrator. Therefore, future studies should include line-up conditions that have more than one perpetrator to see its bearing on the performance of eyewitnesses.

Only a small number of people were analysed for role pairing accuracy and confidence, which is influenced by the number of hits eyewitnesses made. This is a factor that experimenters do not have control over as they cannot ensure that more people make correct identifications.

## References

- Albright, T. (2017). Why eyewitnesses fail. *Proceedings of the National Academy of Sciences*, *114*(30), 7758-7764. doi: 10.1073/pnas.1706891114
- Allen, C. (2021). Contribution of role recollection and perpetrator identification to the accuracy of multi-perpetrator eyewitness testimonies. [Unpublished master's dissertation]. University of Cape Town, South Africa.
- Bradfield, A., Wells, G., & Olson, E. (2002). The damaging effect of confirming feedback on the relation between eyewitness certainty and identification accuracy. *Journal of Applied Psychology*, *87*(1), 112-120. doi: 10.1037//0021-9010.87.1.112
- Brewer, N., & Wells, G. (2006). The confidence-accuracy relationship in eyewitness identification: Effects of lineup instructions, foil similarity, and target-absent base rates. *Journal of Experimental Psychology: Applied*, *12*(1), 11-30. doi: 10.1037/1076-898x.12.1.11
- Cartwright-Finch, U., & Lavie, N. (2007). The role of perceptual load in inattentional blindness. *Cognition*, *102*(3), 321-340. doi: 10.1016/j.cognition.2006.01.002
- Charman, S., Carlucci, M., Vallano, J., & Gregory, A. (2010). The selective cue integration framework: A theory of postidentification witness confidence assessment. *Journal of Experimental Psychology: Applied*, *16*(2), 204-218. doi: 10.1037/a0019495
- Charman, S., & Wells, G. (2011). The moderating effect of ephoric experience on post-identification feedback: A critical test of the cues-based inference Conceptualization. *Applied Cognitive Psychology*, *26*(2), 243-250. doi: 10.1002/acp.1815
- Clark, S., Howell, R., & Davey, S. (2008). Regularities in eyewitness identification. *Law and Human Behavior*, *32*(3), 187-218. doi: 10.1007/s10979-006-9082-4

- Clifford, B., & Hollin, C. (1981). Effects of the type of incident and the number of perpetrators on eyewitness memory. *Journal of Applied Psychology, 66*(3), 364-370. doi: 10.1037//0021-9010.66.3.364
- Cowan, N. (1988). Evolving conceptions of memory storage, selective attention, and their mutual constraints within the human information-processing system. *Psychological Bulletin, 104*(2), 163-191. doi: 10.1037/0033-2909.104.2.163
- Cutler, B., Penrod, S., & Dexter, H. (1990). Juror sensitivity to eyewitness identification evidence. *Law and Human Behavior, 14*(2), 185-191. doi: 10.1007/bf01062972
- Douglass, A., Neuschatz, J., Imrich, J., & Wilkinson, M. (2010). Does post-identification feedback affect evaluations of eyewitness testimony and identification procedures?. *Law and Human Behavior, 34*(4), 282-294. doi: 10.1007/s10979-009-9189-5
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. doi: 10.3758/brm.41.4.1149
- Geiselman, R., Haghghi, D., & Stown, R. (1996). Unconscious transference and characteristics of accurate and inaccurate eyewitnesses. *Psychology, Crime & Law, 2*(3), 197-209. doi: 10.1080/10683169608409778
- Geiselman, R. E., MacArthur, A., & Meerovitch, S. (1993). Transference of perpetrator roles in eyewitness identifications from photoarrays. *American Journal of Forensic Psychology, 11*(4), 5-15.
- Gurney, D., Vekaria, K., & Howlett, N. (2014). A nod in the wrong direction: Does non-verbal feedback affect eyewitness confidence in interviews?. *Psychiatry, Psychology and Law, 21*(2), 241-250. doi: 10.1080/13218719.2013.804388

- Hancock, P., Bruce, V., & Burton, A. (2000). Recognition of unfamiliar faces. *Trends in Cognitive Sciences*, 4(9), 330-337. doi: 10.1016/s1364-6613(00)01519-9
- Hobson, Z., & Wilcock, R. (2011). Eyewitness identification of multiple perpetrators. *International Journal of Police Science & Management*, 13(4), 286-296. doi: 10.1350/ijps.2011.13.4.253
- Hobson, Z., Wilcock, R., & Valentine, T. (2012). Multiple suspect showing: A survey of police identification officers. *Policing*, 7(1), 79-87. doi: 10.1093/police/pas021
- Home Office Research Development Statistics. (2009). Retrieved August, 2018 from <http://rds.homeoffice.gov.uk/rds/bcs1.html>
- Horry, R., Halford, P., Brewer, N., Milne, R., & Bull, R. (2014). Archival analyses of eyewitness identification test outcomes: What can they tell us about eyewitness memory?. *Law and Human Behavior*, 38(1), 94-108. doi: 10.1037/lhb0000060
- Innocence Project (2017). Eyewitness misidentifications. Retrieved from <http://www.innocenceproject.org/understand/Eyewitness-Misidentification>
- IBM Corp. Released 2020. IBM SPSS Statistics for Mac, Version 27.0. Armonk, NY: IBM Corp
- Johnson, M., Hashtroudi, S., & Lindsay, D. (1993). Source monitoring. *Psychological Bulletin*, 114(1), 3-28. doi: 10.1037/0033-2909.114.1.3
- Kail, R., & Hall, L. (2001). Distinguishing short-term memory from working memory. *Memory & Cognition*, 29(1), 1-9. doi: 10.3758/bf03195735
- Lampinen, J., Scott, J., Pratt, D., Leding, J., & Arnal, J. (2007). 'Good, you identified the suspect...but please ignore this feedback': can warnings eliminate the effects of post-identification feedback?. *Applied Cognitive Psychology*, 21(8), 1037-1056. doi: 10.1002/acp.1313

- Machisa, M., Jina, R., Labuschagne, G., Vetten, L., Loots, L., Swemmer, S., ... Jewkes, R. (2017). Rape justice in South Africa: A retrospective study of the investigation, prosecution and adjudication of reported rape cases from 2012. Pretoria, South Africa. Gender and Health Research Unit, South African Medical Research Council.
- Malpass, R. S., Tredoux, C. G., & McQuiston-Surrett, D. (2007). Lineup construction and lineup fairness. In *The handbook of eyewitness psychology, Vol II: Memory for people* (pp. 155-178). Lawrence Erlbaum Mahwah, NJ.
- Megreya, A., & Bindemann, M. (2011). Identification accuracy for single- and double-perpetrator crimes: Does accomplice gender matter?. *British Journal of Psychology*, *103*(4), 439-453. doi: 10.1111/j.2044-8295.2011.02084.x
- Megreya, A., & Burton, A. (2006). Recognising faces seen alone or with others: when two heads are worse than one. *Applied Cognitive Psychology*, *20*(7), 957-972. doi: 10.1002/acp.1243
- Megreya, A., & Burton, A. (2006). Unfamiliar faces are not faces: Evidence from a matching task. *Memory & Cognition*, *34*(4), 865-876. doi: 10.3758/bf03193433
- Mulligan, N. (1998). The role of attention during encoding in implicit and explicit memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *24*(1), 27-47. doi: 10.1037/0278-7393.24.1.27
- Neuschatz, J., Lawson, D., Fairless, A., Powers, R., Neuschatz, J., Goodsell, C., & Togli, M. (2007). The mitigating effects of suspicion on post-identification feedback and on retrospective eyewitness memory. *Law and Human Behavior*, *31*(3), 231-247. doi: 10.1007/s10979-006-9047-7
- Nickerson, R. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*(2), 175-220. doi: 10.1037//1089-2680.2.2.175

- Nortje, A. (2018). The butcher, the baker, the candlestick maker: Investigating facial recognition for multiple-perpetrator crimes. [Unpublished doctoral dissertation]. University of Cape Town, South Africa.
- Nortje, A., Tredoux, C. G., & Vredeveltdt, A. (2017). How many faces can we remember? Why this matters when assessing eyewitnesses. In M. Bindemann & A. Megreya (Eds.), *Face processing: Systems, disorders and cultural disorders*. New York: NOVA Science Publishers.
- Nortje, A., Tredoux, C. G., & Vredeveltdt, A. (2020). Eyewitness identification of multiple perpetrators. *South African Journal of Criminal Justice*, 33(2), 348 – 381.
- Oregon v. Lawson, SC S059306, 2012
- Owens, J. N. (2009). Is three really a crowd?: The effects of multiple perpetrators on eyewitness identification accuracy and confidence (Doctoral dissertation, John Jay College of Criminal Justice).
- Quinlivan, D., Neuschatz, J., Douglass, A., Wells, G., & Wetmore, S. (2012). The effect of post-identification feedback, delay, and suspicion on accurate eyewitnesses. *Law and Human Behavior*, 36(3), 206-214. doi: 10.1037/h0093970
- Quinlivan, D., Neuschatz, J., Jimenez, A., Cling, A., Douglass, A., & Goodsell, C. (2009). Do prophylactics prevent inflation? Post-identification feedback and the effectiveness of procedures to protect against confidence-inflation in ear-witnesses. *Law and Human Behavior*, 33(2), 111-121. doi: 10.1007/s10979-008-9132-1
- Quinlivan, D., Wells, G., & Neuschatz, J. (2010). Is manipulative intent necessary to mitigate the eyewitness post-identification feedback effect?. *Law and Human Behavior*, 34(3), 186-197. doi: 10.1007/s10979-009-9179-7

- Quinlivan, D., Wells, G., Neuschatz, J., Luecht, K., Cash, D., & Key, K. (2016). The effects of pre-admonition suggestions on eyewitnesses' choosing faces and retrospective identification judgments. *Journal of Police and Criminal Psychology, 32*(3), 236-246. doi: 10.1007/s11896-016-9216-7
- Shapiro, P., & Penrod, S. (1986). Meta-analysis of facial identification studies. *Psychological Bulletin, 100*(2), 139-156. doi: 10.1037/0033-2909.100.2.139
- Skagerberg, E., & Wright, D. (2009). Susceptibility to postidentification feedback is affected by source credibility. *Applied Cognitive Psychology, 23*(4), 506-523. doi: 10.1002/acp.1470
- Smalarz, L., & Wells, G. (2014). Confirming feedback following a mistaken identification impairs memory for the culprit. *Law and Human Behavior, 38*(3), 283-292. doi: 10.1037/lhb0000078
- South African Police Service: Annual crime report 2017/2018 (2018)
- Stebly, N., Wells, G., & Douglass, A. (2014). The eyewitness post identification feedback effect 15 years later: Theoretical and policy implications. *Psychology, Public Policy, And Law, 20*(1), 1-18. doi: 10.1037/law0000001
- Uniform Crime Reporting (UCR), F. (2015). Persons Arrested. Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/persons-arrested/persons-arrested>
- Wells, E., & Pozzulo, J. (2006). Accuracy of eyewitnesses with a two-culprit crime: Testing a new identification procedure. *Psychology, Crime & Law, 12*(4), 417-427. doi: 10.1080/10683160500050666
- Wells, G., & Bradfield, A. (1998). "Good, you identified the suspect": Feedback to eyewitnesses distorts their reports of the witnessing experience. *Journal of Applied Psychology, 83*(3), 360-376. doi: 10.1037//0021-9010.83.3.360

- Wells, G., & Bradfield, A. (1999). Distortions in eyewitnesses' recollections: Can the postidentification-feedback effect be moderated?. *Psychological Science, 10*(2), 138-144. doi: 10.1111/1467-9280.00121
- Wells, G., & Olson, E. (2001). The other-race effect in eyewitness identification: What do we do about it?. *Psychology, Public Policy, And Law, 7*(1), 230-246. doi: 10.1037//1076-8971.7.1.230
- Wells, G., Olson, E., & Charman, S. (2003). Distorted retrospective eyewitness reports as functions of feedback and delay. *Journal Of Experimental Psychology: Applied, 9*(1), 42-52. doi: 10.1037/1076-898x.9.1.42
- Wixted, J., & Wells, G. (2017). The relationship between eyewitness confidence and identification Accuracy: A New Synthesis. *Psychological Science in the Public Interest, 18*(1), 10-65. doi: 10.1177/1529100616686966
- Wright, D., Boyd, C., & Tredoux, C. (2001). A field study of own-race bias in South Africa and England. *Psychology, Public Policy, And Law, 7*(1), 119-133. doi: 10.1037/1076-8971.7.1.119
- Wright, D., Boyd, C., & Tredoux, C. (2003). Inter-racial contact and the own-race bias for face recognition in South Africa and England. *Applied Cognitive Psychology, 17*(3), 365-373. doi: 10.1002/acp.898
- Wright, D., & Skagerberg, E. (2007). Postidentification feedback affects real eyewitnesses. *Psychological Science, 18*(2), 172-178. doi: 10.1111/j.1467-9

**Appendix A**  
**Supplementary Data Analysis**

**Table A1**

*Factorial ANOVA: Factors Affecting Post-Identification Confidence*

Source	df	F	Mean Square	<i>p.</i>
Corrected Model	5	9.475	4247.588	<.001
Intercept	1	1463.834	656201.692	<.001
Number of Perpetrators Viewed	2	19.665	8815.548	<.001
Feedback_or_No feedback	1	1.446	648.206	.231
Biased Instructions_or_Unbiased Instructions	1	1.549	694.360	.215
Target Present_or_Target Absent	1	.577	258.548	.449
Error	193		448.276	
Total	199			
Corrected Total	198			

**Table A2**

*Multiple Post-Hoc Comparisons Between Perpetrator Conditions for Absolute Accuracy*

(I) Number of Perpetrators Viewed	(J) Number of Perpetrators Viewed	Mean Difference (I-J)	Std. Error	df	<i>p.</i>	95% Wald Confidence Interval for Difference	
						Lower	Upper
One perpetrator	Two perpetrators	-.19 <sup>a</sup>	.054	1	<.001	-.30	-.08
	Five perpetrators	-.23 <sup>a</sup>	.055	1	<.001	-.34	-.12
Two perpetrators	One perpetrator	.19 <sup>a</sup>	.054	1	<.001	.08	.30
	Five perpetrators	-.04 <sup>a</sup>	.020	1	.036	-.08	.00
Five perpetrators	One perpetrator	.23 <sup>a</sup>	.055	1	<.001	.12	.34
	Two perpetrators	.04 <sup>a</sup>	.020	1	.036	.00	.08

Pairwise comparisons of estimated marginal means based on the original scale of dependent variable Outcome Category

a. The mean difference is significant at the .05 level.

**Table A3**

*Multiple Post-Hoc Comparisons between Target Present and Target Absent Line-ups*

(I) Type of Line-up	(J) Type of Line-up	Mean Difference (I-J)	Std. Error	<i>p.</i> <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
Target Absent	Target Present	-.237*	.045	<.001	-.325	-.150
Target Present	Target Absent	.237*	.045	<.001	.150	.325

Based on estimated marginal means

\*. The mean difference is significant at the 0.05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

**Table A4**

*Test of Model Effects for At Least One Correct Line-up Decision*

Source	Type III		
	Wald Chi-Square	df	<i>p.</i>
(Intercept)	13.691	1	<.001
Number of Perpetrators Viewed	5.515	2	.063
Feedback or No Feedback	.064	1	.800
Biased or Unbiased Instructions	.167	1	.682
Target Present or Target Absent	50.807	1	<.001

Dependent Variable: At least one correct  
 Model: (Intercept), Number of perpetrators viewed, Feedback or No Feedback, Biased or Unbiased Instructions, Target Present or Target Absent

**Table A5**

*Multiple Post-Hoc Comparisons between TA and TP line-ups*

(I) Type of Line-up	(J) Type of Line-up	Mean Difference (I-J)	Std. Error	<i>p.</i> <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
Target Absent	Target Present	-.510*	.056	<.001	-.621	-.399

(I) Type of Line-up	(J) Type of Line-up	Mean Difference (I-J)	Std. Error	<i>p</i> . <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
Target Present	Target Absent	.510*	.056	<.001	.399	.621

Based on estimated marginal means

\*. The mean difference is significant at the 0.05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

**Table A6**

*The Proportion of Correct Responses Across Perpetrator Groups*

<i>Number of Perpetrators Viewed</i>	<i>n</i>	Proportion of Correct Responses
		<i>M (SD)</i>
One perpetrator	90	.28(.45)
Two perpetrators	81	.25(.32)
Five perpetrators	55	.12(.17)

**Table A7***Multiple Comparisons on Proportion of Correct Responses*

(I) Number of Perpetrators Viewed	(J) Number of Perpetrators Viewed	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
One perpetrator	Two perpetrators	.031	.0540	.836	-.097	.158
	Five perpetrators	.154*	.0604	.030	.012	.297
Two perpetrators	One perpetrator	-.031	.0540	.836	-.158	.097
	Five perpetrators	.123	.0616	.115	-.022	.269
Five perpetrators	One perpetrator	-.154*	.0604	.030	-.297	-.012
	Two perpetrators	-.123	.0616	.115	-.269	.022

Based on observed means.

The error term is Mean Square(Error) = .124.

\*. The mean difference is significant at the 0.05 level.

## Appendix B

### Perpetrator Roles

Perpetrators' roles	Two Versions of the Mock Crime Video		
	One perpetrator video	Two perpetrators video	Five perpetrators video
Perp 1: Stole the backpack from the car and returned to getaway car	X	X	X
Perp 2: Opened the boot of the target car, stole the box, and returned to the getaway car		X	X
Perp 3: Stole a trye from the boot of the car and returned to the getaway car			X
Perp 4: Stole the bicycle and cycled off the scene			X
Perpetrator 5: acted as the lookout and went to the getaway car after everyone else.			X

---

Note: "X" indicates the role played in all three perpetrator conditions

## Appendix C

### Experimental Conditions

Perpetrator condition	Line-up instructions		Line-up presentation		Feedback	
1 perpetrator	Biased	Unbiased	Target present	Target absent	Yes	No
2 perpetrators	Biased	Unbiased	Target Present	Target absent	Yes	No
3 perpetrators	Biased	Unbiased	Target Present	Target absent	Yes	No

- Biased x Target present x No feedback
- Biased x Target present x Feedback
- Biased x Target absent x No Feedback
- Biased x Target absent x Feedback
- Unbiased x Target present x No feedback
- Unbiased x Target present x feedback
- Unbiased x Target absent x No feedback
- Unbiased x Target absent x Feedback

## Appendix D

### Vula Advert

Dear students,

My name is Bokang Methola. I am collecting data for my Masters dissertation. My study aims to **assess non-verbal behaviour and personality**. The experiment will take approximately **45 minutes**.

The sign-up slots are available on VULA. Please check those and pick a time slot that is at your earliest convenience. Data collection will take place over a couple of weeks until the target sample is reached. Anyone with basic skills in speaking, reading and writing English, and with reasonably good eyesight (you may wear glasses) can participate in this study.

The experiment will take place in the **ACSENT lab of the Department of Psychology**, at the University of Cape Town.

Your SRPP points will be awarded as soon as you have completed the experiment.

Your participation in this study is highly appreciated. You will get more information about this interesting study when you come through for your scheduled time slot. If you do sign up, and cannot make it, please SMS or WhatsApp me at **0814526617**. Alternatively drop me an email on **MTHBOK002@myuct.ac.za**. This should happen as soon as you realize, so that the slot can be opened for another person.

Thank you

## **Appendix E**

### **Online Survey Instructions**

Thank you for agreeing to participate in my study.  
please read the information below carefully and answer the questions that follow.

For the integrity of this experiment, it is important that you complete it in a single sitting. Therefore, you cannot exit the experiment and come back to complete it at a later stage. Please make sure that you have at least 1 hour and a stable internet connection to proceed.

Your participation is voluntary and anonymous. You may withdraw your participation at any point during the study.

When you have completed the tasks on each page, press the arrow at the bottom of the right-hand screen to continue. You will only be entered into the draw if you complete the entire experiment.

If you participated in Carrie Allen's study titled, "Theft prevention at UCT", you are ineligible to participate in this study!

## **Appendix F**

### **Consent Form**

Dear participant,

You are being invited to partake in a study for the fulfilment of a Master's degree in Neuropsychology, in the Department of Psychology at the University of Cape Town. The aim of this study is to understand non-verbal behaviour and personality.

We would prefer you to complete the experiment on a desktop computer. However, you can use another device (e.g., a smartphone or tablet). You will be required to watch a 15 or 30 or 80-seconds video clip and carry out several tasks related to what you have observed. The study will take approximately 40 minutes to complete.

Possible benefits

You will be entered into a draw to win one of three Takealot shopping vouchers, valued at R750, R500, and R250 each. You will only be entered into the draw if you follow the instructions of this experiment properly and complete the entire experiment.

Possible risks

There is a minimal violation of confidentiality, as you will be required to give out personal identifying information such as names and demographic information when filling out the consent form and participant details. However, this information will only be accessed by the principal investigator, and no one else. The video used poses a minimal risk because the crime depicted is a non-violent and victimless crime. If you feel distressed or anxious, and wish to withdraw your consent before you complete, then you may do so.

Costs

It does not cost anything to participate in this study. The researcher only requires your time.

#### Voluntary Participation

Your participation is voluntary. You have a right to withdraw from the study for whatever reason, at any given point, without any consequences or punishment.

#### Confidentiality

All personal identifying information such as your name, demographic information, and consent forms, and all other identifying information is confidential. The researcher will keep these documents safe in a locked computer folder to which only the researcher has the password. Only the researcher will be able to link your responses back to you.

If you have any questions or comments regarding the study, contact the following researchers:

Bokang Methola (Primary researcher)                      bokangmthesis@gmail.com

Colin Tredoux (Supervisor)                                      colin.tredoux@uct.ac.za

Rosalind Adams    rosalind.adams@uct.ac.za

By clicking on either option below, you are acknowledging that:

I have carefully read the description of the study and understand the risk and benefits that come with participating in this study. I have no further questions about the study and voluntarily consent to participate.

## Appendix G

### Written Eyewitness Statement Questions

#### Single perpetrator

1. Imagine a police officer has asked you to describe the crime you saw being committed in the video. In the space provided below please write this description and include as many details as you can remember. When you are finished, please proceed to the next page.
2. Imagine the police officer has asked you to give a description of the physical characteristics of the perpetrator you saw committing the crime in the video. In the block below, please write the description and include as many details as you can remember. When you are finished, please proceed to the next page.

#### Multiple perpetrator

1. Imagine the police officer has you to give a description of the physical characteristics of the perpetrators you saw committing the crime in the video. You don't have to describe the perpetrators in the order that they appeared in the crime video. In the blocks below, please write those descriptions and include as many details as you can remember. When you are finished, please proceed to the next page.
2. Imagine the police officer has you to give a description of the physical characteristics of the perpetrators you saw committing the crime in the video. You don't have to describe the perpetrators in the order that they appeared in the crime video. In the blocks below, please write those descriptions and include as many details as you can remember. When you are finished, please proceed to the next page.

3. The police officer has asked you to give a description of exactly what each perpetrator did in the crime. The roles do not have to be in the order in which the perpetrators appeared in the crime video. In the blocks below, please write those descriptions and include as many details as you can remember. When you are finished, please proceed to the next page.

## Appendix H

### Line-Up Administration Protocol

Condition	Instruction
1 perpetrator, 1 line-up	
<ul style="list-style-type: none"> <li>Biased</li> </ul>	<p>“Now, you will be presented with a line-up. Your task is to decide who from the line-up is one of the perpetrators that committed the crime in the video. A line-up will only ever contain one perpetrator. To choose, click on the image of their face. You will be shown a line-up, which will consist of six people.”</p>
<ul style="list-style-type: none"> <li>Unbiased</li> </ul>	<p>“Now, you will be presented with a line-up, which may or may not contain one of the perpetrators that committed the crime in the video. A line-up will only ever contain one perpetrator if there is in fact a perpetrator in the line-up. Your task is to decide who, if anyone, from the line-up is one of the perpetrators. You will be shown a line-up, which will consist of six people.</p> <p>If you think the perpetrator is in the line-up, click on the image of their face. However, if you think the perpetrator is not in the line-up, select the 'Not Present' option. Select the 'Don't Know' option if you are not sure whether the perpetrator is in the line-up.”</p>

## 2 perpetrators condition, 2 line-ups

- Biased

“Now, you will be presented with a line-up. Your task is to decide who from the line-up is one of the perpetrators that committed the crime in the video. A line-up will only ever contain one perpetrator. To choose, click on the image of their face. You will be shown two line-ups in total, both of which will consist of six people.”

- Unbiased

“Now, you will be presented with a line-up, which may or may not contain one of the perpetrators that committed the crime in the video. A line-up will only ever contain one perpetrator, if there is in fact a perpetrator in the line-up. Your task is to decide who, if anyone, from the line-up is one of the perpetrators. You will be shown two line-ups in total, both of which will consist of six people.

If you think one of the perpetrator is in the line-up, click on the image of their face. However, if you think the perpetrator is not in the line-up, select the 'Not Present' option. Select the 'Don't Know' option if you are not sure whether the perpetrator is in the line-up.”

### 5 perpetrators condition, 5 line-ups

- Biased

“Now, you will be presented with a line-up. Your task is to decide who from the line-up is one of the perpetrators that committed the crime in the video. A line-up will only ever contain one perpetrator. To choose, click on the image of their face. You will be shown five line-ups in total, all of which will consist of six people.”

- Unbiased

“Now, you will be presented with a line-up, which may or may not contain one of the perpetrators that committed the crime in the video. A line-up will only ever contain one perpetrator, if there is in fact a perpetrator in the line-up. Your task is to decide who, if anyone, from the line-up is one of the perpetrators. You will be shown five line-ups in total, all of which will consist of six people.

If you think one of the perpetrator is in the line-up, click on the image of their face. However, if you think the perpetrator is not in the line-up, select the 'Not Present' option. Select the 'Don't Know' option if you are not sure whether the perpetrator is in the line-up.”

---

---

Instructions for role pairing (administered if the eyewitness made an identification from the line-up)

1. Earlier, the police officer asked you to give descriptions of the roles that the perpetrators played in the video. Below is a list of roles which may or may not have occurred in the crime video. You are now required to make a decision about which role the perpetrator whom you selected, played in the video. If you do not know which role this perpetrator played or you cannot remember, then select the 'I do not know' option.

## **Appendix I**

### **Debriefing Form**

Thank you for taking the time out to participate in my study. The aim of my study is to investigate the accuracy of eyewitnesses who view multiple-perpetrator line-ups, against those who view single-perpetrator line-ups. It is well-published that eyewitness memory is prone to errors, and this issue emerges to an even bigger degree in eyewitnesses that view multiple-perpetrator crimes. This has detrimental consequences for the execution of justice, as innocent people are wrongfully convicted and subsequently sentenced to prison for crimes they did not commit. This topic is relevant to the South African context because multiple-perpetrator crimes are on the rise. However, this area is not well-researched, as there are fewer than 20 published studies addressing the issue of the multiple-perpetrator effect. Another important element of this experiment was the positive feedback and no feedback manipulation. Half of you received positive feedback after making a line-up identification, whilst the other half did not. The feedback was administered to measure how it influences confidence ratings in identification and role-pairing. Confidence ratings are important in that they have been used to gauge the accuracy/credibility of eyewitnesses in criminal justice proceedings. Despite findings disputing the claim that confident eyewitnesses are credible and accurate, the belief persists in the criminal justice system.

If you choose someone from a line-up, you were subsequently asked to decide which role you believe they played in the crime. This role pairing task is important in real life for the purpose of sentencing because different crimes (or actions carried out during a criminal event) do not carry the same weight. Therefore, the justice system has the responsibility to impose a sentence that fits the crime.

In this protocol, we hypothesize that:

- There will be more identification errors in multiple-perpetrator conditions (two perpetrators and 5 perpetrators) in comparison to the control condition (1 perpetrator condition).
- Post-identification feedback will result in higher confidence in identification accuracy for the multi-perpetrator conditions, than the control condition (1 perpetrator condition).
- Eyewitnesses who receive post-identification feedback will report higher confidence in their role pairing, than eyewitnesses who do not.

Now that we have discussed the nature of the study, it is important to explain why using deception was important to draw accurate results for this study. In the consent form, I mentioned that my study aimed to understand non-verbal behaviour and personality. Therefore, the incidental(unintended) learning was important to mimic real-life situations, where criminal events happen unexpectedly, and witnesses have no warning before witnessing a crime. If we had informed you about the real nature of the study, you would have made deliberate efforts to memorize the faces of the perpetrators and the roles that they play in the videos. The distractor task (geographical knowledge) was necessary to create a good delay between your view of the crime and subsequent learning. This was done to approximate your eye witnessing experience to real-world eyewitnesses, who often must wait several weeks before they view an identification parade for a crime they witnessed. I believe that the benefits of the deception outweigh the risks thereof because we can draw more accurate results about the multiple-perpetrator effect and the post-identification feedback effect. You were all randomly assigned to different control and

experimental conditions; therefore, your experiences of the study are different. All your personal identifying information is confidential, and the researcher will ensure that it is kept safe.

The mock crime video used was non-violent and victimless, to minimize any emotional and psychological harm to you as the participant. However, in the case that you feel distressed by the conditions of this study, below are the contact details of the Student Wellness Service:

The Student Wellness Service/Counselling Services

Ivan Toms Building

28 Rhodes Ave

Mowbray

Middle Campus

Tel: 021 650 1020 / 1017

If you have any questions or comments regarding this study do not hesitate to

Contact:

[bokangmthesis@gmail.com](mailto:bokangmthesis@gmail.com) - Researcher

[colin.tredoux@uct.ac.za](mailto:colin.tredoux@uct.ac.za) - Supervisor

[alicia.nortje@gmail.com](mailto:alicia.nortje@gmail.com) - Co-Supervisor

[rosalind.Adams@uct.ac.za](mailto:rosalind.Adams@uct.ac.za) – UCT Psychology Department Postgraduate Administrator

## Appendix J:

### Photograph Protocol

*Photographing Faces: The Schaupp-Tredoux Entente*

Where to get key and camera?

#### 1 Physical-spatial preparation

- a) Place **chair**, **camera** and **flash units** in the designated places. If they are already setup, check their position.
- b) Set flash units to the following heights; Lower flash unit = **78 cm**; Higher flash unit = **128 cm**.  
Refer to Drawing A.

#### 2 Setup of flash heads

- a) Check that switch on wall is on.
- b) Power both flash units on, including modeling lights (to II, higher power setting).
- c) Each flash unit to have flash intensity set to maximum.
- d) Discharge each flash unit twice to dissipate pre-charge.  
Refer to Drawing B.

#### 3 Setup of camera

- a) Mount camera on tripod, in portrait orientation; ensure camera is level and straight.
- b) Connect flash sync lead to camera and to lower flash head.
- c) Set mode to M(anual) on mode selection wheel.
- d) **Reset camera settings to default (?)**
- e) Set image quality to large, smooth.
- f) Set white balance option to color temperature (K) on small LCD screen.
- g) Set color temperature to 5000 K (via menu).
- h) Set aperture to 8.0, shutter speed to 60 (i.e.,  $f = 8.0$ ,  $s = 1/60^{\text{th}}$ ).

#### 4 Photo subjects

##### *I Preliminaries*

- a) Explain release form to subject and get signature.
- b) Ask subject to remove jewellery, headgear, glasses. If they wear heavy make up, continue, but ask them at the end of the session if they can return later without make up.
- c) Ask subject to sit down in chair.
- d) Adjust height of tripod so the camera lens is at eye level of subject.
- e) Adjust angles of the umbrellas and flash units to be 45 degrees to subject's line of sight.

(See Drawing A)

- f) Adjust angles of the flash units according to qualitative impression – lower unit umbrella must reflect downward; higher unit must reflect upward.
- g) Take photograph of MacBeth colour chart for first subject of the day/session. Subject to hold chart so that it is centred in frame, parallel plane to camera. Tell the subject to hold colour chart on the edges without touching any of the colour swats on the chart.

## **II Photographs**

- h) Only one subject in the room at a time. Subject to sit down, upright, not against back of chair. In frontal view should fill 2/3 of frame horizontally, 1/2 of the frame vertically
- i) Tell subject that you are taking four shots
- j) Take casual shot; check for this and all other shots that results are acceptable i.e., no shut eyes, in frame, in focus (test focus with zoomview option in review mode of camera)
- k) Take frontal shot, but VERY IMPORTANTLY ensure
  - i) Vertical orientation angle to be checked (“lift chin”, “drop chin”, led by example)
  - ii) Horizontal orientation angle to be checked (“swivel your head to the left”, lead by example)
  - iii) Pupil eyeline angle to be checked (“tilt your head to the left/right” etc, lead by example)

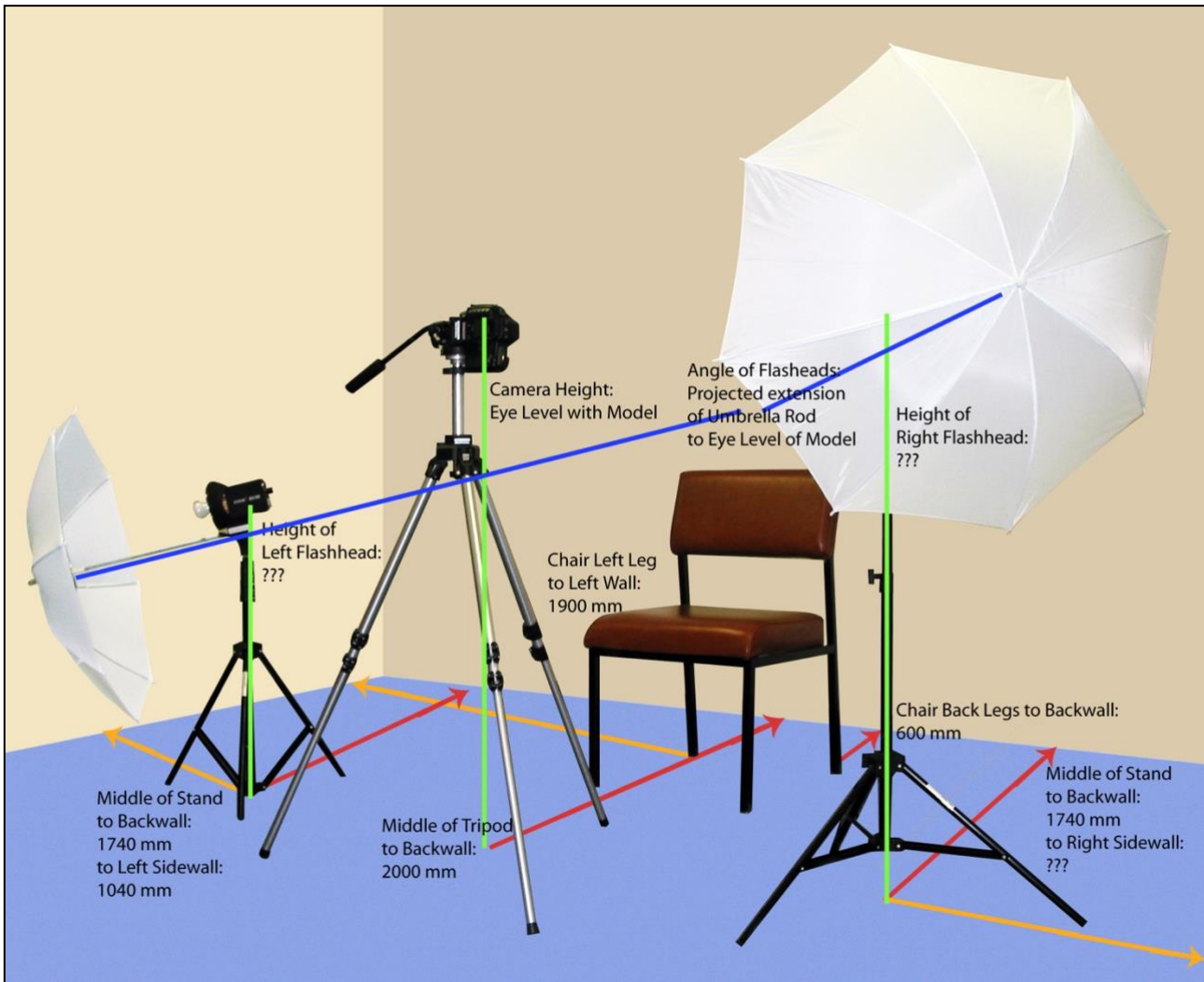
NOTE that these are dynamic and changes in one can undo changes in another! Check and re-check.
- l) Take 3/4 shot. Ask subject to change seating position, not just head angle, and to look to back of umbrella. Adjust vertical (“drop chin”) and horizontal orientation (“swivel left”). A correctly composed shot will just show a hint of the far cheek and eye.
- m) Take 90-degree profile shot. Check vertical and horizontal angles
- n) Thank subject; say goodbyes

## **4 Closure**

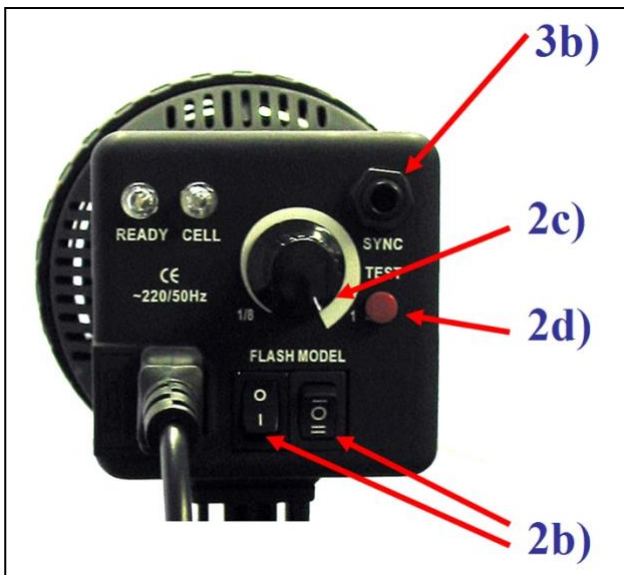
- a) Switch off camera
- b) Turn flash units off, power at wall off
- c) Take out sync leads from camera
- d) Dismount camera.
- e) Camera to be removed from venue, door to be locked
- f) Memory flash card to be given to Heike. Heike to download images, to copy them to the Macintosh server, and to add them to the backup CD or DVD.

Key??

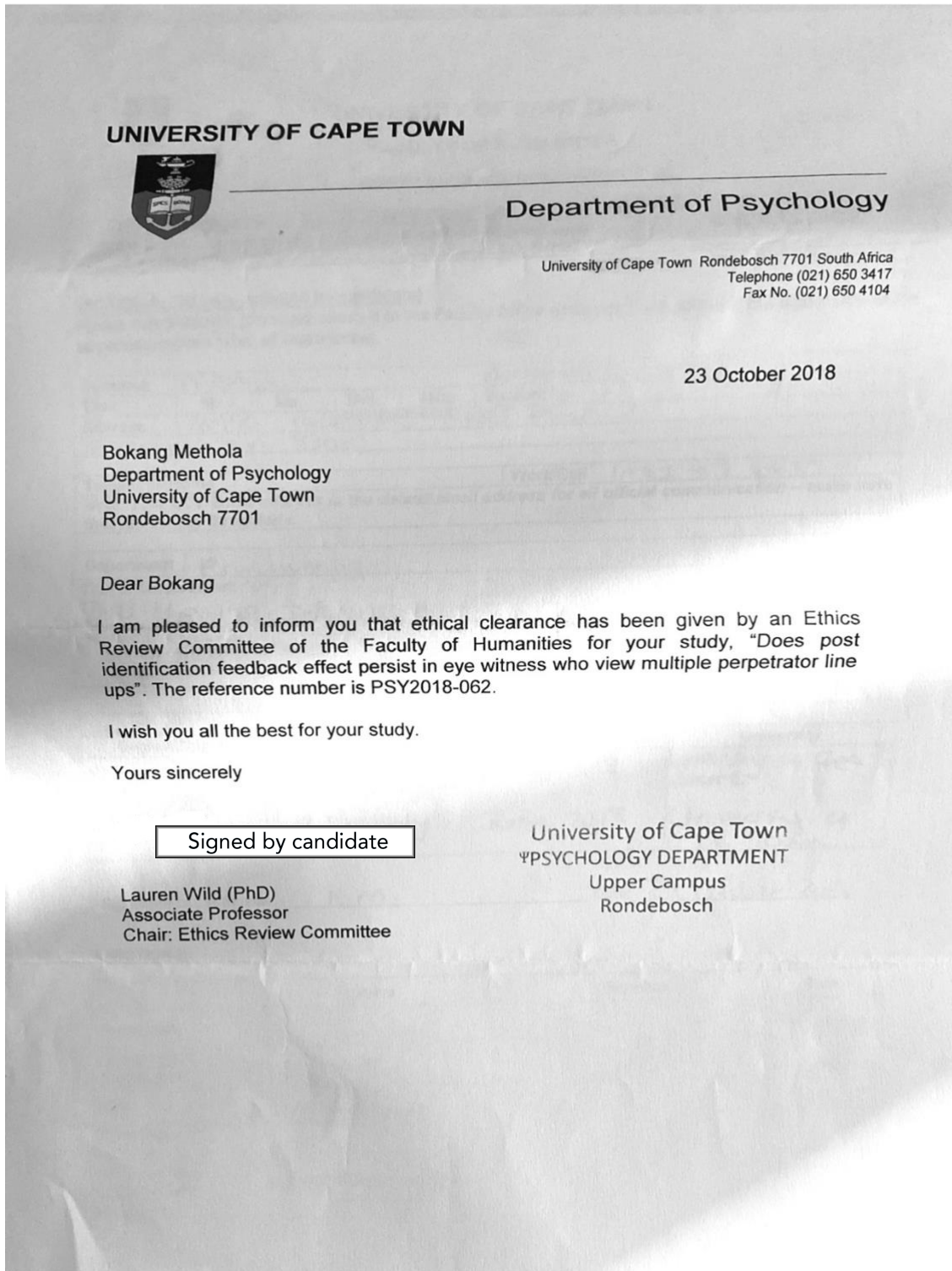
Drawing A: High Fidelity Photographic Setup for Forensic Studio in Room 4.23



Drawing B: Settings for Flash Heads



**Appendix K**  
**Ethical Approval Letter**

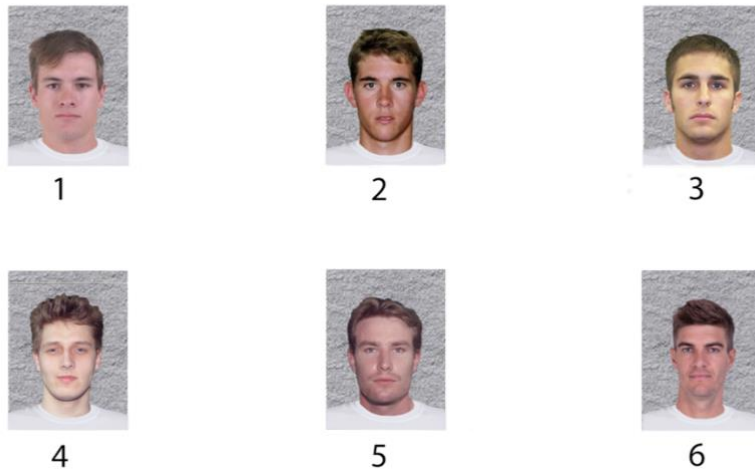


## Appendix L

### Examples of Line-ups

Figure L1

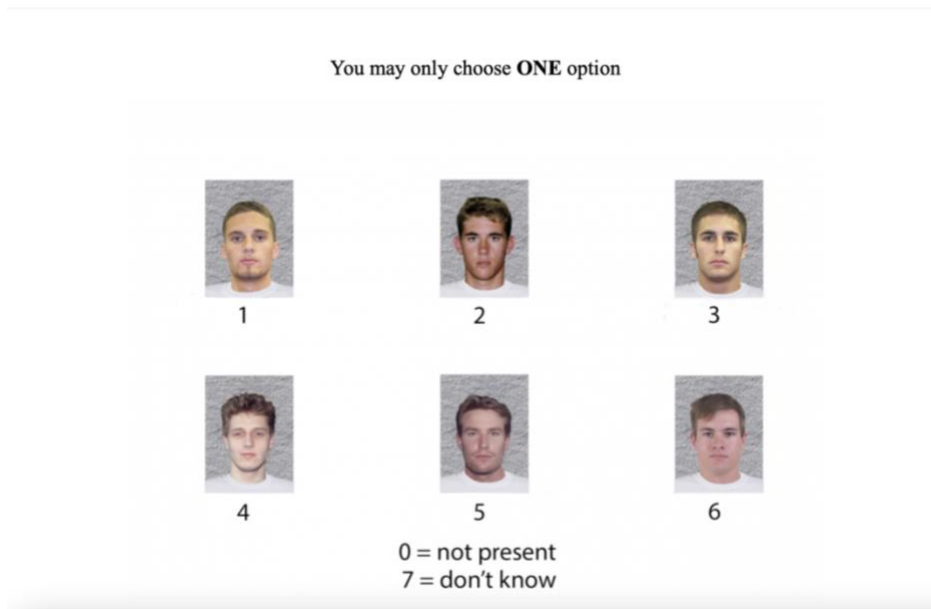
Target Present, Biased Instructions Line-up



*Note.* Perpetrator one appears in position six, whereas in his first line-up, he appears in position one.

Figure L2

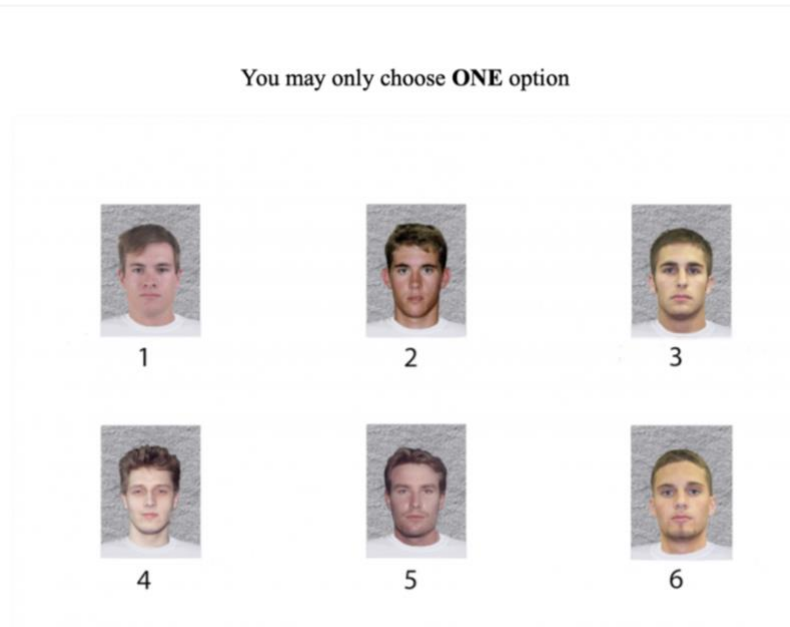
## Target Absent, Unbiased Instructions Line-up



*Note.* The foil appears in position one.

Figure L3

Target Absent, Biased Instructions



*Note.* The foil appears in position six.

## Appendix M

### Role Instructions and Names

Figure M1

#### Role Instructions and Names for Two Perpetrators Condition

Earlier, the police officer asked you to give descriptions of the roles that the perpetrators played in the the video. Below are a list of roles which may or may not have occurred in the crime video. You are now required to make a decision about which role the perpetrator whom you selected, played in the video. If you do not know which role this perpetrator played or you cannot remember, then select the 'I do not know' option.

Stole the backpack
Opened the gate
Stole the box
Jumped the fence
I do not know



Figure M2

#### Role Instructions and Names for Five Perpetrators Condition

Earlier the police officer asked you to give descriptions of the roles that the perpetrators played in the the video. Below are a list of roles which may or may not have occurred in the crime video. You are now required to make a decision about which role the perpetrator whom you selected, played in the video. If you do not know which role this perpetrator played or you cannot remember, then select the 'I do not know' option.

Stole the tyre
Smashed the car window
Stole the backpack
Slashed the tyres
Stole and rode the bicycle
Acted as lookout man
Opened the gate
Stole the box
Jumped the fence
Stole the car battery
I don't know

**Appendix N**  
**Number of Eyewitnesses in Each Condition**

**Table N1: Number of Eyewitnesses in Each Condition**

Number of perpetrators viewed	Feedback or No Feedback	Biased or Unbiased Instructions	Target Present or Target Absent	<i>n</i>
1 Perp	Feedback	Biased Instructions	TAbsent	10
			TPresent	12
			Total	22
		Unbiased Instructions	TAbsent	11
			TPresent	11
			Total	22
	No Feedback	Biased Instructions	TAbsent	21
			TPresent	23
			Total	44
		Unbiased Instructions	TAbsent	10
			TPresent	11
			Total	21
	Total	Biased Instructions	TAbsent	22
			TPresent	21
			Total	43
		Unbiased Instructions	TAbsent	20
			TPresent	23
			Total	43

			Total	43
		Unbiased Instructions	TAbsent	23
			TPresent	21
			Total	44
		Total	TAbsent	43
			TPresent	44
			Total	87
2 perps	Feedback	Biased Instructions	TAbsent	9
			TPresent	13
			Total	22
		Unbiased Instructions	TAbsent	10
			TPresent	7
			Total	17
		Total	TAbsent	19
			TPresent	20
			Total	39
	No Feedback	Biased Instructions	TAbsent	10
			TPresent	9
			Total	19
		Unbiased Instructions	TAbsent	5
			TPresent	7
			Total	12
		Total	TAbsent	15
			TPresent	16
			Total	31
	Total	Biased Instructions	TAbsent	19
			TPresent	22
			Total	41

5 perps	Feedback	Unbiased Instructions	TAbsent	15
			TPresent	14
			Total	29
		Total	TAbsent	34
			TPresent	36
			Total	70
	No Feedback	Biased Instructions	TAbsent	4
			TPresent	5
			Total	9
		Unbiased Instructions	TAbsent	6
			TPresent	2
			Total	8
	Total	Total	TAbsent	10
			TPresent	7
			Total	17
Biased Instructions		TAbsent	9	
		TPresent	8	
		Total	17	
Total	Unbiased Instructions	TAbsent	6	
		TPresent	2	
		Total	8	
	Total	TAbsent	15	
		TPresent	10	
		Total	25	
Total	Biased Instructions	TAbsent	13	
		TPresent	13	
		Total	26	
	Unbiased Instructions	TAbsent	12	

			TPresent	4
			Total	16
		Total	TAbsent	25
			TPresent	17
			Total	42
Total	Feedback	Biased Instructions	TAbsent	23
			TPresent	30
			Total	53
		Unbiased Instructions	TAbsent	27
			TPresent	20
			Total	47
		Total	TAbsent	50
			TPresent	50
			Total	100
	No Feedback	Biased Instructions	TAbsent	29
			TPresent	28
			Total	57
		Unbiased Instructions	TAbsent	23
			TPresent	19
			Total	42
		Total	TAbsent	52
			TPresent	47
			Total	99
	Total	Biased Instructions	TAbsent	52
			TPresent	58
			Total	110
		Unbiased Instructions	TAbsent	50

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	TPresent	39
	Total	89
Total	TAbsent	102
	TPresent	97
	Total	199

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