

The Misinformation Effect in Eyewitness Statement Collection

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Abstract

Very little research exists on the collection of eyewitness statements in South Africa. The aim of this study was to determine if the statement collection procedure could be susceptible to the *misinformation effect*, which could affect the integrity of real eyewitness testimonies in court. Additionally, the affect of statement collection on eyewitness recall and confidence was assessed. Four independent groups received different statement collection procedures after witnessing a crime video. Statements were collected from participants (with the exception of Control group), and after a seven day delay they were either given a refresh of their statement or not. Participants were then tested for recall (free- and cued-recall), and their answers were measured via coding. The participants in the Misinformation group were misled by altering their statements, after statement collection but before refresh, with the aim of recreating possible mistakes made in practice. A trend was discovered that the eyewitnesses might indeed be vulnerable to the *misinformation effect*. Further research would however be needed to confirm the result.

Keywords: Memory, eyewitness, misinformation, confidence

The Misinformation Effect in Eyewitness Statement Collection

The integrity of witness recollection is imperative to the realisation of a reliable legal system. However, the practice of collecting witness statements has come under fire over the past 40 years from psychologist's who have revealed a series of factors that can distort and diminish the accuracy of the testimony presented in court.

Retrieval-induced forgetting (Shaw, Bjork, & Handal, 1995), *verbal overshadowing* (Schooler & Engstler-Schooler, 1990), normative and information social influences (Rodeiger, Meade, & Bergman, 2001), as well as a variety of other factors can play a role in affecting memory (see Wright, Memon, Skagerberg, & Gabbert, 2009). One particular effect that has been of interest to psychologists is the *misinformation effect*.

The *misinformation effect* occurs when an individual is exposed to misleading information after, an event of interest, and reports the misleading information as if it were a fact from the event (Loftus, Miller, & Burns, 1978). That is to say, the individual unconsciously appropriates a memory that is in fact a fiction, and confuses the original event with the misinformation.

Misinformation effect experiments generally share a common format (Loftus, 2005). Initially, eyewitnesses watch and remember an event, like a mugging, digitally or acted out in front of them. Next, the eyewitnesses are presented with a piece of misinformation, such as a similar (but distinct) written account of a mugging. Finally, the eyewitnesses report the details of the event. By comparing their report to the actual event and to the misinformation items, the degree to which misinformation has affected their memory can be measured.

Misinformation Effect: the classic debate

Researchers originally believed the *misinformation effect* not only supplemented eyewitness memory, but also transformed and distorted it (Loftus et al., 1978). In Loftus and Palmers' (1974) seminal work, they argued that a process occurs whereby the misleading post-event information overwrites the original memory permanently. This retroactive interference with the memory is now referred to "destructive updating" (Loftus & Loftus, 1980, p. 409).

An alternative account, the *Strategic Effects Account (SEA)*, explains the failure to recall the original event as eyewitnesses failing to encode the memory in the first place (McCloskey & Zaragoza, 1985a). Misinformation thus does not replace the memory, but rather co-exists with and overshadows the original (Ayers & Reder, 1998).

However, by using a cued recall selection test, which has both the original facts and a similar non-misinformation alternative, those exposed to the misinformation can still recall the original event. This modified test provides evidence that an alternate mechanism, and not retroactive interference, is responsible for the memory loss of the original event (McCloskey & Zaragoza, 1985b).

Contrary to the SEA, and in defence of destructive updating, meta-analysis (Payne, Toglia, & Anastasi, 1994) and then experiments (Schrieber & Sergent, 1998) reveal that even when employing a modified test, memories are retroactively impaired. One can however, incorporate both the *destructive updating account* and the *SEA*, and explain their conflicting evidence within the *source monitoring framework*.

The Source Monitoring Framework

This theory accounts for the *misinformation effect* as a failure of source monitoring (Johnson, Hashtroudi, & Lindsay, 1993). The proposal is that information about the origins of

the memory (the source) are not stored as a specific piece of information, but are instead recreated via a process of evaluation of the characteristics of the memory as understood by the eyewitness. The eyewitness recalls the key characteristics of the event (such as perceptual, affective, and contextual information), the semantic details, and the cognitive operations that were all originally encoded, subject to a series of judgment processes. Errors occur when there is overlap in the features we associate with any given memory, such that we cannot decide to which episodic memory the features belong. In misinformation experiments, the overlap is so extensive that the characteristics of the witnessed event and the misinformation are nearly identical. Repeated attempts to recall the memory only further confuse both memories via simultaneous activation.

When forcing a participant to commit overtly to the misinformation, it increases activation of this misinformation while access to the original information is inhibited, but not destroyed (Eakin, Schreiber, & Sergent-Marshall, 2003). This process provides an explanation for the evidence used in support of the *strategic effects account*. Alternatively, the memory is not encoded at all, so that when recall is tested it appears to have vanished. This perceived disappearance gives the impression that the memory has been destroyed (Loftus, 2005).

The *source monitoring framework* thus undermines the *destructive updating account*, because it recognizes the destructive updating account as an incorrect interpretation of data. Because the *strategic effects account* can explain both effects, the balance of academic opinion has shifted in its favour. Other debates in the field do however exist.

The Ancillary Debate

Some debate has arisen as to whether participants who experience the *misinformation effect* have false beliefs or alternatively false memories (Zaragoza & Lane, 1994). To assess this

distinction between perceived and actual memory, source-monitoring tests are used. Participants are asked to identify the origin of the memory (e.g. event or misinformation phase), as opposed to simply being asked if they recognize something indiscriminately. When applying these tests the frequency of witnesses who are successfully misled reduced (Zaragoza & Lane, 1994), but strong evidence exists that even after eyewitnesses complete source-monitoring tests they will persist in claiming that they remember witnessing suggested (misinformation) details (Johnson et al., 1993; Mitchell, Johnson, & Mather, 2003; Zaragoza & Lane, 1994).

Memory Retrieval: verbalizing and transcribing

The prevailing societal belief is that recording information by writing it down improves later recall of that information (Schooler & Engstler-Schooler, 1990). In practice, this belief can be both right and wrong. Repeated recall does improve later recall of information (Bornstein, Liebel, & Scarberry, 1998).

An illustration of this is the *testing effect* (Carrier, & Pashler, 1992), whereby prior recall of a memory before testing can improve memory retrieval later on, sometimes even better than re-exposure to the original test content (Zaromb, & Roediger, 2010). Occasionally it can even help to recall information that was not previously remembered (Chan, McDermott, & Roediger, 2006). One trade-off however is that the retrieval of some material can inhibit the recall of other untested material later on, an effect referred to as *retrieval-induced forgetting* (Anderson, Bjork, & Bjork, 1994; Chan, 2009). However, while testing does increase the accuracy of eyewitness reports, it can also increase eyewitness suggestibility (Chan, Thomas, & Bulevich, 2009; Thomas, Bulevich, Chan, 2010). Of most concern however, is the findings that illustrate that recall can be even more detrimental to memory by introducing distortions (see Roediger, McDermott, & Goff, 1997).

The reason for this apparent contradiction is that memory retrieval is not a neutral process, but is instead susceptible to the manner in which the recall is performed (Odinot, & Walters, 2006). Within the *source monitoring framework* the consolidation of an accurate memory improves later recall by making the contents of the memory more distinct from other memories. However, if the incorrect information is retrieved because the eyewitness is misled, mistaken, or confabulates, the retrieval process will strengthen competing false memories (Dodson, Johnson, & Schooler, 1997; see Henkel & Carbuto, 2008). If participants are instructed to intentionally fabricate misinformation themselves, or to report misinformation immediately after exposure, it increases the risk of confabulation and *misinformation effects* (Roediger, Jacoby, & McDermott, 1996).

This potential for memory corruption also increases with repeated exposure. By thinking about a false memory repeatedly, we increase cognitive activation of that memory, consolidating the memory and making it seem feel familiar, increasing the risk of misinformation errors (Ceci, Huffman, Smith, & Loftus, 1994).

Loftus and Pickrell (1995) showed the striking effect of this suggestibility by inducing false memories using repeated exposure. Using repeated suggestions, they could convince participants that as a small child they were lost in a shopping mall, when in fact it never happened (see Loftus, Coan, & Pickrell, 1996). The number of repetitions, as opposed the number of sources an eyewitness is exposed to, has been shown to increase the susceptibility of the misinformation effect, and inflate confidence in accuracy (Foster, Huthwaite, Yesberg, Garry, & Loftus, 2012).

Mitchell and Zaragoza (1996) criticised these findings because imbedded, misleading questions are needed to achieve the effect, suggesting that the results are affected by interview

context. This highlights the key issue in *misinformation effect* research: it is very difficult to construct an ecologically accurate study. Most simulations are done in a laboratory, and it is difficult to see how an internally valid study could be conducted without being contrived.

Nevertheless, the issue of retrieval and repeated exposure is pertinent for eyewitness statements in the field, where it has been an issue of contention for decades (see Hale, 1929). Like the retrieval process, if the statement collected contained distorted memories, it will only further entrench false memories, and increase *source-monitoring errors*. If the statement is accurate however, it will consolidate accurate memories. The goal is to refresh the eyewitness, but the impact it has might repeat any of the effects set out above.

It is precisely because of this problem that procedures like the cognitive interview (Memon, Zaragoza, Clifford, & Kidd, 2010), self-administered interviews (Gabbert, Hope, Fisher, & Jamieson, 2012), and the effect of eye-closure (Vredeveltdt, Hitch, & Baddeley, 2011) are investigated, so that the original memory can avoid or resist unwanted distortion.

Taking Witness Statements in South Africa

In South Africa, the standard procedure for providing eyewitness testimony of a crime follows a regular process in the South African Police Services (SAPS) (Warrant Officer R. Uys, personal communication, May 11, 2012):

1. First, the witness observes the incident.
2. Next, the eyewitness reports the incident to a police officer who records what he or she believes is relevant (usually at the scene of the incident, or soon thereafter at the police station), mostly by hand.
3. Once satisfied with the contents of the statement the witness then signs the document under oath and then may be given a copy (*Director of Public Prosecutions*

Kwazulu-Natal v John Mekka, 2003). Eyewitness interest in statements varies, and while some may read over the statement, others will simply sign the oath (which may later play a role in recall). An officer's poor handwriting may additionally contribute to the effort a eyewitness puts into reading over the contents of the statement because the more difficult the task is, the less enthusiastic the eyewitness will be in looking for errors

4. At any stage between statement collection and appearing in court a detective from the South African Police Services might conduct an additional interview, with the intention of collecting more detail, or clarifying ambiguity.
5. The eyewitness then waits until the case goes to trial, at which point he or she is requested/subpoenaed to provide testimony in court. This process may take as long as 5 years, while the statement he or she collected is put in the case file awaiting trial. These statements sometimes go missing, but eyewitnesses are still requested to provide evidence if possible.
6. When the court date arrives, just before the eyewitness takes the stand, the witness is usually given an opportunity to inspect his or her statement, with the hope that it refresh's his or her memory (Sergeant J. Kotze, personal communication, March 1, 2012).
7. The eyewitness then provides testimony in court alone, and without the aid of the statement, which cannot accompany him or her onto the stand.

This process has the capacity to be highly susceptible to the *misinformation effect*.

Statement collection and refreshing the eyewitness are relevant to the retrieval effects set out above. The repeated exposure to the statement or questioning can play a role, and can be compounded by the interviewers whose handwriting or interview style may be detrimental to memory retention. Recall of the crime can therefore be improved, retained, lost, or distorted.

Variables Relevant to the Study

Many studies over the past 40 years have continued to develop and enrich our understanding of the variables that affect the nature and extent of the *misinformation effect* and eyewitness memory in general. These variables can provide an explanation for honest mistakes in testimony presented to a court.

Participant variables. Unsurprisingly, eyewitnesses' general cognitive ability and recall ability play a significant role in their capacity to remember the details of an event (Jaschinski & Wentura, 2002). Recollection is also limited by deficiencies in an individual, like cognitive impairment due to head injuries (Lee, 2004) and age (Templeton & Wilcox, 2000).

Delay. The length of time between the event and the initial recall plays a significant role in the *misinformation effect* (Chan & LaPaglia, 2011). As the period between exposure to the event and final retrieval increases, so does the likelihood that the eyewitness will make misinformation errors, or forget details (Zaragoza & Mitchell, 1996; Odinet, Walters, & Lavender, 2009). General memory decay also amplifies the *misinformation effect* by weakening memory of the subtle distinctions between event and misinformation (see Lindsay, 1990).

The gravity of the prolonged time delays experienced between offence and trial is most obvious when delays as short as 1-week can yield a *misinformation effect* (Loftus & Palmer, 1974). Longer delays reduce retrieval of both correct and the incorrect detail compared to previous retrievals. Trial delays occur worldwide and may be caused by a wide variety of factors (e.g., state resources), but are experienced acutely in South Africa, where limited resources has resulted in a considerable backlog of cases awaiting trial, sometimes even years (Ballard, 2011).

Interviewer effects. The perception of trust and credibility, interviewer accent, as well as the power dynamics between participant and interviewer can have an impact on the

misinformation effect, either increasing or decreasing the risk of susceptibility (Vornik, Sharman, & Garry, 2010; Zhu, Chen, Loftus, Lin, & Dong, 2009).

These findings have special implications regarding police officers. As states, police officers mostly write down statements by hand while he or she recounts evidence. This is a time-consuming process, and witnesses may be more likely to agree with a statement because they trust the competency of the officer sufficiently to forgo the effort of deciphering what the officer wrote down. A witness to a crime may also sometimes feel intimidated by uniformed officers and so be unwilling to correct them when during the statement collection process (Warrant Officer R. Uys, personal communication, May 11, 2012). Witnesses report that they often felt pressured to suit the interviewing officers' expectations of what they were expected to know. Witnesses were particularly suggestible to leading questions and supplying answers that received affirmation from interviewers (For a full summary of international trends see Compo, Gregory, & Fisher, 2012).

Police officers themselves make errors when recording the witness statements, due to a lack of training, experience, or general disinterest (Warrant Officer R. Uys, personal communication, May 11, 2012). In field studies, it is reported that police officers make fabrications, ignore or miss relevant detail, are prone to using suggestive and leading questions, and occasionally write down the opposite of what witnesses say (McLean, 1995; Baldwin, 1992; Compo, Gregory, & Fisher, 2012). Police officers also record hesitant guesses as facts in the statement, misrepresenting the information they received.

Confidence. One key variable in the process of court testimony is eyewitness confidence. Judges and juries are more inclined to believe confident witnesses than those who are not (Cramer, Brodsky, & DeCoster, 2009; Slovenko, 1999). This makes memory retrieval and

repeated memory retrieval dangerous because it can lead to eyewitness overconfidence (Granhag, Strömwall, & Allwood, 2000). However conflicting results have also been found that indicate that repeated retrieval reduces confidence, especially when combined with delays beyond a week (Odinot, & Wolters, 2006; Odinot, Walters, & Lavender, 2009). The fear however is that the process of eyewitness statement collection may inflate confidence and mislead judges.

Ancillary variables. Adjusting exposure time to the misinformation items (Tousignant, Hall, & Loftus, 1986), diverting an eyewitness' attention, or even shortening decision-making time (Zaragoza & Lane, 1998), will disrupt the complete encoding of the information, thereby increasing the *misinformation effect*. Eyewitness interaction effects also exist, which can confound results. For this reason, participants must be run through the experiment one at a time (see Gabbert, Memon, & Allan, 2003). One last aspect to keep in mind is that certain types of memories (e.g. order of events vs. surroundings to crime) may be retained at different levels, and follow a pattern where the actions that occur are recalled more accurately than other aspects of a crime (Migueles, & García-Bajos, 1999).

Summary and Conclusion

The process of collecting eyewitness statements has the potential to either improve or distort the memory of the witness via the process of retrieval. What determines the influence of the process on memory is a complex variety of factors. Most prominently of these factors are those relating to the witness, e.g. an inattentive witness; and due to factors relating to the interviewer, e.g. inexperienced. However, a variety of other factors, including the number of retrievals, and the method of interview and retrieval, also play a fundamental role in either maintaining or distorting memory. If distortions are made in the statement collection process,

they may later lead to a *misinformation effect*. The risk of these errors occurring increases as the memory of the crime deteriorates over time, prompting greater reliance on the statement. The procedure employed by the SAPS to collect and then refresh witnesses might be providing a dangerous climate for these memory errors, and have dire consequences for innocent individuals are convicted based on the false information supplied by misled eyewitnesses. The implication that witnesses may feel overconfident as a result of statement collection only makes the problem of eyewitness reliability even more difficult, since it becomes harder to assess truthful testimony.

Rationale and Specific Aims

Studying the effects of collecting witness statements in South Africa will shed light on the procedures and rules that affect the integrity of evidence presented to court. Because the entire topic is so broad, with many avenues of research still unexplored, a research program would be required to gain a full assessment of the strengths and weaknesses of current practice. The aim of this study is to begin by assessing to what extent the statement collection procedure employed by the South African Police Services affects the memory retention of crimes, and to assess whether it is susceptible to *misinformation effects*. There has been no research on the procedures involved in eyewitness statement collection in South Africa before. The hypotheses of this research are:

1. The process of statement collection will significantly improve the quantity of retrieved memories.
2. Participants in the Misinformation group will be more prone to the *misinformation effect* than the other groups.
3. The confidence of participants who make a statement will be higher than those who do not.

Methods

Participants

Table 1

Participant details.

Group	Control (n = 12)	Statement Only (n = 12)	Refresh (n = 12)	Misinformation (n = 12)
Mean age (years)	21.08	21.75	20.1	23.4
Black	6	5	4	5
White	6	6	6	6
Coloured	0	0	1	0
Asian	0	1	0	0
Indian	0	0	1	1
Female/ male	6/6	6/6	8/4	9/3

All races and genders were included into the study, but participants were split into the categories of “White” or “Other” as a precautionary step to ensure no racial interaction effects occurred. Participants were recruited as either part of their requirements for completing courses in Psychology (SRPP-Student Research Participation Program); or using an incentive, with each participant being entitled to an entry into a R1000 draw. Participants were all English-speaking student adults, and all races and genders were included in the study.

Participant data was excluded from the study if the participant had had completed a similar study were or if they knew about the nature of the study. This information was obtained via the selection criteria, and confirmed before each experimental phase.

Design and Setting

The study used four groups and employed a between-groups experimental design, with participants randomly assigned to each group. There was one Control group, and three experimental groups: the Statement Only group, the Refresh group, and the Misinformation group (Table 2). Data was collected from participants on the university campus (University of Cape Town). The experiment procedure ran over two months, and each individual participant's experiment took seven days to complete.

Table 2

Summary of procedures for respective groups.

Group	Watch a video	Make a statement	One week delay	Refresh memory	Recall test	Confidence Likert
Control	✓		✓		✓	✓
Statement Only	✓	✓	✓		✓	✓
Refresh	✓	✓	✓	✓	✓	✓
Misinformation	✓	✓	✓	✓ ^a	✓	✓

Note. ^afalse information is placed in the statements of participants in this group

Materials and Procedure

The stimulus material consisted of a 1-minute long video clip previously recorded for eyewitness research, which was displayed on a 17-inch monitor with headphones. It depicted a

male victim being approached by a male assailant who took the victims mobile phone at knifepoint, using only the threat of violence. Three versions of the same video were used, where all aspects remained constant except the victim and the suspect were replaced with different actors. All suspects and victims used in the study were white as a precautionary control for racial interaction effects. The venue used was a small distraction free room that replicated a police interrogation cell. The same interviewer was used for all experiments to ensure consistency, namely a white male student. Four trial interviews were completed before data was collected, to prevent any practice effects for the competency of the interviewer. Each of the groups received a different procedure as indicated in the table.

Stage one.

Viewing the crime. Each participant in each of the groups watched only one of the three videos, and was only permitted to watch it once. All participants were unaware of the contents of the video, and were simply asked to watch the video, with no other instruction, to mimic the unprepared nature of witnessing a crime. Once they had completed watching the video, all groups completed a simple 3-minute distracter task, in which they were asked to work out the date of the follow-up session and filled out personal information forms created using police forms as the basis. Once this was completed, the Control group participants were told to return the following week to report what they had seen in the video. They were informed they would be tested on the contents as if they were appearing in court, and were asked to remember the details until then. They were explicitly told not to write down or record what they remembered, or discuss the contents with anyone else, especially not with anyone who took part in the study, to avoid contamination. The remaining three groups proceeded to the second half of the first stage.

Making a statement. The remaining three groups (Statement Only, Refresh, and Misinformation), were asked a series of specific questions to compile a statement (see Appendix A). Answers to these questions were typed on a laptop. Participants were also shown that the copy of the statement sheet in front of them, which contained their details, was the same document being filled out on the laptop. Participants were told that the reason for typing the statement was that it was faster and neater than handwritten statements. This information was given to facilitate the *misinformation effect* via plausibility of procedure, but was done for all groups to maintain consistency.

Whilst the statement was being typed, participants could not see it, thereby mimicking the inability of a witness to see the contents of the statement, as occurs in practice. As each participant answered the questions, the interviewer typed up their answers. If answers were vague, participants were asked to provide more detail using open-ended questions, to prevent suggestion (e.g. if no weapon was mentioned, no detail of a weapon was requested. If a knife was mentioned, they were asked to describe it in as full a detail as possible). As per required police procedure, once they had completed their statements, participants were given an opportunity to look at their statement and determine whether they were satisfied with the contents, or wished to make any alterations or additions to the statement. The goal was to maintain as much ecological validity as possible. If participants were satisfied with the statement, they were requested to read over the recognized non-theistic evidentiary oath in South Africa, and sign the oath in agreement (see Appendix B).

Once this was completed, they received the same completion instruction that the Control group received, namely that they would be tested the following week based on the contents of the video, and requested not to write down what they remembered or discuss their memory with

anyone else. In addition to this, the Refresh group and the Misinformation group were told that their statement would be printed out and supplied to them before they were questioned. They were told that a copy could not be printed immediately because the printers in the building were out of service. This deception was employed to facilitate the *misinformation effect*, by making the procedure plausible, and was applied to both groups to maintain consistency and avoid unintended inter-group differences.

Interim preparation stage. Between stage one and stage two in the experiment the statements made by the participants in the Misinformation group were changed. In each statement, two misinformation items were added to the original statement (e.g. the addition of “he held the knife against the victims neck”), and two items in the statement were changed (e.g. the handedness of the assailant was changed from right to left). A ranked list of misinformation options was used (see Appendix C). Thus, if an option to change a description (e.g. the knife handle) was not available because the eyewitness failed to report a knife in their statement, a specified second, third, fourth, or fifth option was available. The ranking was done to maintain as much consistency between participants as possible. Two methods of inserting misinformation into the statement were used for convenience and to reduce the variety of items included, in an attempt to maintain as much consistency between participants as possible.

Stage two.

Refresh. After a one-week delay, each participant returned to the same venue for his or her follow-up sessions. Participants were tested one at a time, with five-minute time gaps between participants to avoid inadvertent communication between participants, and thus avoid contamination of data. Only the Refresh group and the Misinformation group took part in the refresh stage. Each participant was handed a printed copy of his or her completed statement,

which was stapled to the oath and details sheet he or she had completed the week before. This was done to mimic an actual witness statement. The participant was then were told to read over his or her statement to refresh their memory until satisfied that he or she could recall the event and answer a series of questions based on the witnessed event. The participant could read over the statement as many times, and at whatever speed he or she wished. When the participant was satisfied, the statement was taken away from him or her (as per regular court practice) and the testing phase began.

Recall test. All four groups completed the same verbal test (Appendix D). The experimenter conducted the second phase in a suit jacket or collared shirt to create a sense of decorum and formality. The test comprised of a maximum of eleven questions, which comprised of nine standard questions, and two questions that were only asked if the participant mentioned a weapon at some point during the test. The first question was a free-recall question, and the remaining ten were open-ended cued-recall questions. The interview was recorded via a digital recorder.

Once participants completed the test they were asked to rate their overall confidence of the accuracy of their statements on a 10-point interval scale, where 1 denoted “not confident at all” and 10 denoted “completely confident” (Appendix D).

After participants completed the confidence question they were debriefed on the study, special attention was made to debrief those who had been misled in the Misinformation group. All groups were given an opportunity to watch the video again if they wished, were given an opportunity to ask questions, and then were thanked for their participation.

Ethical Considerations

Ethical approval was granted for all procedures employed in this study by the Ethics Committee of the UCT Department of Psychology. This study upheld the ethical research guidelines for human subjects as outlined by the Health Professions Council of South Africa (HPCSA) and the University of Cape Town (UCT) Codes for Research.

Consent and confidentiality. Informed consent was obtained from each participant before they took part in the study. The contents of the consent form were explained to each of the participants so that they were aware of their rights and obligations. The name and nature of the study were distorted to facilitate the *misinformation effect* and prevent preparation (Appendix E). They were requested to provide a mobile phone number and/or email address for the purposes of contact. They were informed that the information was only available to the experimenter for the express purpose of the study, and would be destroyed when the study is completed. Confidentiality for their responses was assured for all their responses and data.

Voluntary participation. Participants were informed that their participation was voluntary, and that they could withdraw at any point for any reason they saw fit. They were however informed that the SRPP points, or entry into the raffle, were contingent on their completion of the study, but that should they leave an alternative study would be recommended for them.

Risks and deceptions. The videos used in the study contained no harmful risks, with the exception of mild profanity, and non-physical violence (threats only). Due to the nature of the misinformation test, some participants were intentionally deceived. When the true nature of the study was revealed it may have resulted in mild embarrassment for the participant, but this was ameliorated during the debriefing. If a participant felt traumatised by the contents of the video, a

psychologist from the UCT Student Wellness Offices would have been sought to provide assistance, but no participant required this service.

The research design employed mild deception that was necessary for the integrity of the study. Participants were deceived regarding their need to remember the contents of the video before they watched the video, the authorship of the statement that was handed to them (Misinformation group only), and were deceived regarding the exact nature of the study when they signed the consent form.

Benefits. Participants either received two SRPP points for completing the study, or alternatively were given an entry into a raffle to win R1000 rand. They also gained some experience and insight into making a witness statement (all groups except Control group), and those participants who were interested were given some advice on how best to complete eyewitness statements in the future if ever needed.

Debriefing. Once the study was completed, participants were given full disclosure regarding the purpose of the study and were given an opportunity to enquire, reflect, and discuss the study, and were told where they will be able to access the results of the study when it is completed.

Statistical Analysis

Coding. Once the data was collected, it was transcribed and then analysed. Entire statements were broken down into information parcels, and then coded individually (Appendix F). They were coded for accuracy (correct, incorrect, subjective, or repeated), the substance of the information parcel (person, action, object, or surroundings), and for type of recall (free-recall or cued recall). The codes from these three criteria would thus generate a particular 3-digit code, which represented a combination of these three factors (e.g. correctly identified object using free

recall would be “1.3.1”). These unique codes were then counted to give the total number of each type of information parcel.

The misinformation items were coded and counted separately. There were three available codes (misled, not misled, and other mistake). The third category (other mistake) was also included in the misinformation coding for information parcels which were neither misinformation items, nor accurate items (e.g. if the knife handle was accurately described as steel, and the misinformation item was a wooden handle, but the participant recalled a plastic handle). A memorandum of all unique correct parcels was compiled for each of the three videos, to maintain consistency and for use in inter-rater reliability testing (Appendix G). And finally, confidence and errors in procedure were also recorded.

Eleven interviews (23% of the sample) were randomly selected, and scored by a second encoder. Inter-rater reliability was high, ($r = .925$, $p < .01$).

Results.

Table 3

Means(μ) of results across groups

	Control (n = 12)	Statement Only (n = 12)	Refresh (n = 12)	Misinformation (n = 12)
Number of information parcels (in total)	42.42	40.75	41.33	35.33
free recall: total correct	15.67	19.83	22.25	23.75
free recall: total incorrect	2.92	2.33	2.58	1.83
cued recall: total correct	9.42	10.08	8.75	9.67
cued recall: total incorrect	0	7.42	6.58	0
Misinformation items:				
Total misled	.17	.33	.5	1
Total not misled	1.58	1.25	1.92	1.33
Total "other error"	.67	.58	.33	.42

*Note. * $p < .05$*

Total detail recall. To test the total quantity of correct and incorrect information parcels that were retrieved by participants, across the four groups, a one-way ANOVA was run on both variables. All the correct cued-recall item scores were compiled and added to the free-recall item scores for the sake of ease of analysis and simplicity. The same was done for incorrect answers, so that two overall statistics were created, namely, the overall correct average, and the overall incorrect average. Exploratory descriptive analysis indicated that the data for both the total

number of incorrect and correct retrievals was normally distributed. Levene's test for homogeneity of variance was not statistically significant for either the incorrect retrievals $F(3, 44) = 2.53, p = .07$; or for correct retrievals $F(3, 44) = .37, p = .78$. The ANOVA test result was not significant for the total number of incorrect retrievals $F(3, 44) = .53, p = .78$, but was marginally significant for correct retrievals $F(3, 44) = 2.69, p = .058$. A *post-hoc* Tukey's HSD was done, which revealed that the Misinformation group ($M = 33.42$) recalled more correct parcels of information than the Control group ($M = 25.08; p = .04$), an average difference of 8.33.

Misinformation effect. Exploratory descriptive analysis was done across all four groups (independent variable is procedure which is determined by group) for the number of times participants were successfully misled in each group (dependant variable). The analysis indicated that the data had a positive skewing, and had heterogeneous variances, making the results from a parametric test unreliable. Therefore a nonparametric test, namely a between-groups Kruskal-Wallis exact test, was conducted to test for significant differences between the four groups ($n = 12$ for each group).

The hypothesis was that as the mean number of retrievals will be greatest in the Misinformation group, which had misinformation items implanted by design. The Refresh group and Statement Only group would have the next two highest means because of self-induced misinformation, and the lowest mean would be in the Control group, by experimental design. This order was based on the justification that after the Misinformation group, the highest number of correctly misled items would be determined by the likelihood of maintaining memory of self-induced misinformation items. The reasoning was that because the misinformation items chosen for the study were common, it was possible that participants would self-induce misinformation

these items by mistake. Once these were recorded however, participants would be more likely to recall them the more times they retrieved them (so the Statement only group would have less correctly misled item, on average, than the Refresh group where false memories will be further entrenched). Those in the Control group would score lowest on average because they will recall the least information, but will have made the least self-induced misinformation mistakes.

When analysed however, no significant difference was found between the groups for the number of successfully misled items $H(3) = 6.37, p = .092$. A Jonckheere-Terpstra test did however indicate a significant positive trend between the groups stated, from the Control group to the Misinformation group (in the order Control group, Statement Only group, Refresh group, Misinformation group), with a medium effect size. Therefore the number of successfully misled items for participants increased across groups, $J = 550, z = 2.54, r = .366, p < .05$.

Confidence. Exploratory descriptive analysis was done for the recorded confidence across the 4 groups. The analysis indicated that the data had a slight positive skewing, and had heterogeneous variances. A between-groups Kruskal-Wallis exact test was therefore conducted to test for significant differences between the four groups ($n = 12$ for each group). The four groups were ranked in the order of the total number of information parcels (correct and incorrect combined, excluding repetitions and opinions), because presumably the more a participant believes they can remember, the more confident they feel about what they have said. Namely, starting with the highest, the Misinformation group ($\mu = 42.42$), then the Refresh group ($\mu = 41.33$), then the Statement Only group ($\mu = 40.75$), and finally Control group ($\mu = 35.33$). No significant difference was found between the groups $H(3) = 6.37, p = .092$. However, a Jonckheere-Terpstra test indicated a significant trend between the groups, in the order stated $J = 487, z = 1.05, r = .37, p = .15$

Discussion

Despite rigorous testing, and a well constructed design, none of the hypotheses were proven. Several trends were however discovered which provide useful direction for future studies in the field of eyewitness research, especially in the context of the *misinformation effect*.

The Misinformation Effect

A moderate trend was identified based on the data that was collected and analyzed. The results for the number of misinformation items that participants were induced to believe, were not significant, but the trend analysis does indicate that a pattern may exist across the four groups. This pattern follows the same direction that was expected by the hypothesis, namely that eyewitnesses are more susceptible to the *misinformation effect* in the Misinformation group, and least susceptible in the Control group. The trend regarding the Statement Only group and Refresh group was also correct. Further research will however need to be done to show that the difference between those in the Misinformation group and the other groups is significant. The lack of significance may be due one or more limitations in the study.

Firstly, the process of retrieving the memories regarding the crime followed by making a statement may have inoculated the participants in the Misinformation group from the effect (Memon, Zaragoza, Clifford, & Kidd, 2010). In an attempt to control for the measurement of misinformation items, suggestive and leading questions were not used in the interview process. For this reason the interview was not entirely reflective of the interview style used in the field, where these types of errors are more innocuous and facilitated more actively by the interviewer.

A solution to this problem would be to include another group in the study, which makes a statement, but does not get an opportunity to read over the statement once it is complete. This Impoverished Statement Only group would receive less rehearsal than the original robust

Statement only group, and so provide a clearer pattern for inoculation from the effect via the process of statement collection. This study would however need to control for the manner and accuracy of the interviewer as he creates the statement, since the witness cannot read over the statement to confirm the contents.

An alternative solution would be to change the manner in which misinformation items are inserted into the statement. Namely instead of including them after the statement is complete, to insert them during the statement collection process. In this way, the process will more accurately mimic real practice, and those inserted items which are not identified by the witness when they read over the statement, will gain greater familiarity later during the recall stage (Ecker, Lewandowsky, Swire, Chang, 2011).

The choice of items used to mislead participants may also have been susceptible to an unintended confounding variable. The types of misleading information selected for the study may occur naturally in the interview process, and so the *misinformation effect* may be more widespread and unavoidable than anticipated, even in the Control group. Because data had to be compiled based on the test used, the items selected for the misinformation group may have been inappropriately strong or weak, depending on the item. To test for this, an experiment would need to use misinformation items that are unusual and common and determine their level of success. A study on the types of misinformation that participants are prone to make in the statement collection process (with or without the leading or suggestive influence of the interviewer), and the frequency in which they make them, would most likely need to be completed first so that the appropriate items are selected.

This research would provide a baseline for the number and types of errors produced, and so make designing experiments like the current one, more accurate. Researching misinformation

items which occur naturally will additionally open avenues for research into ranking the types of misinformation that are most forensically relevant, and would help produce a list of the most dangerous types of misinformation errors that can be made.

One other option to increase the effect would have been to increase delay. Either the delay between viewing the video and making the statement could be increased, or the delay between statement and recall could be increased. Both of these increases have been shown to increase risk of susceptibility to the misinformation effect (Odinot, Walters, & Lavender, 2009). This would also be more ecologically valid, but retaining a large number of people with low drop-out rates would be more difficult, and might require greater incentives for completing the study.

Finally, if the sample size was extended, it might reveal more of the data, and distribute the data normally, reducing the reliance on nonparametric testing. Despite the relatively small sample size, the trend analysis is indicative that a significant effect may exist, and deserves further research.

Total Recall

The results for the total number of correct retrievals provided some evidence of a pattern, but the evidence was not as clear as was expected, and the pattern of incorrect retrievals was even less indeterminate. The mean number of correctly retrieved items in the Misinformation group and Refresh group was expected to be greater than the number in the Statement Only group. The Statement Only group would then in turn do better than the Control group, in which participants did not have the benefit of making a statement or received a refresh event. The results only showed one significant relationship, namely that those in the Misinformation group scored an average of 8.33 more correct items than the Control group.

However, it would be expected that if the Misinformation group scored better than Control group that the Refresh group would similarly do as well due to the minor difference between their procedures> It was similarly expected that the Statement Only group would fall between the Refresh group and the Control group. The while the data was inconclusive, it does not necessarily mean that the pattern does not exist, and that it might still reveal itself. To extend the size of the sample to obtain a significant result ($\alpha = .05$) with a medium effect size ($f = .25$), and sufficient power ($\beta = .8$), a sample of approximately 180 participants would be needed ($n = 45$ participants per group). Given the size of the current sample, this marginally significant effect may justify further research.

One explanation for the lack of significance is that the number of items a person can retain over one week, with the benefit of a statement and/or a refresh, is not significantly different to what can be retrieved without a statement and/or refresh. Thus, memory did not degrade sufficiently over the span of one week to spread variance of the data. To solve this problem, future studies should extend the delay between viewing the event and retrieval; or the video should be extended to include more detail (making retrieval of more items more difficult); or use a combination of these two options.

Alternatively, the coding could be made stricter, so that accepted answer must satisfy certain *grain sizes* (Weber, & Brewer, 2008). *Grain size* refers not just to accuracy of memory parcel retrieved, but additionally the level of detail, e.g. the difference between “a brown jacket” and “a russet brown suede jacket with bronze buttons.” By increasing the threshold of correct answers, and compelling witnesses to disclose more richly described details, a clearer distinction could be revealed by the data, that values not just quantity but quality of detail. These

descriptions may also promote confabulations, which may lend itself to a study measuring self-generated misinformation items (Pickel, 2004).

Confidence

The confidence score was not significant, this was in opposition to research that had found trends of either increasing or decreasing confidence for repeated recall (for broad summary see Odinet, Walters, & Lavender, 2009). The response mean seems to indicate a central tendency response bias, which indicates that a different approach to measuring confidence should be pursued. However, the recurrent theme in the literature has been to use a far more complex process, that analyzes confidence for each parcel of information, or each answer to a question, as opposed to an overall score. The simplification of the process may have resulted in an effect where participants all average their scores out towards the mean.

Conclusion and Summary

Overall, the research was useful in identifying the problems with this type of research, and suggesting that that further research on these same hypothesis should be continued. The trends identified were those expected, and their significance levels support the notion that more research should be completed. These results highlight the need for more research on the problem of eyewitness testimony, in special relation to the process of statement collection. With more significant results there would be better grounds for re-assessing the procedures currently employed by the SAPS, which place more emphasis using psychological research in practice. The implication would be that the quality of eyewitnesses in South Africa would be improved, so that the legal system can be more robust and prepared for the possible influence of the *misinformation effect*.

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