UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

The effect of cognitive schema on eyewitness memory

by

Wayne Viljoen

A dissertation submitted in partial fulfilment of the

requirements for the degree

M.A. Research Psychology

In the Department of Psychology at the

UNIVERSITY OF PRETORIA

FACULTY OF HUMANITIES

SUPERVISOR: Professor Patrick Chiroro

January 2010

Abstract

This study investigated the effect of cognitive schema, gender and type of information recalled on participants' memory of a video-recorded staged hijacking event. The results showed that, overall, participants who were exposed to the 'schema-inconsistent' video recalled significantly more accurate information than participants who were exposed to schema-consistent information (F (1, 58) = 14.671, P < 0.001). Gender did not significantly affect overall memory performance (F (1, 58) = 0.460, p > 0.05) nor did gender alone interact significantly with any other variable investigated in the study. However, there were significant main effects of the four types of information recalled; namely, hijacker details, victim details, time estimations, scene description and event sequencing.

First, with respect to recall of hijacker details, participants were most accurate in their recall of the physical description of the hijacker(s), followed by the verbalisation(s) of the hijacker(s). Least accurate were participants' recall of the behaviour of the hijacker(s) (F (2, 58) = 16.394, p < 0.001). Second, with respect to victim details participants were most accurate in recalling the physical description of the victim(s) followed by the behaviour of the victim(s) and then lastly, the verbalisations of the victim(s) (F (2, 58) = 73.271, p < 0.001). Third, participants were significantly more accurate in their estimations of the time of day than they were in their estimation of event duration, which was consistently overestimated (F (1, 58) = 116.769, p < 0.001). In terms scene description and event sequencing, participants were significantly better at describing the scene than describing the sequence of events (F (1, 58) = 7.21, p < 0.01).

With regards to interactions, condition interacted significantly with the recall of hijacker details (F (2, 58) = 5.713, p < 0.005). Recall of the schema-inconsistent group was better than that of the schema-consistent group on verbalisation(s) of the hijacker(s) and physical description of the hijacker(s) but the same for the behaviour of the hijacker(s). Also, a significant condition X description of scene X event sequencing interaction was found (F (1, 58) = 10.771, p < 0.0021). The schema-inconsistent group performed better than the schema-consistent group in terms of describing the scene but the two groups did not differ significantly in their recall of the sequence the event.

The theoretical and practical implications of the findings from the study are presented and discussed. Also, recommendations for future research are made.

Acknowledgments

I would firstly like to thank my supervisor, Professor Patrick Chiroro, who was a great inspiration for me during my tuition. Thank you for your expert insight and involvement during the conceptualisation, fieldwork, data analysis and interpretation phases of this project.

I would also like to express my gratitude to the following individuals:

- *My parents Hennie and Colleen Viljoen and my brother Christopher: for your unconditional support, motivation and patience. You have instilled in me the desire to "contribute my verse to the world".*
- *My wife, Nadine Viljoen: for supporting me every step of the way and sharing the excitement regarding the outcome of the project with me.*
- *Michelle Harvey, my aunt: for your assistance in the recovery and replacement of valuable documentation that was lost due to theft.*
- *The Smit Family: for the use of your farm and resources for the filming duties related to this project.*
- *Glen Blackadder: for your careful and precise assistance with the language and grammar editing of the text.*
- *The late Dr. Daan van Vuuren: for your thoughtfulness and consideration throughout the progress of this project.*

This dissertation is especially dedicated to my late grandmother Joan Harvey who departed before this journey concluded.

Table of contents

Chapter 1 6
Introduction 6
1.1 Introduction 6
1.2. Aim and objectives of the study 9
1.3 Structure of the dissertation 11

Chapter 2 13
Literature review 13
2.1 Introduction 13
2.2 Cognitive schemas and memory 14
2.3 The effect of cognitive schemas (condition) on eyewitness memory 16
2.4 The effect of gender and age on eyewitness memory 25
2.5 Type of information 31
2.6 Other related studies 32
2.7) Conclusion 38

Chapter 3 39
Research methodology 39
3.1 Introduction 39
3.2 Schema Identifying Questionnaire (SIQ) 39
3.2.1 Nature and procedure of the SIQ 39
3.2.2 Analysis of the SIQ data 42
Table 3.1: Breakdown of the SIQ sample 43
Table 3.2: Sequence of events 46
3.3 Research design 47
Table 3.3: Research design (N=60) 48
3.4 Hypotheses and variables 48
Hypothesis 1: Main effect of schema (condition) 49
Hypothesis 2: Main effect of gender 49
Hypothesis 3: Main effect of type of information (TI) – 1 50
Hypothesis 4: Main effect of type of information (TI) – 2 50
Hypothesis 5: Interactions between independent variables 51
3.5 Participants 51
3.6 Stimuli and apparatus 52
Figure 3.1: Screen shots of the schema-consistent video 54
Figure 3.2: Screen shots of the schema-inconsistent video 55
3.7 Procedure 57
3.8) Ethical considerations 59

Chapter 4 61
Results 61
4.1. Data analysis 61
4.2 Overall memory performance 62
4.2.1 Main effect of condition on overall performance 62
Table 4.1: Descriptive statistics for 'condition' 63
4.2.2 Main effect of gender on overall performance 63
Table 4.2: Descriptive statistics for 'gender' 63
4.2.3 The overall condition and gender Interaction 64
Table 4.3: 'Schema' and 'gender' interaction 64
4.3 Memory for different types of information 64
4.3.1 Memory of hijacker details 65
4.3.1.1 Main effect of hijacker details 65
Table 4.4: Descriptive statistics: hijacker details 66
4.3.1.2 The relationship between condition and the recall of hijacker details 66
Figure 4.1: 'Condition' and 'hijacker details' interaction 67
4.3.1.3 The relationship between gender and the recall of hijacker details 68
Table 4.5: 'Gender' and 'hijacker details' interaction 68
4.3.1.4 The relationship between condition, gender and the recall of hijacker details 68
Figure 4.2: 'Condition', 'gender' and 'hijacker details' interaction 69
4.3.2 Memory of victim details 70
4.3.2.1 Main effect of victim details 70
Table 4.6: Descriptive statistics: victim details 70
4.3.2.2 The relationship between condition and the recall of victim details 71
Table 4.7: 'Condition' and 'victim details' interaction 71
4.3.2.3 The relationship between gender and the recall of victim details 71
Table 4.8: 'Gender' and 'victim details' interaction 72
4.3.2.4 The relationship between condition, gender and the recall of victim details 72
4.3.3 Memory of time 73
4.3.3.1 Main effect of time 73
Table 4.9: Descriptive statistics: time 73
4.3.3.2 The relationship between condition and time estimations 73
Table 4.10: 'Condition' and 'time' interaction 74
4.3.3.3 The relationship between gender and time estimations 74
Table 4.11: 'Gender' and 'time' interaction 75
4.3.3.4 The relationship between condition, gender and time estimations 75
4.3.4 Memory of the description of the scene and sequence of events 75
4.3.4.1 Main effect of the description of the scene and sequence of events 75
Table 4.12: Descriptive statistics: description of the scene and sequence of events 76
4.3.4.2 The relationship between condition and the description of the scene and sequence of events 76
Figure 4.3: 'Condition' and the 'description of the scene and sequence of events' interaction 77
4.3.4.3 The relationship between gender and the description of the scene and sequence of events 77
Table 4.13: 'Gender' and the 'description of the scene and sequence of events' interaction 78
4.3.4.4 The relationship between condition, gender and the description of the scene and sequence of events 78

Chapter 5 79
Discussion, conclusion, recommendations and limitations of the study 79
5.1 Discussion 79
5.2 Conclusion and recommendations for future research 86
5.3 Limitations of the present study 90

References 92

Appendix A: Schema Identifying Questionnaire (SIQ) 98
Appendix B: SIQ tables and results 107
Appendix C: Schema-consistent questionnaire 116
Appendix D: Schema-inconsistent questionnaire 121
Appendix E: Informed consent forms 126

Chapter 1

Introduction

1.1 Introduction

Between April 2007 and March 2008, 14 201 cases of vehicle hijacking were reported to the South African Police (South African Police Service, 2008). More than half (7 466) of these cases were reported in Gauteng, making it the province with the highest reported incidence of vehicle hijacking in South Africa. Although this reported incidence is less than that of other violent crimes, these cases receive a considerable amount of media coverage and are often sensationalised. As a result, it is possible that South Africans have very similar ideas regarding typical vehicle hijacking incidents.

Hijacking events are also often witnessed by one or more individuals, whose testimony may prove to be crucial in the successful prosecution of guilty offenders. Tuckey and Brewer (2003) point out that eyewitness testimony serves an important role in the Criminal Justice System (CJS) as it influences police investigations and courtroom strategies and procedures. The present study investigated the effect of cognitive schema on eyewitness testimony.

There are numerous factors that may influence the accuracy of eyewitness testimony (e.g. the nature of the police interview, the time lapse between the event and the interview and the extent of the information that was witnessed). An

important factor that plays a significant role in our ability to accurately recall information from memory is the extent to which the information corresponds or does not correspond with our pre-existing schema or "script" of the event.

In this study, the effect of cognitive schema on subjects' memory of a simulated hijacking event was investigated using an experimental design. Specifically, the study sought to examine the extent to which exposure to schema-consistent and schema-inconsistent information would affect subjects' memory for a simulated hijacking event. In particular, the following research question was investigated:

> *Do people remember information that is inconsistent with their schema of a hijacking better than information that is consistent with their schema of a hijacking?*

As a result of the high incidence of vehicle hijackings in South Africa, the heightened exposure that hijackings receive in the media and the similarities that seem to exist between hijackings in this country, it was assumed that the South African population share common ideas (i.e. a schema) about this criminal offence. For this reason, a hijacking event was decided upon as the stimulus that the participants were exposed to, and required to remember.

Since the goal of the research was to compare memory performance between a group of research participants who were exposed to a simulated hijacking video

that was inconsistent with the hijacking schema and another group of research participants that was exposed to a simulated hijacking event that was consistent with the hijacking schema, it was necessary to establish first what information was consistent with a hijacking schema and what information was inconsistent with a hijacking schema. Thus, before conducting the main experiment, a Schema Identifying Questionnaire (SIQ) was administered to a sample of participants in order to identify the hijacking schema that people share.

The results of the SIQ were used to create one video containing schema-inconsistent hijacking elements and another video containing schema-consistent hijacking elements. One group of participants viewed the schema-inconsistent hijacking video (i.e. an atypical hijacking) while another group viewed the schema-consistent hijacking video (i.e. a typical hijacking) after which memory recall was tested to ascertain, in the first instance if the groups differed in their overall recall and with respect to the 10 information categories; and if so, which group scored higher both on an overall level and across different categories of information.

The study employed a 2 x 2 x 10 multifactor, mixed factorial design in which there were two between-subjects factors, namely: (1) condition, with two levels: schema-inconsistent *vs.* schema-consistent and (2) gender, with two levels: female *vs.* male. The within-subjects factor was 'information type', which had 10 levels: the physical description of the hijacker(s), the physical description of the

victim(s), behaviour of the hijacker(s), behaviour of the victim(s), verbalisations of the hijacker(s), verbalisations of the victim(s), description of the scene, sequence of events, time of day and duration estimates.

1.2. Aim and objectives of the study

Tuckey and Brewer (2003) investigated how cognitive schemas influence eyewitness memory over repeated retrieval attempts. Their results showed that eyewitness memory remained accurate when individuals were exposed to crime scenes containing schema-consistent and schema-inconsistent information, but not when individuals were exposed to schema-irrelevant information. The study however did not investigate extensively the nature of the difference between the effect of schema-consistent and schema-inconsistent information on subsequent retrieval. From the Tuckey and Brewer (2003) study, it seems that schema-inconsistent information was reported on more accurately in most cases. However, a small difference between the retrieval of schema-consistent and schema-inconsistent information was found.

The purpose of the present study was to explore the nature of this difference more rigorously. Other researchers (Nakamura, Graesser, Zimmerman & Riha, 1985; Rice & Okun, 1994; Feldman, 1998) have argued that new information regarding an event is incorporated within pre-existing schemas, making the retrieval of information that is consistent with the cognitive schema more successful.

Conversely, it is possible that individuals could more successfully recall information after experiencing or witnessing a simulated hijacking event containing schema-inconsistent characteristics rather than a simulated hijacking event with schema-consistent characteristics. In South Africa, not much research has been done to test the hypothesis that schema-inconsistent information may be retained and retrieved better, because such information is atypical and is given more attention, cognitive processing and mental resources because of its incongruent nature, or that the existing schemas will become modified. The present study also sought to investigate whether or not males and females differ in terms of their memory recall as it is possible that they attend to different information.

Therefore, the objectives of the present study were as follows:

- To investigate the effect of cognitive schemas (condition) on eyewitness memory
- To investigate the effect of gender on eyewitness memory
- To investigate possible differences in the nature and quantity of information retrieved about various aspects of the simulated hijacking event (e.g. behaviour of the hijacker(s), verbalisations of the victim(s), duration estimates, and so on).
- To investigate possible interactions among the three variables of interest, namely condition, gender and type of information.

1.3 Structure of the dissertation

Chapter 2 provides a review of the literature in terms of theory, methodology and data analysis. The chapter is structured according to the independent variables investigated in the present study, namely, the effect of condition, gender and information type on eyewitness memory. Also, an overview of other related studies is provided, with an emphasis on possible confounding variables.

In chapter 3, the methodology that was used in this study is described. Following a brief introduction, the process that was followed in administering the Schema Identifying Questionnaire (SIQ) is described. This is followed by an explanation of how the data obtained from the SIQ, which informed the development of lists of schema-inconsistent and schema-consistent elements, was used to generate the videos for the main experiment. The methodology that was used in the main experiment is presented in terms of: the research design, hypotheses and variables, participants, measurement instruments and research materials, data collection procedures, and data analysis. Ethical issues that were taken into account during the study are also described.

Chapter 4 presents the demographic characteristics of the sample and the findings of the study. The statistical procedures that were used to test the study's hypotheses are described and the main effects and interactions presented in terms of their statistical significance.

In Chapter 5, the results are summarised, interpreted and discussed in terms of their significance and in relation to the study's hypotheses. This chapter also contains a contextualisation of the findings in relation to other research in this field. Chapter 5 contains recommendations that were generated from the present study, for future research in this field. The final chapter also includes the limitations of the present study, with recommendations on how they could be overcome in future studies.

Chapter 2

Literature review

2.1 Introduction

The phenomenon of eyewitness memory has received much attention from experimental researchers. A great deal of effort has been devoted to the examination of the effect of numerous variables on eyewitness memory (e.g. the effect of cognitive schemas, gender, the characteristics or type of information, misinformation and anxiety). In this chapter, relevant literature is critically reviewed on the basis of theory, methodology and statistical analysis.

First, the theoretical underpinnings of cognitive schemas and memory will be presented. This will be followed by a review of empirical and experimental research that has been conducted to investigate the effect of cognitive schemas (sometimes referred to as scripts) on eyewitness memory. A review of studies on gender and age differences in memory recall will also be presented. Next, a review of research that has investigated which properties or characteristics of an eyewitness memory event are recalled more accurately than others is given (e.g. the behaviour of the perpetrator, duration estimates, physical description of the victim, and so on). This will be followed by a review of other related studies in the domain of eyewitness memory. The latter set of studies is critical to the present study because it is necessary to understand the effect of possible confounding

variables, such as misinformation and anxiety. The conclusion will summarise the key points from the literature review.

2.2 Cognitive schemas and memory

Nairne (2003) points out that individuals not only store facts in memory but also relationships among facts, which are known as schemas, or mental concepts formed through experiences with objects and events (Ciccarelli & Meyer, 2006). Rumelhart and Ortony (1977) refer to schemas as the essential or fundamental building blocks of cognition, which are units of organised knowledge analogous to theories. Rumelhart and Norman (in Galotti, 2004, p. 232) define a schema as "...a large unit of organized information used for representing concepts, situations, events and actions in memory". According to Tuckey and Brewer (2003) schemas are knowledge structures that represent concepts in terms of the specific characteristics that account for the concept and the relationships between those characteristics.

Zillmer and Spiers (2001) point out that memory is an umbrella concept which can be divided into subsystems based on storage and processing. Memory, as defined by Tulving (in Sternberg, 2006) is the means by which we retain and draw upon our past experiences to use that information in the present; and as a process, memory refers to the dynamic mechanisms associated with storing, retaining and retrieving information about our past experiences (Bjorklund, Schneider & Hernandez Blasi in Sternberg, 2006).

The form of memory that is of importance to the present study is that which is known as declarative memory, which gives individuals the ability to learn about and remember information, objects and events (Lezak, 1995).

Schema theory maintains that the act of remembering is dependent on the relationship between the actual input information and "pre-existing" schemas (Koriat, Goldsmith & Pansky, 2000). Terry (2003) and Santrock (2005) have noted that individuals mould memories to fit information that already exists in their minds.

Although it is also known that schemas can aid the act of remembering, particularly as related information is assimilated and grouped together into a schema, which can then be recalled as a whole thereby making remembering easier (Brown, 2006), there are also other consequences resulting from the formation of cognitive schemas in one's mind. It is with these consequences that the present study is especially concerned.

According to schema theory, individuals do not store and retrieve information like bits of data in a computer-like manner (Schacter, 2001) or like an exact photograph (Mayer, 2003) but rather reconstruct the past, which can then be distorted as we encode and store impressions of it. The implication of this is that new information can alter memories. According to Nairne (2003), remembering depends on one's beliefs and expectations, which can "colour" the act of

remembering, just as much as on retrieval cues, which brings about the information from memory. Nairne (2003) emphasises that schema-based memory can result in the existence of false memories, whereby one can remember something that did not happen at all, but still be confident that it did happen because the information is contained within one's schema of the event.

It is, therefore, possible that people devote less mental resources and processing time and effort to new information that is consistent with their schemas because the information is what they expect it to be. Consequently, this would result in individuals exhibiting poor memory performance for the finer details of schema-consistent information. Conversely, it is also possible that individuals devote more mental energy to new information that is inconsistent with existing schemas because they have no frame of reference or reference point for the information, which could then result in improved memory performance for schema-inconsistent information. This study seeks to explore the hypothesis that individuals may remember new information that is inconsistent with their schemas more accurately than new information that is consistent with their schemas.

2.3 The effect of cognitive schemas (condition) on eyewitness memory

A review of experimental research in which the effect of schemas on memory has been investigated highlights the fact that although there are studies that have indicated that schema activation results in improved memory recall, overall,

participants show better recall for schema-inconsistent information in comparison to schema-consistent information, across methodologies and procedures.

In a seminal study conducted by Neisser (1967) it was ascertained that when people were required to remember details that were not available in any pre-existing schematic representations, they may have attempted to reconstruct the missing details using schema-based inferential processing, during retrieval. Koriat, Goldsmith and Pansky (2000) elaborated on this, stating that these schema-based inferences or reconstructions replace the original input information with generic schema information, which results in retrieval distortions or commission errors. These suppositions or inferences that are schema based therefore become incorporated as part of the event's memory representation (Koriat et al., 2000).

In a study conducted by Christianson (1992), it was found that when an individual witnessed an unexpected event, he or she would recall details more readily. In another study investigating the effects of typical crime scripts on the memory of 247 students, Holst and Pezdek (1992) found that individuals do indeed have scripts for typical robberies and that these scripts influence memory. They established that "typical robbery scripts" are activated during memory retrieval and people incorporate non-input information or information not presented into these scripts. Similarly, Davidson (1994) concluded that schema-inconsistent

information, rather than schema-irrelevant information, was remembered better than schema–consistent information.

Schema-inconsistent information was also recalled more accurately than schema-consistent information in an experiment conducted by Davies and Alonso-Quecuty (1997). In this study, which assessed whether or not cultural factors influence testimony, groups of forty eight Spanish and English students successively viewed two videos; one containing information that was specific to an event in Spain and the other information related to an English event. The results showed that, contrary to the researchers' hypothesis, memory recall was more accurate for the event that was not from the participant's culture and more recall errors were made on the event that was from their own country. Thus, the recall of the participants was better for the event that was schema-inconsistent.

Following this study, Greenberg, Westcott and Bailey (1998) investigated their hypotheses that there were conditions under which schemas produced "gap-filling errors" in the eyewitness memory of a robbery. Firstly, they collected SIQ data from 120 participants. Based on their SIQ data, they developed the schema central and schema peripheral stimuli. As Greenberg, Westcott and Bailey (1998) hypothesized, there was a higher error rate in terms of recognition of central as opposed to peripheral information.

In an initial study among thirty seven undergraduate students conducted by Lampinen, Faries, Neuschatz and Toglia (2000), it was concluded that the recall of auditory information was superior for atypical actions in comparison to typical actions. The schema-atypical information was therefore better recalled than the schema-typical information.

Corroborating evidence was found from subsequent studies conducted by Neuschatz, Lampinen, Preston, Hawkins and Toglia (2002). On the basis of their results, they concluded that the memory of schema-inconsistent actions was more accurate than the memory of schema-consistent actions. In the latter study, 51 research participants in the first experiment and 123 in the second experiment, watched a video of a lecture containing schema-consistent (e.g. writing on the black board) and schema-inconsistent (e.g. smoking a cigarette) actions. Apart from the superior recall of schema-inconsistent elements, the participants also rated their memories of the inconsistent details as being more vivid (Neuschatz et al., 2002).

Tuckey and Brewer (2003) conducted two experiments in which they investigated how schemas impact eyewitness memory over repeated retrieval attempts. The sample sizes for the two experiments were 106 and 97 participants respectively. The first independent variable of the study was the type of schema information, which was comprised of three levels: schema-consistent, schema-inconsistent and schema-irrelevant information. The second independent variable was

retention interval with three levels for the first component of the experiment (3 days, 3 weeks and 3 months) and three levels for the second component of the experiment (2 weeks, 10 weeks and 12 weeks).

Tuckey and Brewer (2003) defined schema-consistent information as all the events that occur routinely or are considered to be typical elements of an event. For example, in the case of a bank robbery, a schema-consistent element would be that the perpetrator carried a firearm. Schema-inconsistent elements were defined as events that were in conflict with the schema. A schema-inconsistent element would, for example, be that the perpetrator was female. Schema-irrelevant elements were defined as elements unrelated to the goals of the event (Tuckey & Brewer, 2003). A schema-irrelevant element would, for example, be the colour of the floor.

Tuckey and Brewer (2003) point out that the researcher cannot merely assume what elements are consistent or inconsistent within a given schema. One has to ascertain what the schema for the specific event is. This is done by using a Schema Identifying Questionnaire (SIQ) from which the schema of an event (e.g. a robbery) can be deduced. In their study, two hundred and thirty-four students from various disciplines completed the questionnaire. The questionnaire used by Tuckey and Brewer (2003) consisted of a list of elements or statements (e.g. carries a weapon, behaves aggressively, male, and so on), with the opportunity to provide a “yes” or “no” answer for each of the elements. A “robbery” schema

was then obtained by counting the frequencies of "yes" responses. An element had to be mentioned by at least 25% of participants for it to be included in the bank-robbery schema, which made it schema-consistent (Tuckey & Brewer, 2003). The schema-inconsistent elements were defined as those elements that contradicted any of the schema-consistent elements. Schema-irrelevant elements were subsequently defined as those elements that did not fall into the above two categories. The present study also utilised a Schema Identifying Questionnaire (SIQ). However, a few adaptations to the SIQ developed by Tuckey and Brewer were made.

Tuckey and Brewer (2003) used a single video of a staged bank robbery, containing schema-consistent, schema-inconsistent and schema-irrelevant information, for both components of their experiment. The present study made use of a schema-consistent video and a schema-inconsistent video as this eliminates the possibility of intrusions and confabulations from occurring since schema-consistent information is contained in one video and schema-inconsistent information is contained in another video.

Tuckey and Brewer (2003) were concerned with measuring the number of correct and incorrect responses for the three conditions (schema-consistent, schema-inconsistent and schema-irrelevant) but discarded the incorrect schema-inconsistent responses from their analysis, because too few incorrect schema-inconsistent responses were obtained.

From the results of their experiments, Tuckey and Brewer (2003) found that eyewitness memory remained relatively stable after repeated retrieval attempts (the variations were not statistically significant) with schema-consistent and schema-inconsistent elements, whereby the participants' memory did not decay significantly after different time lapses. Schema-irrelevant elements decayed as the repeated retrieval attempts progressed. In other words, the participant's memory of the schema-irrelevant elements decayed as the period between viewing the video and the memory test increased.

Their results therefore showed that eyewitness memory was less prone to decay when individuals were exposed to crime scenes containing schema-consistent and schema-inconsistent information compared to when they were shown schema-irrelevant information. Memory for schema-irrelevant information showed a statistically significant decay after repeated measures.

Four years after the Tuckey and Brewer (2003) study, Henkel and Mather (2007) conducted a novel investigation into how beliefs shape memories. These researchers ascertained that in instances where research participants misremembered the option that they previously selected, on the whole, they favoured the option that they believed (schema-consistent) they selected rather than the actual one that they chose; another example of empirical evidence about the distorting effect of schemas on memory.

Corroborating the findings of Tuckey and Brewer (2003), Kleider, Pezdek, Goldinger and Kirk (2008), concluded, on the basis of two experiments that in terms of delayed recall, stereotypic memory errors became apparent as a result of the operation of schematic processing. These researchers indicated a higher error incidence when participants were exposed to stereotype-consistent actors in comparison to stereotype-inconsistent actors.

Previously, Johnson (1970) had argued that information that is more central to activated schemas will be recalled better than information that is less central. For example, Nakamura, Graesser, Zimmerman and Riha (1985) found that typical information is better recalled than atypical information. Similarly, Rice and Okun (1994) found that participants' memory of schema-inconsistent information decayed over a two-week period whilst the schema-consistent information remained the same. It has been suggested that this finding could be attributed to the individual having to continuously retrieve information from memory (Tuckey & Brewer, 2003).

Feldman (1998) hypothesised that individuals interpret new information within the matrix of pre-existing schemas, meaning that events and behaviours that are consistent with schemas are more readily recalled.

A study conducted by Butler and Pallone (2002) showed that the accuracy of recall among eyewitnesses of a simulated armed robbery was significantly

influenced by the “experimentally manipulated” status of the perpetrator but not by the gender of the victim and not by the gender of the research participants themselves. It was ascertained that subjects who witnessed an armed robbery of either a male or female victim, committed by a perpetrator dressed in “low-status” attire recalled details more accurately than subjects who witnessed the same perpetrator attired in “high status” clothing. Participants’ memory of the “low status”, schema-consistent offender was therefore superior to that of the “high status” schema-inconsistent offender.

In their main experiment involving 101 participants who watched one of two staged muggings, Pozzulo and Weeks (2007) expected that schema-inconsistent information would be better recalled. Although it is evident that most studies have concluded that schema-inconsistent information is recalled better than schema-consistent details, the results of the research undertaken by Pozzulo and Weeks (2007), suggests that neither schema-inconsistent nor schema-consistent information was recalled significantly better.

Therefore, previous findings regarding the effect of cognitive schemas on memory are varied. The present study sought to explore the relationship between schemas and memory within the South African context as hijacking schemas are mostly well defined and consistent among South Africans.

2.4 The effect of gender and age on eyewitness memory

A considerable amount of research has been conducted investigating the effect of gender on eyewitness memory and the results of these studies are contradictory.

However, research does show gender differences in memory recall, which mostly seems to favour females as having an advantage. According to Herlitz and Rehnman (2008), these differences vary depending on the type of information required to be remembered. For example, some studies have suggested that females have an advantage over males in terms of verbal episodic memory. These findings therefore suggest that women should perform better on an eyewitness memory task assessing the contextual recall of verbal information.

Preceding the Herlitz and Rehnman (2008) study, the results of two investigations provided comparable evidence. Firstly, Yonker, Eriksson, Nilsson & Herlitz (2003) discerned in the control groups of their study investigating the influence of Estradiol on episodic memory, that females, who did not receive the treatment condition, performed better than males, who did not receive the treatment condition. Subsequent to that, Yonker, Nilsson, Herlitz and Anthenelli (2005) again ascertained, in a national memory study among adults in Sweden, that females performed significantly better in episodic memory tasks in comparison to males.

The findings of Guillem and Mograss (2005), also suggested that females performed better at a recognition memory task of faces than males. According to Guillem and Mograss (2005), these findings further support the perspective that the cognitive processing of females is characterised by more elaboration in terms of information content whereas the processing among males is likely to be driven by schema activation.

In a leading study conducted by Yarmey (1993), 651 men and women between the age of 18 and 65 were tested for their recall accuracy of an adult woman they met and talked to for a couple of minutes earlier in a public place. Witnesses were members of the public and unaware that they were participating in a psychological experiment. The study was designed to simulate a relatively short, low-impact crime, such as a confidence game or a swindle, in which witnesses had an unobstructed, close-up view of a perpetrator under daylight viewing conditions. Two young white females were used as targets. Participants were randomly approached in public places and asked for directions or for assistance in finding some lost jewellery.

The duration of exposure to the targets was approximately 15 seconds, during which time the targets attempted to maintain eye contact and talk as much as possible to the witness. On average, witnesses correctly recalled 60% of the eight target characteristics that were created and, as the researchers expected,

there was a great variability in recall accuracy across characteristics (Yarmey, 1993).

Furthermore, a target effect was found in that four characteristics were recalled more accurately with target A than target B. It may be that certain characteristics for target A were particularly salient, distinctive or schema-consistent, which facilitated witnesses' memory for the characteristics of that particular person. The "distinctiveness" effect was similar across all three age groups and for both males and females. This study provided interesting findings with regard to gender as individuals have such distinct and well developed gender schemas.

In the Yarmey (1993) study, recall for target A, a blond with blue eyes, was relatively high. In contrast, recall for target B, a blond with green eyes, was very poor. It is often expected that blond hair and blue eyes are associated with one another. However, as this study showed, when blonds had green eyes (a schema-inconsistent condition); recall of eye colour was very inaccurate. Except for height, weight, and complexion, younger witnesses performed better than the oldest age group in recall of hair colour, hair length, hairstyle, age, and eye colour. All three groups showed significant positive correlations between accuracy of recall and confidence. The study showed that adult age groups did not differ in their duration estimates of the event but witnesses, on average, overestimated, with females proving less reliable than males (Yarmey, 1993).

In a consequent study conducted by Yarmey and Yarmey (1997), witnesses were tested for either interrogative recall or narrative recall of a young woman to whom they had spoken a minute earlier for approximately 15 seconds. Three major issues were addressed in the Yarmey and Yarmey (1997) study: (1) the accuracy of interrogative reports (cued recall) and narrative reports (free descriptive recall) of a target (culprit) by younger and older men and women; (2) the accuracy of duration estimates with and without the use of mental imagery rehearsal of a witness-culprit encounter; and (3) the relationships between recall factors, duration estimates, and confidence in performance.

Interrogative recall responses were more complete and more accurate but were also more error prone than narrative responses. Men and women showed similar performance on most characteristics but men were more confident in their responses. A negative correlation was found between the age of the witness and accuracy of recall.

The Yarmey and Yarmey (1997) study followed the research design used by Yarmey (1993), and extended this naturalistic “real world” study to include an investigation of both interrogative and narrative reports for a target's facial, body and clothing characteristics. The fact that the age of the witnesses was found to correlate negatively with accuracy of recall, supports the findings of Yarmey (1993).

It is possible that young adults' superior observational skills for a person and clothing characteristics are a function of interest in and greater familiarity with target persons of their own age range. The study failed to show a correlation between age and confidence. Overall, levels of recall for men and women were comparable but men were more confident in their responses, especially with their narrative responses.

For the purpose of the present study it is necessary to discuss this interaction between the gender of the witness and duration estimates more thoroughly. Both male and female eyewitnesses overestimated the duration of the encounter and women gave significantly longer overestimations than men did. However, there were no significant differences between men and women when duration estimates were preceded by mental imagery rehearsal. Men were more confident in the accuracy of their estimates than were women. When given the opportunity to respond freely, most participants overestimated the duration of their interaction with the target while they underestimated the interaction with an imagery rehearsal strategy.

The results obtained from a study conducted by Tomes and Katz (1997) suggests that females are significantly more prone or habitually susceptible to misinformation than males. A chi-square analysis also confirmed that susceptible individuals were most often female, high in empathy, had poor memory and reported vivid imagery.

Ihlebaek, Love, Eilertsen and Magnussen (2003) staged a bank robbery and also conducted a laboratory experiment using a video of a staged robbery on two different sets of participants. The laboratory participants reported more details accurately in comparison to the participants who witnessed the crime, but the overall memory performance was similar in both conditions. However, these researchers also found that female participants reported more correct information about clothing in comparison to males, which was consistent with earlier research, thus indicating that males and females attend to different kinds of information.

Shaw and Skolnick (1994) state that prior research indicates that females are more accurate witnesses, more resistant to misleading questions regarding female orientated details and males are also resistant to same gender details. These findings are explained by Shaw and Skolnick (1994) by referring to same gender bias, hypothesising that someone will more readily attend to, and process, details of a target that is from his or her gender. These researchers also claim that witnesses tend to engage in inferential processing when viewing members from the same gender and engage in superficial processing when viewing members of the other gender.

The study conducted by Shaw and Skolnick (1994) also found that female participants were more able to identify the target person when a weapon was present.

2.5 Type of information

Chiroro and Sibanda (2004) found that children reported more errors on verbalisations and descriptions of the person than adults. However, when having to report on the actions in the event, there were no differences between different age groups. In the adult group (16-21 years), the participants made the highest number of errors on the overall scores for the descriptions of the person, followed by the actions recalled and the least mistakes were made when the participants were required to recall the verbalisations from the event.

The overall means of the entire group showed interesting results. The descriptions of the person remained the least correctly recalled, followed by the verbalisations and then the actions of the event. Therefore, the verbalisations were recalled less correctly than the actions, overall, whilst the actions were recalled less correctly than the verbalisations in the adult group (Chiroro & Sibanda, 2004). The present study included "sequence of events" as an extra category as well as questions on the behaviour and the verbalisations of both the perpetrators and the victims.

Of crucial importance to the present study is the type of information contained in the videos, which was included as a within subjects factor. Without appropriately categorising the stimulus, it is possible to infer a relationship (or fail to do so), between an independent variable and the dependent variable when there is no relationship (or there is). For example, without assessing the different

components of the event it is possible to infer that females or males are more accurate in their recall, when in fact this relationship only occurs in one category (e.g. physical description of the perpetrator). It is therefore possible to conclude that females who viewed the schema-inconsistent video have more accurate eyewitness memory than males, when in fact they are, for example, only superior in one or two categories.

2.6 Other related studies

Ihlebaek et al. (2003) state that laboratory research has contributed significantly to information gathered on eyewitness memory and further state that laboratory research and forensic contexts differ in important ways. Violent crimes, such as hijackings, are very traumatic events which result in elevated levels of arousal, an aspect which cannot be induced in a laboratory setting. Laboratory participants adopt a passive and observant role when watching violent movies, which are a luxury, that real life eyewitness do not have.

Despite this, Ihlebaek et al. (2003) state that results obtained from field studies supplement the results obtained from laboratories. Furthermore, Ihlebaek et al. (2003) point out that the following conclusions have been drawn from research: victims and witnesses close to the crime scene accurately remember more information than peripheral victims. Apart from hair colour and clothing, individuals can estimate the physical characteristics of the perpetrators accurately. The duration of the event is overestimated and there are no gender

differences regarding the accuracy. However, both genders attend to different aspects.

Investigations into eyewitness memory and suggestive questioning are often concerned with what is known as the misinformation effect. Tomes and Katz (1997) define the misinformation effect as occurring when an individual experiences an event, receives additional information that is false, often after experiencing the event, and consequently exhibits this false information in a memory test suggesting that he or she has incorporated it into his or her memory of the event.

The results of the Tomes and Katz (1997) study indicated no statistically significant difference between the accuracy of eyewitness memory of the control group (who received no misinformation) and the experimental group (who received misinformation). These two groups also did not differ significantly on their confidence scores. This study also found a non-significant correlation ($r = 0.10$) between the accuracy of non-misinformation items and confidence scores. In the experimental group, only 2% of participants were resistant to misinformation while the majority (45%) reported false details on three occasions.

From the study by Tomes and Katz (1997) it was also evident that the following individual difference measures significantly predicted habitual susceptibility: accuracy of recall, empathy, imagery vividness (VVIQ), card rotation, paper

folding and gender. From this, Tomes and Katz (1997) concluded that poor memory for the event, high empathy, and high scores on the VVIQ (measure of imagery vividness), were significant predictors of habitual susceptibility.

Jaschinski and Wentura (2002) indicated that few studies have investigated the effects of individual differences regarding post event misinformation and its implications on eyewitness testimony. Jaschinski and Wentura (2002) state that in a classical study conducted by Ward and Loftus (1985) it was found that participants with an introverted and intuitive personality were more likely to exhibit a misinformation effect. This implies that these individuals rely on external information and not their own memory and perception. These researchers also found that the extent to which the participants dissociate was a key driver with regard to the misinformation effect. Individuals who obtained high scores on the Dissociation Experience Scale (DES) were more prone to memory errors.

A third important factor associated with the misinformation effect is imagery abilities. Research indicates that individuals with good imagery abilities are more likely to confuse sources of information (Ward & Loftus, 1985).

Post event information and misleading information regarding the same event were also integrated into a mental representation or schema of the event (Jaschinski & Wentura, 2002). Therefore, in the study conducted by Jaschinski and Wentura (2002), it was found that individuals who had a large working

memory capacity were less likely to integrate misleading post event information in memory. Furthermore these researchers state that individuals who have better memory capacity create a coherent and detailed mental model while watching a movie clip.

A study done by Bjorklund, Cassel, Bjorklund, Brown, Park, Ernst and Owen (2000) investigated the effect of suggestive or misleading questions and different interviewers on both the free recall and the recognition of children and adults. Three age groups were used, namely a group with a mean age of 5, a group with a mean age of 7 and a college aged group with a mean age of 26 years, 3 months. The participants in all three groups were exposed to two similar videos. After this, the participants were given interpolated and unrelated tasks ranging from jigsaw puzzles to reading magazine articles. The use of these filler tasks served as a motivation for the present study to include such activities after exposure to the videos, in order to mitigate the confounding effect of primacy and recency recall.

After a careful review of Bjorklund et al. (2000) the present study considered the effect of such a multitude of measures on the alertness and enthusiasm of the participants. It is likely that the participants may have become fatigued, which may skew the data in both directions, thus increasing the likelihood of making a type I error (i.e. inferring significant relationships when there are none) or, even more likely, a type II error (failing to infer a significant relationship when in fact

there are). For this reason, and to minimise mortality, which was also experienced by Bjorklund et al. (2000), in the present study fewer measures were used, but with different sections concerning the categorisation of the video.

Dobson and Markham (2001) studied the relationship between individual differences in anxiety level and eyewitness memory. Among the 120 undergraduate students, those who obtained a score of 23 or higher on the standardised Test Anxiety Scale (TAS) were included into the high anxiety group. Participants who scored 15 or lower on the TAS were included into the low anxiety group.

The actual anxiety was induced by ego threat (Dobson & Markham, 2001). The high anxiety and low anxiety participants were told that they would be evaluated in comparison with the other participants and that this evaluation is directly related to intelligence. All the groups received a filler task to do between encoding and retrieval, which was unrelated to the measurement but served to further increase anxiety in the groups. At retrieval, the participants were required to complete a multiple-choice test of the presented slides.

The statistics revealed that anxiety had a significant main effect with the high anxiety group making more errors than the low anxiety group when anxiety was induced at encoding and retrieval. The Dobson and Markham (2001) study highlights the influence of anxiety, a motivator for the present study to present a

research environment that is friendly, calm and lacking in anxiety evoking instructions.

An important and interesting phenomenon to be considered when conducting research on eyewitness memory requiring the processing, recall and recognition of the faces of perpetrators, is own race bias (ORB). Slone, Brigham and Meissner (2000) state that recognition memory is better for faces of one's own race rather than for faces from different races. These researchers postulate four possible reasons for ORB. These are the following: (1) inherent differences regarding the ability to recognise faces from a particular race, (2) having experience with and contact with people from a different race (a postulate that is experiencing more support in contemporary experimental research), (3) the individual may be influenced by ethnocentrism, (4) different cognitive processes.

Slone et al. (2000) state that no evidence has been found to support the first hypothesis. These researchers also state that with regards to ethnocentrism, individuals who have negative attitudes towards people from other race groups may lead the person to stop processing details of a face once the individual categorises the face as belonging to an out group. In cases such as this, the individuals' personal schema may be filling in the blanks that were not processed. In addition, if an individual has a negative attitude towards a certain racial group they are unlikely to interact with these people or at the very best interact with these people on a very superficial level. This means that these

individuals will not have sufficient knowledge to distinguish between the faces of different groups. Some studies have found that people who have contact with individuals from other races are less likely to show an ORB. However, other studies did not find this relationship, while other studies have reported mixed findings.

2.7) Conclusion

From the above review of the literature, it is evident that there are complex factors related to eyewitness memory. These factors have to be taken into account when designing an investigation into eyewitness memory.

Based on the review it seems that overall, schema-inconsistent information is remembered better than schema-consistent information. With regard to investigations into the effect of gender on memory recall, it is evident that the findings of the respective studies often contradict one another but females are most often reported as having superior recall. The literature review has also identified possible confounding variables for the present study (e.g. anxiety and misinformation effects). From this a proper operationalisation of the constructs, the applicable statistical analyses and other methodological insights (such as the need to include a filler task, for example) have become evident.

Chapter 3

Research method

3.1 Introduction

This chapter provides an account of the research methodology that was used during the study. From the data that were obtained from the SIQ, the schema-inconsistent and schema-consistent hijacking scenarios were developed. Actors were then recruited and the settings where the "hijackings" were to be video-recorded, selected.

First, a description of the process that was followed to identify the schema-inconsistent and schema-consistent scenarios using the SIQ will be provided. Next, the methodology of the experiment will be described in terms of the research design, hypotheses and variables, the participants, the stimuli and apparatus, the procedure and ethical considerations. The procedures that were implemented in order to ensure validity and reliability of the present study will be discussed throughout the chapter at relevant points.

3.2 Schema Identifying Questionnaire (SIQ)

3.2.1 Nature and procedure of the SIQ

The SIQ was used to provide information on the kind of information that would be consistent with people's schemas and the kind of information that would be inconsistent with their schemas of a hijacking. The SIQ contained items which

related to the possible content of a hijacking scenario in terms of the behaviour of the hijacker(s) and the victim(s), physical description of the hijacker(s) and the victim(s) and verbalisations of the hijacker(s) and the victim(s), characteristics of the event, the scene, the duration of the event, the time of day and the sequence of events, as well as the process of a typical hijacking (see appendix A).

A small pilot study was conducted with 10 participants in order test the efficacy of the SIQ, as well as to give the participants an opportunity to provide insights that may have been overlooked by the researcher. Once the insights of the pilot study were incorporated into the SIQ, the final version of the SIQ was administered.

The SIQ was administered to a sample of 45 participants between the ages of 18 and 30 years, which was the same age range as that of the participants in the main experiment. In order to decrease subject "mortality" in the main experiment, which often occurs when individuals are expected to return at later dates and times, the SIQ was group-administered in lecture rooms to two separate groups, none of whom took part in the main experiment. Once the participants entered the venue, they were seated with at least one open seat between each individual. They were then informed that they were not to view each other's responses but work independently. Informed consent was obtained from each individual. The following instructions were then given:

I am a registered postgraduate student at the University. As part of my studies, I have chosen to study people's views on hijacking. This questionnaire seeks to gather information on this topic. Your participation in this study will be highly appreciated. You are not required to fill in your name or any other personally identifying information anywhere on this questionnaire. This ensures that you remain anonymous. Also, your responses will be treated confidentially.

The SIQ also contained the following description, which gave the participants some information about its purpose:

Please note: This questionnaire requires you to provide information on what you think to be a typical hijacking, regardless of whether or not you have experienced it. Individuals who have not experienced hijacking may also complete this questionnaire, since its goal is to collect information on the public's image of hijacking and not actual recall of hijacking events.

Each participant was given a SIQ to complete. The cover page of the SIQ contained questions on participants' demographic information in terms of age, gender and population group. It also contained a screening question used to indicate whether or not the participant had previously been involved in a hijacking. The responses of the individuals who had experienced hijacking were excluded from the analysis, seeing that they might not correspond to the schema

of participants who had not experienced hijacking and subsequently skew the results.

Section 1 of the SIQ gathered information about the demographics of typical hijacker(s) and victim(s) in terms of gender, population group, age, socio-economic status and the number of hijacker(s) and the victim(s). Section 2 of the SIQ required participants to indicate what they believed to be the typical characteristics and behaviours of hijacker(s) and victim(s) on a 5-point Likert scale ranging from "never" to "always". Section 3 of the SIQ required the participants to indicate which elements they viewed to be typical of a hijacking event on the same 5-point Likert scale. Lastly, section 4 required participants to rank certain elements of a hijacking temporally, from what they believe to be the first thing that takes place during a hijacking to the last thing that takes place.

At the end, participants were given more information about the study in terms of the purpose of their responses, and thanked for their participation. Using the information obtained from the SIQ, the researcher determined, through statistical analyses, the elements that were perceived by participants to be more characteristic of a hijacking than others.

3.2.2 Analysis of the SIQ data

Unlike the dichotomous, "yes" or "no" format that was used by Tuckey and Brewer (2003), with a 25% cut off point, the Schema Identifying Questionnaire

(SIQ) that was used in the present study, yielded Likert scale options for each element. The elements with the highest reported frequency were subsequently included as schema-consistent. Schema-inconsistent elements were identified as the corresponding opposites of each schema-consistent element. This study did not include the schema-irrelevant condition as was done by Tuckey and Brewer (2003).

Table 3.1 shows the demographic characteristics of the sample that completed the SIQ (n=45).

Table 3.1: Breakdown of the SIQ sample

Demographic		Frequency	Percent
Age	**18 - 20**	15	33.3
	21 - 23	16	35.6
	24 - 26	8	17.8
	27 - 30	6	13.3
	Total	**45**	**100**
Gender	**Male**	24	53.3
	Female	21	46.7
	Total	**45**	**100**
Population group	**Asian**	8	17.8
	Black / African	17	37.8
	Coloured	6	13.3
	White	13	28.9
	Other	1	2.2
	Total	**45**	**100**

The majority of the sample, 68.9% (n=31) was between the age of 18 and 23 years. A slightly greater proportion of males (n=24, 53.3%) completed the SIQ. Most of the participants (n=30, 66.7%) indicated that they either belonged to the

Black / African population group (n=17, 37.8%) or the White population group (n=13, 28.9%).

A frequency analysis was conducted on the data in order to determine the elements or units that were identified by the majority of participants as consistent with a typical hijacking scenario and these elements were included in the schema of a hijacking (see appendix B). Ninety three percent (n=42) of the participants believed that a typical hijacking has two or more perpetrators, with two hijackers indicated by the majority (51.1%, n=23) as typical. Twenty eight participants (62.2%) indicated that a typical hijacking only has one victim. In a schema-inconsistent hijacking, there would therefore be 1 hijacker and 2 victims.

Participants viewed hijackers as typically being between the ages of 24 and 34 years (n=29, 64.4%), male (n=44, 97.8%), Black / African (n=39, 86.7%) and from a poor socio-economic background (n=23, 51.1%). This also implies that in a schema-inconsistent hijacking, the hijacker is a female, white and comes from a wealthy background.

The participants viewed a typical hijacking victim as being between the age of 24 and 34 years (n=25, 55.6%), female (n=40, 88.9%), White (n=40, 88.9%) and from a wealthy socio-economic background (n=29, 64.4%). The converse is therefore applicable to schema-inconsistent hijackings, where the victim is a male, belongs to a population group other than the white group and is poor.

The largest proportion of participants was of the opinion that the hijackers in a typical hijacking wear balaclavas (or something to cover their faces), dark or black clothes, jeans, a jacket, a cap or hat and carry a weapon (i.e. a firearm). The participants also indicated that it is atypical or inconsistent for the hijackers to wear jewellery items.

In terms of the behaviour of hijackers in a schema-consistent hijacking scenario, the participants indicated that hijackers typically talk in a raised voice to the victim, work in teams, are aggressive, make threats, warn the victims of the consequences, instruct the victim to do certain things, make demands and order the victim to get out of the car. Participants also indicated that in a typical hijacking, shots are not fired by the hijacker. It was schema-inconsistent for hijackers to talk in a calm voice.

The participants also indicated certain salient characteristics and behaviours of the hijacking victim. In a typical hijacking, the participants viewed the victim as cooperating, nervous, pleading for her life, looking at the hijacker and inside the car when attacked. In a schema-inconsistent hijacking, the victim should therefore not cooperate, not be nervous and not plead for his/ her life.

Apart from the characteristics of the hijackers and the victim it was evident that a schema-consistent hijacking is viewed as taking place during the evening, in a driveway, where an expensive car is targeted, the hijacking takes seconds, it is

successful, the victim survives but is injured and a backup or getaway car is present. The inconsistent event was therefore characterised as taking place in the daytime, away from any settlements and lasting longer than mere seconds. Conversely, in a schema-inconsistent hijacking scenario, the target vehicle is inexpensive.

Table 3.2 summarizes the sequence of a schema-consistent hijacking event, according to the participants. The greatest proportion of the sample thus placed each element in the sequence and ranked them accordingly.

Table 3.2: Sequence of events

Hijacking Element		Frequency	Percent
Victim is driving	**1st**	43	95.6
Hijacker appears	**2nd**	26	57.8
Victim is stunned	**3rd**	23	51.1
Victim stops the vehicle	**4th**	22	48.9
Hijacker orders the victim to get out	**5th**	28	62.2
Victim gets out	**6th**	31	68.9
Hijacker injures victim	**7th**	30	66.7
Hijacker gets into the vehicle	**8th**	30	66.7
Hijacker drives away	**9th**	37	82.2

A schema-consistent video was developed, based on the findings of the SIQ. All the elements that were identified by a distinctive majority of participants as being typical of a hijacking were included into the schema-consistent video. The schema-inconsistent video displayed information that was inconsistent with the determined schema produced by the analysis of the SIQ data.

Elements which did not produce a differential dynamic (e.g. “hijacker carries a bag”) were not included in the videos and were defined as schema-irrelevant. Elements that would have decreased the quality of the videos (e.g. “the victim is injured”) or which were impractical to film with the available resources (e.g. “hijacking takes place during the evening”) were also excluded from the filming.

The usage of the SIQ to identify the hijacking schema that individuals share was implemented to prevent any researcher bias or expectancies from influencing the nature of the videos that were presented to the participants. The videos were based solely on information gained from the analysis of the SIQ data. The focus of the remainder of the chapter will be on the research methodology implemented during the main experiment.

3.3 Research design

An experimental design was used in the present study. A 2 x 2 x 10 multifactor, mixed factorial design was used. Two factors were manipulated between subjects and one factor was a within subjects factor. Figure 3.1 below shows the design of the study including the experimental “cells” that were created. The table also contains the variables that were manipulated in the study.

Table 3.3: Research design (N=60)

N = 60		Between-subjects factors			
		Schema-inconsistent (n=30)		Schema-consistent (n=30)	
		Female (n=15)	Male (n=15)	Female (n=15)	Male (n=15)
Type of Information (TI) (Within-Subjects factor)	Physical description of the hijacker(s)				
	Physical description of the victim(s)				
	Behaviour of the hijacker(s)				
	Behaviour of the victim(s)				
	Verbalisations of the hijacker(s)				
	Verbalisations of the victim(s)				
	Description of the scene				
	Duration estimate				
	Time of day				
	Sequence of events				
Total score					

3.4 Hypotheses and variables

The independent variables that were manipulated between-subjects were (1) condition (schema-inconsistent vs. schema-consistent) and (2) gender (female vs. male). The other factor, type of information (TI) was measured within subjects, and had 10 levels namely: the physical description of the hijacker(s), the physical description of the victim(s), behaviour of the hijacker(s), behaviour of the victim(s), verbalisations of the hijacker(s), verbalisations of the victim(s), description of the scene, time of day, duration estimates and sequence of events.

The dependent variable for the study was the proportion of correct recall responses on an eyewitness memory task. The following five hypotheses were tested during the study:

Hypothesis 1: Main effect of schema (condition)

Overall, participants who were shown the video containing schema-inconsistent (SI) information were expected to perform significantly better in their recall of event information than participants who were shown the video containing schema-consistent (SC) information.

H0: μ (SI) = μ (SC)

H1: μ (SI) > μ (SC)

Hypothesis 2: Main effect of gender

It was expected that females would perform significantly better than males in their recall of the details of the simulated hijacking event.

H0: μ (Females) = μ (Males)

H1: μ (Females) > μ (Males)

Hypothesis 3: Main effect of type of information (TI) – 1

It was expected that there would be differences between what the participants would recall across the 10 information categories [i.e. physical description of the hijacker(s) and the victim(s), behaviour of the hijacker(s) and the victim(s), verbalisations of the hijacker(s) and the victim(s), description of the scene, duration estimates, time of day and sequence of events].

HO: μ [physical description of hijacker(s)] = μ [physical description of the victim(s)] = μ [behaviour of the hijacker(s)] = μ [behaviour of the victim(s)] = μ [verbalisations of the hijacker(s)] = μ [verbalisations of the victim(s)] = μ [description of the scene] = μ [sequence of events] = μ [time of day = μ [time course (duration estimates)]

H1: μ [physical description of hijacker(s)] ≠ μ [physical description of the victim(s)] ≠ μ [behaviour of the hijacker(s)] ≠ μ [behaviour of the victim(s)] ≠ μ [verbalisations of the hijacker(s)] ≠ μ [verbalisations of the victim(s)] ≠ μ [description of the scene] ≠ μ [sequence of events] ≠ μ [time of day ≠ μ [time course (duration estimates)]

Hypothesis 4: Main effect of type of information (TI) – 2

The participants were expected to have significantly better recall of the hijacker details' (HD) physical description, behaviour and verbalisations than the victim details (VD) physical description, behaviour and verbalisations.

H0: μ (HD) = μ (VD)

H1: μ (HD) > μ (VD)

Hypothesis 5: Interactions between independent variables

Apart from the above 4 hypotheses regarding main effects, it was also expected that the between subjects factors would interact significantly with the within subjects factor "type of information" (TI) in such a way that, in some cases, participants who were exposed to the schema-inconsistent video would perform better across the categories of the eyewitness memory task than the participants exposed to the schema-consistent video while no differences would be found on some aspects of the to-be-remembered information. Due to the exploratory nature of the study and the fact that no prior studies have investigated this interaction, no specific hypotheses were formulated.

3.5 Participants

Students between the ages of 18 and 30 were invited to take part in the study during lecture room visits and via advertisements that were placed on the students' website. Half of the participants were exposed to the schema-inconsistent video and the other half were exposed the schema-consistent video. In each group, there were equal numbers of male and female participants. Thus, the subjects were randomly assigned to the various experimental conditions within each gender. Within the sample (n=60) the following groups were obtained:

- 15 female participants who viewed the schema-inconsistent video
- 15 male participants who viewed the schema-inconsistent video
- 15 female participants who viewed the schema-consistent video

- 15 male participants who viewed the schema-consistent video

By employing a screening procedure with qualifying questions on the questionnaire, it was ensured that no individual who had previously been a victim of a hijacking, either directly or indirectly was included in the final data set. Data from the 2 individuals who indicated that they had previously either been a direct or indirect victim of a hijacking were excluded from the analysis.

3.6 Stimuli and apparatus

Two videos (one being schema-inconsistent and another being schema-consistent) were shown to the respective experimental groups. A local telephone directory was used during the filler task. A context reinstatement questionnaire was used to assess participants' memory of the simulated hijacking event. A personal computer with audio speakers was used to present the video.

In terms of the actual filming of the schema-inconsistent and schema-consistent hijacking events, actors were employed that "fitted" the characteristics of hijacker(s) and victim(s) as identified by the SIQ. Informed consent was obtained from the 2 male actors and 1 female actor (see appendix E).

The schema-inconsistent and schema-consistent simulated hijackings were filmed using a digital video recording device and saved in Digital Video Disk (DVD) format. The scenes of both the schema-inconsistent and schema-

consistent videos were edited using the Adobe Premiere Pro (version 2.0) digital video editing software program and converted into mpeg-4 [Motion Picture Experts Group–4: standard compressed video at 64 kilobytes per second (kbps)] format. The schema-inconsistent and schema-consistent videos were displayed to the participants in mpeg-4 digital format using the Apple QuickTime Pro (version 7.2) multimedia player on 17 inch Liquid Crystal Display (LCD) monitors with widescreens (aspect ratio 16:9). The audio was played over 2.1 stereo personal computer (PC) speakers.

Keeping the hypotheses of the present study in mind and apart from the fundamental differences in the stimuli related to the extent of schema-inconsistency or schema-consistency, which made it impossible to make both videos equivalent in all respects, it was however important to ensure that the videos were as equivalent as possible. In terms of the duration of the videos, both were under a minute with the schema-inconsistent video 57 seconds in duration and the schema-consistent video 53 seconds in duration. In terms of the size of the subjects in the picture and their distance from the camera, it was also endeavoured to film the scenarios in such a way that these aspects were as equivalent as possible for both versions of film. In addition, with the aim of maintaining equivalence both hijacking scenarios followed the same sequence from beginning to end, with the hijacker driving away with the stolen vehicle. Figures 3.1 and 3.2 below are temporal screen shots of both the schema-consistent and schema-inconsistent videos in the form of storyboards.

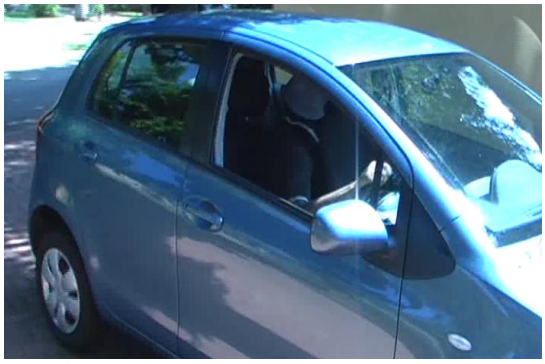
Figure 3.1: Screen shots of the schema-consistent video

1) The hijackers are waiting

2) The victim approaches the driveway

3) One hijacker approaches the victim

4) The hijacker orders the victim



5) The hijacker takes the vehicle

6) The hijackers drive away

Figure 3.2: Screen shots of the schema-inconsistent video

1) The hijacker is waiting

2) The victims approach

3) The hijacker approaches the victims

4) The hijacker orders the victims

5) The hijacker takes the vehicle

6) The hijacker drives away

For purposes of the present study, it was necessary to implement the cognitive interview technique in order to gain information from the participants regarding the recall of information after viewing the videos (see appendices C and D).

According to Geiselman (1994), a cognitive interview (CI) utilises a number of memory retrieval techniques as well as supplementary techniques for recalling specific details. Context reinstatement was one of the techniques used in the current study, which encouraged the witnesses to recreate aspects of the scene mentally as well as describe sounds and physical conditions (Bull, Holley, Koehnken, Memon, & Wark, 1997).

According to Fischer and Geiselman (1992), activating and probing a witness's mental image of the various components of an event can elicit greater details through memory recall. Bull et al. (1997) also emphasise that the cognitive interview is more effective compared to using untrained interviewers when attempting to elicit eyewitness memory. Another advantage of the cognitive interview technique is that the data can easily be quantified. The cognitive interview contained both closed and open-ended questions that assessed the memory recall of the participants. The final section of the cognitive interview instrument used in this study presented the participants with shuffle cards, which they were required to rank temporally from the first event that took place to the last.

Regarding the confounding effect of misinformation (as discussed in the literature review), the schema-consistent questionnaire and the schema-inconsistent questionnaire were structured according to the same parameters, whereby the tone in both questionnaires was identical. Both questionnaires were also phrased in such a way that the items contained in the questionnaire were not leading in any way.

3.7 Procedure

The participants in the experiment were tested individually. The study was conducted in a quiet and controlled experimental laboratory. The temperature and lighting were kept constant and comfortable for all the participants, and each participant viewed the hijacking scenario on the same monitor with the same volume and sound settings. The fact that each participant experienced the same comfortable conditions limited the possible influence of confounding variables such as anxiety, noise and extreme temperatures. The fact that each participant viewed the video on the same screen size and at the same volume level eliminated the possibility that some participants had an advantage or a disadvantage over others. Each participant was seated 50cm away from the screen, with their line of sight corresponding to the midpoint of the monitor.

As each participant left the waiting area and entered the laboratory, informed consent was obtained and a brief description of the study was given, which

informed them about the study without giving away the hypotheses. Once the participants were seated and comfortable, the following instructions were given:

> *You are going to be shown a video of a simulated hijacking. Please pay as much attention as possible to what you will be seeing and hearing; and try to remember as many details as possible. Afterwards, you will be asked a few questions about what you can remember.*

The participants were not informed that there were two videos, nor were they told which condition of the experiment they were taking part in. Before each participant viewed the video, a screening question was employed to identify whether or not the participant had previously been involved in a hijacking. Results from the two participants who were identified by this procedure as having been involved in a hi-jacking were excluded from the analysis.

Participants were randomly assigned to the schema-inconsistent and schema-consistent conditions of the experiment. The participants were required to attend to the all the elements of the video.

A filler task was presented immediately after the participants watched the videos. This task required participants to look up the telephone number of a vehicle tracking company in the local telephone directory. A task of this nature was not only unrelated to the video, but also removed the participants' attention away

from the video for a short while. The filler task was implemented to mitigate the potential impact of primary and recency effects, whereby participants would either remember more elements from the beginning or near the end of the videos.

After this, the participants were interviewed using the cognitive interview questionnaire. The questionnaire assessed the recall of the participants in terms of the type of information (TI) contained in the videos, that is, the physical characteristics of the hijacker(s) and the victim(s), behaviour of the hijacker(s) and the victim(s), verbalisations of the hijacker(s) and the victim(s), description of the scene, duration estimates, time of day and the sequence of events (see appendix C and D).

At the end of the experimental session, the participants were thanked and debriefed about the nature and purpose of the study. It was at this point that the researcher shared with participants the true purpose of the study and answered questions posed by participants.

3.8) Ethical considerations

Before the actors appeared in the videos and before the participants were exposed to any stimuli or apparatus, informed consent was obtained from them (see appendix E). This was to ensure that the participants were confident and aware that at no time before, during and after the study would their privacy,

confidentiality and anonymity be undermined (Strydom, 2002). Informed consent was also obtained from the relevant authorities and stakeholders for the filming of the videos and the collection of the data. The potential participants also had to be made aware that they would not be harmed in any way and that they had the right to withdraw from the study at any time if they wished to do so. Furthermore, the watching of a traumatic event could induce a certain level of anxiety in some individuals. Such individuals were informed that they could withdraw from the study if that was the case. None of the participants indicated experiencing any anxiety during or after the experiment.

After the results were obtained, participants were debriefed about the objectives, purpose and nature of the study. Obtaining informed consent and the subsequent debriefing ensured that the participants maintained a positive outlook towards experimental research during and after the actual research and put them at ease.

Chapter 4

Results

4.1. Data analysis

The results of the experiment are presented in this chapter. Given the experimental nature of the study and the methodology employed, the statistical analysis involved a series of steps that were followed in order to summarise, describe and interpret the data. The data were analysed using the Statistical Package for the Social Sciences (SPSS) – (Ver. 17).

The data analysis took the form of both descriptive and inferential statistics. Demographic data from the participants were analysed and the findings used to present in tabular form how each experimental group performed overall on the eyewitness memory task and with regards to each of the categories of the independent variable that was measured within-subjects (i.e. type of information).

For this study, the proportion of correct responses was used as the dependent variable. The number of correct responses for each respondent (in each category of information) was calculated and converted into a proportion out of the maximum number of possible correct responses. The proportions were converted to percentages. A score of 0.5 therefore indicated 50% accuracy.

Of the 30 participants who were tested in the schema-inconsistent condition, 15 were male (mean age=21.73, SD=1.71) and 15 were female (mean age=21.07, SD=2.49). The schema-consistent condition also consisted of 15 males (mean age=19.87, SD=1.3) and 15 females (mean age=21.2, SD=2.54).

The data were analysed using a series of mixed design ANOVAs in which both the effect of the between-subject factors and the within-subject factors were checked for statistical significance in terms of both main effects and interactions.

Firstly, the main effect of condition (schema-consistent vs. schema-inconsistent) and gender on memory recall, and their interaction, are presented. The subsequent sections describe the interactions between condition and gender on participants' memory of the hijacker details, the victim details, time dynamics and information related to the description of the scene and the sequence of events. Only significant interactions are plotted. The main effects of each of the four within-subjects factors are also described.

4.2 Overall memory performance

4.2.1 Main effect of condition on overall performance

Table 4.1 shows the overall mean scores for the schema-inconsistent group and the schema-consistent group.

Table 4.1: Descriptive statistics for 'condition'

Condition	N	Mean	Standard deviation
Schema-inconsistent	30	64.59	9.148
Schema-consistent	30	58.42	8.775
Total	**60**	**61.51**	**9.415**

A statistically significant main effect of condition was found (F (1, 58) = 14.671, p < 0.001). Overall, participants in the schema-inconsistent group performed significantly better than participants in the schema-consistent group.

4.2.2 Main effect of gender on overall performance

Table 4.2 shows the mean scores for the male and female participants.

Table 4.2: Descriptive statistics for 'gender'

Gender	N	Mean	Standard deviation
Males	30	62.26	10.168
Females	30	60.75	8.705
Total	**60**	**61.51**	**9.415**

The main effect of gender was not statistically significant (F (1, 58) = 0.460, p > 0.05) as males and females did not differ significantly in terms of their overall memory scores.

4.2.3 The overall condition and gender Interaction

Males and females in the schema-inconsistent group recalled more accurate details than males and females in the schema-consistent group. Table 4.3 shows this finding.

Table 4.3: 'Schema' and 'gender' interaction

	Schema-inconsistent		Schema-consistent	
Gender	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Males	64.04	9.95	60.49	10.42
Females	65.13	8.59	56.36	6.47

However, condition and gender did not interact significantly ($F(1, 58) = 2.588$, $p > 0.05$).

4.3 Memory for different types of information

The questions that measured participants' recall of event information were divided into 10 categories [i.e. physical description of the hijacker(s), behaviour of the hijacker(s), verbalisations of the hijacker(s), physical description of the victims(s), behaviour of the victims(s), verbalisations of the victims(s), description of the scene, duration estimates, time of day and sequence of events].

The number of correct responses in each category were counted and expressed as a percentage. This value served as the dependent variable during data analysis. The following four within-subjects factors were generated:

1. Hijacker details
    - Physical description of hijacker(s)
    - Behaviour of hijacker(s)
    - Verbalisations of hijacker(s)
2. Victim details
    - Physical description of victim(s)
    - Behaviour of victim(s)
    - Verbalisations of victim(s)
3. Time estimations
    - Duration estimates
    - Estimates of the time of day
4. Description of the scene and sequence
    - Description of the scene
    - Sequence of events

4.3.1 Memory of hijacker details

4.3.1.1 Main effect of hijacker details

Table 4.4 shows the mean performance of the participants' recall of details related to the hijacker.

Table 4.4: Descriptive statistics: hijacker details

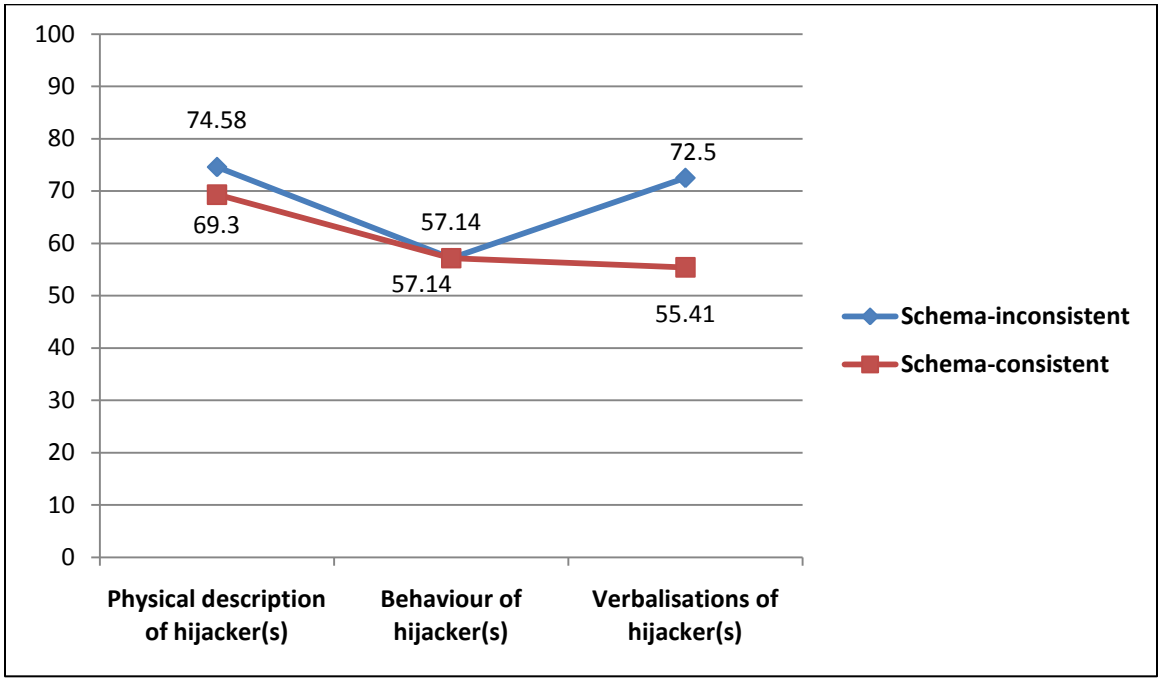
Hijacker(s) details	N	Mean	Standard Deviation
Physical description of hijacker(s)	60	71.94	12.67
Behaviour of hijacker(s)	60	57.14	17.45
Verbalisations of hijacker(s)	60	63.96	19.27

It is clear from table 4.4 that the participants' ability to recall hijacker information varied between the three categories. Participants were considerably more accurate in terms of recalling details related the physical description of the hijacker(s) in comparison to the behaviour and the verbalisations of the hijacker(s). This within-subjects effect was statistically significant ($F(2, 58) = 16.394$, $p < 0.001$).

4.3.1.2 The relationship between condition and the recall of hijacker details

The interaction between condition and the different levels of information regarding the hijacker details was statistically significant ($F(2, 58) = 5.713$, $p < 0.005$). Figure 4.1 shows this interaction.

Figure 4.1: 'Condition' and 'hijacker details' interaction



Both groups within condition were most accurate in terms of their recall of the physical description of the hijacker(s). The schema-inconsistent group scored lowest on the behaviour of the hijacker(s) and the schema-consistent group obtained the lowest mean for the verbalisations of the hijacker(s).

Furthermore the schema-inconsistent group scored considerably higher than the schema-consistent group with regards to the verbalisation of the hijacker(s) and slightly higher when it came to the physical description of the hijacker(s). These two groups however obtained the same mean score for 'behaviour of hijacker(s)'.

4.3.1.3 The relationship between gender and the recall of hijacker details

Table 4.5 shows the gender differences in terms of the recall of hijacker details.

Table 4.5: 'Gender' and 'hijacker details' interaction

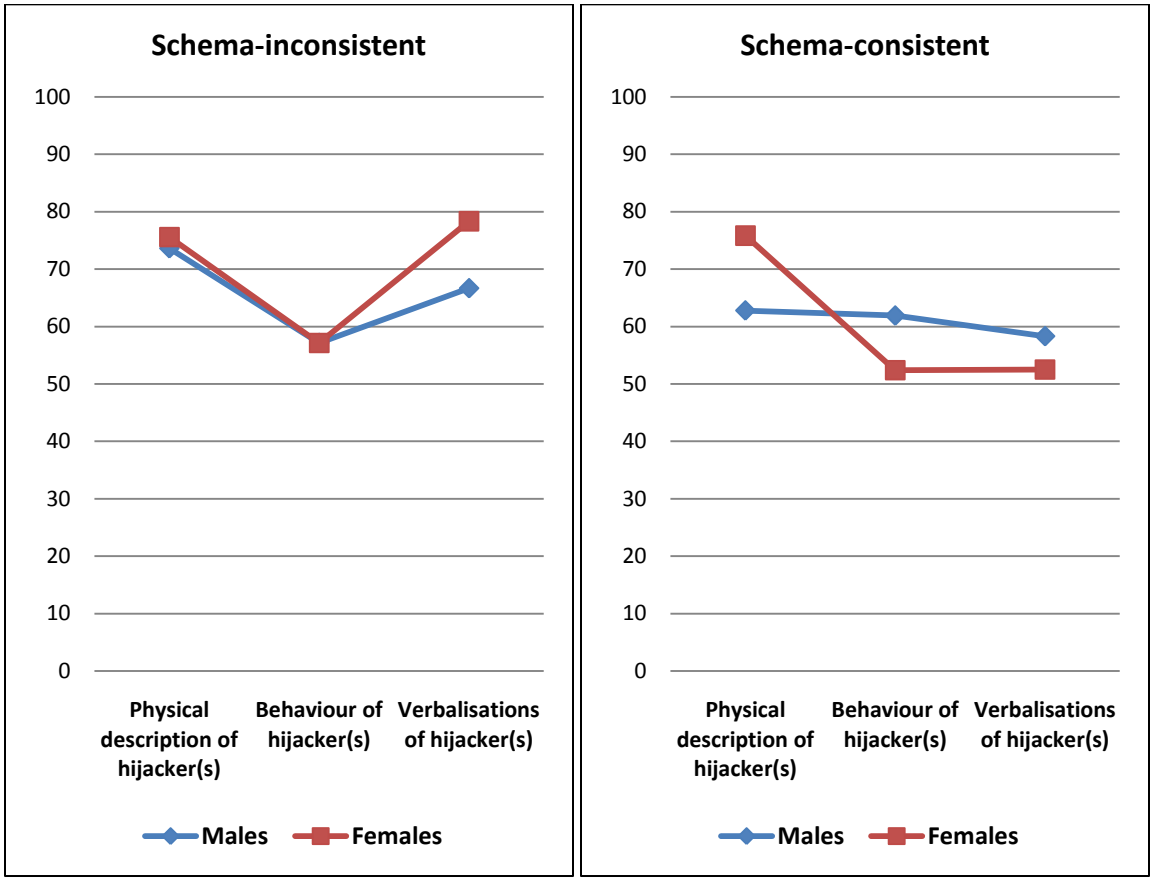
	Males		Females	
Hijacker(s) details	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Physical description of hijacker(s)	68.19	13.24	75.69	11.06
Behaviour of hijacker(s)	59.52	17.63	54.76	17.23
Verbalisations of hijacker(s)	62.5	17.37	65.42	21.16

The interaction between gender and the recall of hijacker details was not statistically significant ($F(2, 58) = 2.867$, $p > 0.05$).

4.3.1.4 The relationship between condition, gender and the recall of hijacker details

A statistically significant interaction was obtained between condition, gender and hijacker details ($F(2, 58) = 4.07$, $p < 0.021$). Figure 4.2 shows the interaction between condition, gender and the recall of the hijacker details.

Figure 4.2: 'Condition', 'gender' and 'hijacker details' interaction



The males and females in the schema-inconsistent condition performed better than the males and females in the schema-consistent condition in terms of their recall of the verbalisations of the hijacker(s).

In terms of recall of the physical description of the hijacker(s), the males in the schema-inconsistent condition performed better than the males in the schema-consistent condition but the females in the schema-inconsistent condition scored marginally lower than the females in the schema-consistent condition. In terms of the recall of the behaviour of the hijacker(s), the males in the schema-consistent group performed better than the males in the schema-inconsistent group

whereas the females in the schema-inconsistent group were more accurate than the females in the schema-consistent group.

Therefore the participants differed significantly in their recall of accurate details related to the hijacker. Also, the schema-inconsistent condition was significantly more accurate than the schema-consistent condition.

4.3.2 Memory of victim details

4.3.2.1 Main effect of victim details

Table 4.6 shows the mean performance of the participants' ability to recall details related to the victim of the hijacking.

Table 4.6: Descriptive statistics: victim details

Victim(s) details	N	Mean	Standard Deviation
Physical description of victim(s)	60	67.32	15.96
Behaviour of victim(s)	60	55.28	20.47
Verbalisations of victim(s)	60	26.53	26.99

It is clear from table 4.6 that the participants were considerably more accurate in terms of recalling details related to the physical description of the victim(s) and the behaviour of the victim(s) in comparison to the verbalisations of the victim(s). This within-subjects effect was highly significant ($F(2, 58) = 73.271$, $p < 0.001$).

4.3.2.2 The relationship between condition and the recall of victim details

Table 4.7 displays the different means obtained for the three categories related to the details of the victim(s), based on condition.

Table 4.7: 'Condition' and 'victim details' interaction

	Schema-inconsistent		Schema-consistent	
Victim(s) details	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Physical description of victim(s)	73.21	11.59	61.43	17.66
Behaviour of victim(s)	58.89	20.87	51.67	19.74
Verbalisations of victim(s)	36.39	16.59	16.67	31.71

Participants in the schema-inconsistent condition performed better than the participants in the schema-consistent condition with regards to the physical description of the victim(s), the behaviour of the victim(s) and the verbalisations of the victim(s). However, the interaction between the different levels of information regarding the victim details and condition was not statistically significant ($F(2, 58) = 1.668$, $p > 0.05$).

4.3.2.3 The relationship between gender and the recall of victim details

As is evident in table 4.8, both genders obtained the highest mean for the physical description of the victim(s), followed by the behaviour of the victim(s) and then the verbalisations of the victim(s).

Males had a higher mean score than females for the behaviour of the victim(s) and the verbalisation of the victim(s) categories, while females exhibited better recall for the physical description of the victim(s). However, these differences were not statistically significant (F (2, 58) = 0.817, p > 0.05).

Table 4.8: 'Gender' and 'victim details' interaction

	Males		Females	
Victim(s) details	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Physical description of victim(s)	65.95	18.75	68.69	12.75
Behaviour of victim(s)	58.33	20.41	52.22	20.40
Verbalisations of victim(s)	27.5	28.2	25.56	26.16

4.3.2.4 The relationship between condition, gender and the recall of victim details

The males and females in the schema-inconsistent condition had a better recall of the physical description of the victim(s), behaviour of the victim(s) and verbalisation of the victim(s) than the males and females in the schema-consistent condition. However, the interaction was not significant (F (2, 58) = 0.66, p > 0.05).

4.3.3 Memory of time

4.3.3.1 Main effect of time

Table 4.9 shows the mean performance of the participants' recall of time characteristics.

Table 4.9: Descriptive statistics: time

Time details	N	Mean	Standard Deviation
Duration estimates	60	40	29.23
Time of day	60	83.75	15.83

The 'time' within-subjects effect was statistically significant ($F(1, 58) = 116.769$, $p < 0.001$). The participants were substantially more accurate in their estimations of the time of day in comparison to their duration estimates, which were consistently overestimated.

4.3.3.2 The relationship between condition and time estimations

Table 4.10 shows how the schema-inconsistent and the schema-consistent groups performed with regards to time estimations.

Table 4.10: 'Condition' and 'time' interaction

Time details	Schema-inconsistent		Schema-consistent	
	Mean	Standard Deviation	Mean	Standard Deviation
Duration estimates	40.67	29.47	39.33	29.47
Time of day	90.83	13.9	76.67	14.58

Both schema groups performed better in terms of estimating the time of day in comparison to estimating duration. In terms of the difference between the scores of the two groups and time of day estimations, the schema-inconsistent group obtained a higher mean score in comparison to the schema-consistent group. In relation to the duration estimates, which were overestimated by both groups, the schema-inconsistent group performed marginally better than the schema-consistent group. However, the interaction between condition and time estimations was not statistically significant ($F(1, 58) = 2.512$, $p > 0.05$).

4.3.3.3 The relationship between gender and time estimations

As is evident in table 4.11, both genders performed better with regards to estimating the time of day in contrast to duration estimates. Males had a higher mean score in terms of the duration estimates in comparison to females. Males also scored slightly better than females with regards to the estimations of the time of day. However, the interaction between gender and time estimations was not statistically significant ($F(1, 58) = 1.475$, $p > 0.05$).

Table 4.11: 'Gender' and 'time' interaction

Time details	Males		Females	
	Mean	Standard Deviation	Mean	Standard Deviation
Duration estimates	45.33	31.48	34.67	26.23
Time of day	84.17	15.37	83.33	16.52

4.3.3.4 The relationship between condition, gender and time estimations

Condition, gender and time estimations did not interact significantly ($F (1, 58) = 0.187$, $p > 0.05$).

Therefore, considering the findings related to time estimations neither condition nor gender accounted for the variations in the accuracy of recall as none of the obtained differences in terms of condition, gender and the interactions were statistically significant.

4.3.4 Memory of the description of the scene and sequence of events

4.3.4.1 Main effect of the description of the scene and sequence of events

Table 4.12 shows the mean performance of the participants' recall of details related to the description of the scene and the sequence of events.

Table 4.12: Descriptive statistics: description of the scene and sequence of events

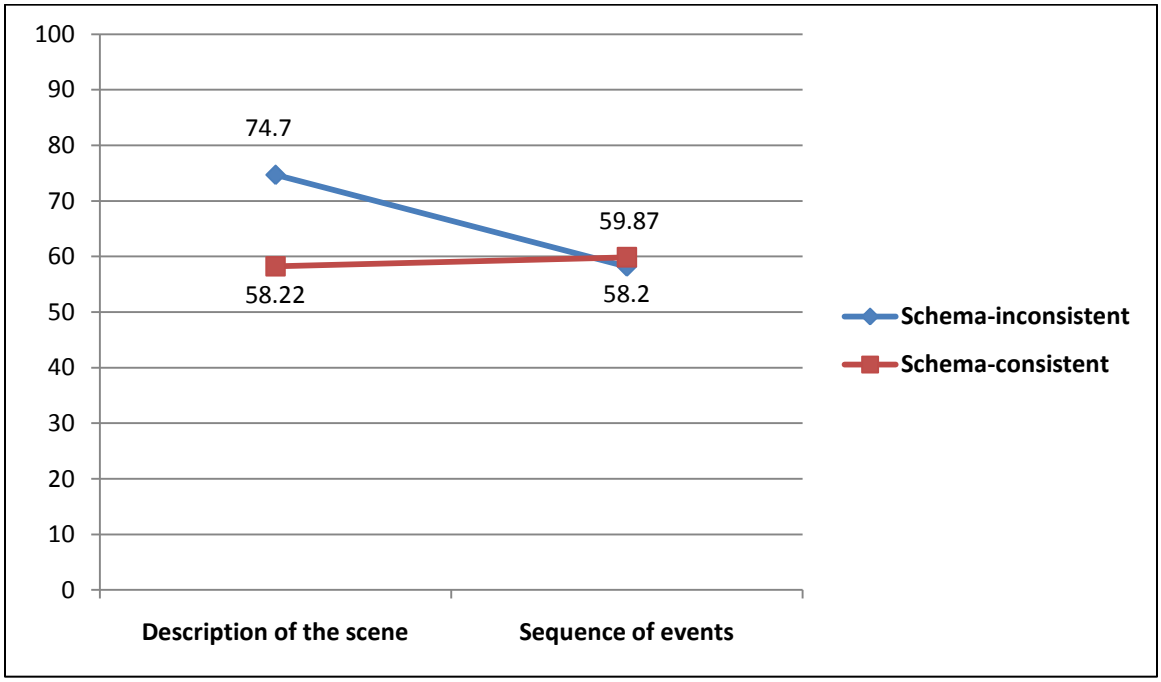
Description of the scene and sequence of events	N	Mean	Standard Deviation
Description of the scene	60	66.46	16.83
Sequence of events	60	59.04	19.14

The participants were more accurate in recalling details related to the scene than they were in recalling the sequence in which the event took place. This difference was statistically significant ($F(1, 58) = 7.210$, $p < 0.01$).

4.3.4.2 The relationship between condition and the description of the scene and sequence of events

The interaction between condition and the recall of the description of the scene and sequence of events was statistically significant ($F(1, 58) = 10.771$, $p < 0.0021$). Figure 4.3 shows this interaction.

Figure 4.3: 'Condition' and the 'description of the scene and sequence of events' interaction



The schema-inconsistent group and the schema-consistent group obtained a similar mean score in terms of recalling the sequence of events that took place. In terms of the description of the scene, the schema-inconsistent group was considerably more accurate than the schema-consistent group.

4.3.4.3 The relationship between gender and the description of the scene and sequence of events

Table 4.13 displays the gender differences in terms of the description of the scene and the sequence of events.

Table 4.13: 'Gender' and the 'description of the scene and sequence of events' interaction

Description of the scene and sequence of events	Males		Females	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**
Description of the scene	68.01	17.57	64.91	16.2
Sequence of events	60	18.59	58.08	19.96

The mean differences between males and females regarding the description of the scene and the sequence of events were not statistically significant ($F (1, 58) = 0.045$, $p > 0.05$).

4.3.4.4 The relationship between condition, gender and the description of the scene and sequence of events

Condition, gender and the recall of the description of the scene and sequence of events did not interact significantly ($F (1, 58) = 0.007$, $p > 0.05$),

Therefore, condition played an important role in the participant's accuracy of recall for the description of the scene and their sequencing of the event as the schema-inconsistent group were more accurate than the schema-consistent group. This trend also remained regardless of gender.

Chapter 5

Discussion, conclusion, recommendations and limitations of the study

5.1 Discussion

The results from the current study suggest that the extent to which information corresponded or did not correspond with the pre-existing schema or "script" of an event influenced the degree to which participants recalled information to which they had been exposed moments earlier.

Firstly, it seems that the very nature of the information that we perceive may predict how well we are able to recall the information at a later time. On an overall level, individuals who were exposed to new information that was inconsistent with the typical schema of a hijacking event were able to recall details more accurately than individuals who were exposed to information that was consistent with the hijacking schema. This finding confirms the first hypothesis of the study.

Secondly, the results of the present study suggest that the ability to recall event information does not depend on one's gender. In this study, females and males did not differ significantly in their ability to recall the details to which they were exposed. This was found to be the case for the overall data set as well as for the different information types that were included in the study. Thus, the second

hypothesis of the study was not supported by the data. This finding differs with the findings of studies that have established a significant gender difference in memory recall (Yonker, Eriksson, Nilsson & Herlitz, 2003; Yonker, Nilsson, Herlitz & Anthenelli, 2005; Guillem & Mograss, 2005; Herlitz & Rehnman, 2008).

Considering the relationship between condition and gender on an overall level, the participants more accurately recalled details from the schema-inconsistent event compared to the schema-consistent event regardless of whether or not they were female or male. This means that apart from the fact that there were no significant differential dynamics between the accuracy of recall between females and males, there were also no significant differences between the females and males who were exposed to the schema-inconsistent condition compared to the females and males who were exposed to the schema-consistent condition. Therefore, unlike the suggestion made by Guillem and Mograss (2005), maintaining that males are more prone to schema activation and the resulting distortion, the present study did not provide evidence of this.

The third hypothesis of the study, that there would be differences between the recall of the participants across the ten information categories was supported by the data as each of the four within-subjects categories (hijacker details, victim details, time estimations and the description of the scene and event sequencing) had a significant main effect on the accuracy of the participants. With respect to the hijacker details the participants were most accurate in their recall of the

physical description of the hijacker(s), followed by the verbalisations of the hijacker(s) and least accurate when it came to the behaviour of the hijacker(s). Concerning the recall of victim details, the participants were most accurate in their recall of the physical description of the victims, followed by the behaviour of the victim(s) and least accurate in terms of the verbalisation(s) of the victim(s). Regarding their estimations of time, the participants were substantially more accurate in their estimations of the time of day than their duration estimates, which were consistently overestimated. This finding, that the participants overestimate the duration of the event corroborates the results of other studies in this regard (e.g. Yarmey, 1993; Yarmey and Yarmey, 1997). Lastly, regading the description of the scene and the sequence of events, participants were more accurate in recalling the scene than sequencing the events.

Comparing the ten information categories, the participants were most accurate in their estimations of time of day. The participants were more accurate in terms of the physical descriptions of the hijacker(s), the victim(s) and the scene in comparison to the behaviour and verbalisations. The accuracy of the participants was similar with regards to the recall of the behaviour of the hijacker(s) and the victim(s) and the participants better recalled the verbalisations of the hijacker(s) in comparison to the verbalisations of the victim(s). This is different from the findings of Chiroro and Sibanda (2004), who staged a robbery in a store, where the recall was most accurate, among the adult (16-21 years) group, for verbalisations, followed by behaviour and then the descriptions. In comparison

to hijackings, in-store robberies, which are longer in duration, are characterised by a greater range of verbalisations and behaviours. Witnesses of robberies of this nature therefore have a greater opportunity to attend to these elements in comparison to witnesses of vehicle hijackings.

However, in terms of the fourth hypothesis, the model does not provide sufficient evidence that the hijacker details were recalled significantly more accurately than the victim details, although there was a greater proportion of correct responses for the physical description of the hijacker(s), the behaviour of the hijacker(s) and the verbalisations of the hijacker(s) in comparison to the behaviour of the victim(s), the verbalisation(s) of the victim(s) and the physical description of the victim(s) respectively.

In relation to the fifth hypothesis of the study, whereby it was expected that there would be significant interactions between the within-subjects factor ‘type of information’ and condition on the one hand and gender on the other, key interactions were obtained. Condition accounted for significant proportions of the variance for the recall of hijacker details but not the victim details. The schema-inconsistent group performed better than the schema-consistent group with regards to the physical description of the hijacker(s) and the verbalisation(s) of the hijacker(s) but not the behaviour of the hijacker(s). In terms of the recall of victim details the schema-inconsistent group outperformed the schema-consistent group but not significantly so.

In terms of time estimations, condition did not account for the differences in the participants estimations of duration and time of day as the schema-inconsistent group did perform better than the schema-consistent group but the differences between the two groups for the duration estimates was not substantial. Lastly, in relation to the description of the scene, the participants' accuracy in this regard was dependent on condition as the schema-inconsistent group were significantly more accurate than the participants in the schema-consistent group. Both groups were similar in their ability to remember the sequence of events.

Although the means of males and females differed in terms of their recall of the hijacker details, victim details, time estimations, description of the scene and event sequencing these differences were not statistically significant.

In conclusion, the schema-inconsistent group performed significantly better than the schema-consistent group on overall memory recall accuracy, the recall of the physical description and verbalisations of the hijacker and the description of the scene. The schema-inconsistent group was also more accurate for time of day estimations and in their recall of the victim details. The two groups performed comparably in terms of duration estimates and the recall of hijacker behaviour and the schema-consistent group only slightly outperformed the schema-inconsistent group when it came to sequencing the event.

In relation to the four within subjects factors comprised of the 'types of information categories' of the present study, condition was a key factor when it came to the recall of the hijacker details and the description and sequencing of the event as the schema-inconsistent group performed significantly better than the schema-consistent group.

The above findings support the growing body of empirical evidence that asserts that in comparison to schema-consistent information, schema-inconsistent information is recalled better, as these findings correspond with those of Neisser (1967), Holst and Pezdek (1992), Davidson (1994), Greenberg, Westcott and Bailey (1998), Neuschatz, Lampinen, Preston, Hawkins and Toglia (2002), Tuckey and Brewer (2003), Kleider, Pezdek, Goldinger and Kirk (2008) and other studies, with regard to the differences between the memory of schema-inconsistent and schema-consistent events. The fact that schema-inconsistent and atypical information was remembered better than the typical information also corroborates the conclusion made by Christianson (1992) regarding improved memory performance when it comes to participants witnessing an unexpected event.

However, the results obtained from this study do not support the findings of studies in which schema-consistent events were recalled better (Johnson, 1970; Nakamura, Graesser, Zimmerman and Riha, 1985; Rice & Okun, 1994; Feldman, 1998; Butler & Pallone, 2002). Recently, a very compelling argument has been

put forth by numerous authors regarding why schema-inconsistent information may be recalled better in some instances and schema-consistent information recalled better in others.

According to Dijksterhuis and Knippenberg (2006) the key factor that influences the extent to which schema-inconsistent information is recalled is the duration of exposure to the information, as inconsistencies take up more processing time and are more difficult to encode. Therefore, if individuals are granted sufficient time during exposure, the schema-inconsistent information may be recalled similarly to, or better than, the schema-consistent information (Pozzulo & Weeks, 2007).

As the cognitive load or complexity of a task increases, Bodenhausen and Lichtenstein (1987) found that schema activation aids recall and schema-inconsistent information is neglected. In the present study, the cognitive load was comparable between the schema-inconsistent condition and the schema-consistent condition.

It is therefore possible that we devote more mental resources to new information that is atypical and inconsistent with our schemas of an event and are subsequently able to recall the information more accurately in comparison to new information that we would expect, which is most likely to be assimilated into our already formed schema of the event and may then become prone to distortion.

The implication of this in the realm of eyewitness testimony is evident in that the accounts of witnesses who experienced atypical hijackings are likely to be more accurate than the accounts of individuals who witnessed the typical hijacking scenario. The witness's account of the event may be distorted by his or her cognitive schema of that event, in such a way that certain bits of information may be modified to suit the schema as less accurate recall was obtained from the schema-consistent group. As Koriat, Goldsmith and Pansky (2000) clarified, it is likely that schema-based inferences or reconstructions replace the original input information with generic schema information, which results in retrieval distortions or commission errors.

The schema of the witness may therefore prescribe what is recalled. For example, the witness may recall the presence of a handgun, when in fact the perpetrator carried no such item, or recall distinct characteristics and behaviours, which were not displayed by the perpetrator.

5.2 Conclusion and recommendations for future research

It must be pointed out that officials who carry out interviews with eyewitnesses need to be sensitive to the effect that cognitive schemas can have on memory recall in that the questions must be formatted in such a way to counteract distortion. A style of questioning that assesses the details and focuses on specific elements is recommended over and above a spontaneous and free-recall format, which may be more prone to distortion from the schema of the

event. The interviewing official must also keep in mind that the eyewitness is likely to overestimate the duration of the event and recall the fewest amount of accurate information with regard to the verbalisations of the victim(s) as more attention will be allocated to the description of the hijacker(s), victim(s), the scene and what the hijacker(s) said.

While numerous attempts were made at a methodological level to improve the validity of the present study, it is still possible to identify some recommendations for future research.

Regarding the between-subjects effects of the two independent variables 'condition' and 'gender', the findings of the current study suggest that individuals are more likely to accurately recall information from an event at a later time if the information is inconsistent with their schema of that event and that this phenomenon also seems to maintain regardless of whether or not the individual is male or female. As the relationship between the recall accuracy of schema-inconsistent information and schema-consistent information may be dependent on the cognitive load of the task, it is recommended that future research investigates the interaction between cognitive load and condition in order to ascertain if the ability to recall schema-inconsistent information depends on the cognitive load of the stimulus task, in comparison to schema-consistent information.

For future research it is also recommended that the design could be expanded to investigate the effect that suggestive or misleading questioning has on individuals' ability to recall schema-consistent and schema-inconsistent information. Individuals who are exposed to the schema-consistent video may be more prone to suggestive questioning if it is constructed around typical or expected elements.

Staying in line with experimental investigations of memory recall whereby a developmental approach is often implemented, it is recommended that the effect of age be determined. Future research should include participants of different ages from children to adults. Such a design will not only indicate which age groups have a superior memory recall but also at which point in the developmental span children begin to show schema effects. The memory of children with less developed schemas may for example be less prone to distortion in comparison to adults. With the aim of maximising the scientific rigour of investigations of this nature, it is recommended that the verbalisations be made comparable both in quantity and general content for both conditions.

The results of the current study indicated that the schema-inconsistent group recalled a greater proportion of accurate details across eight of the ten within-subjects' categories, most notably the verbalisations of the hijacker(s) and the verbalisations of the victim(s). For future investigations, it is recommended that a rigorous analysis be conducted in order to identify significant differences between

the categories and between the means of the schema-inconsistent group for the within-subjects categories and the means of the schema-consistent group. However, the current study does suggest that schema information plays a more important role when it comes to the recall of the characteristics of the hijacker(s) and the description of the scene.

It is also recommended that a temporal element be included into the design of the research whereby the phenomenon of memory decay is investigated. By measuring the dependent variable initially and then delayed recall at repeated intervals one will be able to identify at which stage after witnessing an event the recall of the various elements begin to significantly decay and if the level of the schema-consistency of the witnessed information determines at which stage recall begins to decay.

A further recommendation for future investigations is to measure whether or not the format of the measurement instrument has an effect on the accuracy of memory recall. Research of this nature may therefore measure recall using different types of instruments, for example the cognitive interview, self reporting, free recall and unstructured interviewing and assess whether or not there are significant differences between groups with regard to the different measurement instruments and an interaction with the experimental condition (i.e. schema).

5.3 Limitations of the present study

Ideally, a study of this nature should be designed in such as way that the schema-inconsistent and schema-consistent stimuli are equivalent in all respects, barring the one is schema-inconsistent and the other schema-consistent. However, in the present study, which involved two versions of film and the manipulation of the level of schema-consistency between the two films, an unavoidable confound was introduced in that the equivalence between the films became more challenging to uphold, as the difference in schema-consistency between the two film was introduced for all the characteristics under investigation. This is a key limitation of the present study. Preferably, a confound of this nature should be eliminated by filming several versions of the scenario whereby the schema-inconsistent elements are introduced one at a time, or with every new version of film, thus ensuring that the remainder of the scenario remains equivalent in other respects.

One of the limitations of the present study was the sample size. The small sample size could have resulted in less stable data, making it difficult to infer conclusively whether or not the lack of statistical significance found for most of the interactions was a true reflection of the nature of the existing relationships in the population.

Another limitation of the current study relates to issues around external validity (i.e. whether or not these findings can be generalised to the real world

environment). Due to the fact that in real life contexts, witnesses may be confronted with new information, some of which is consistent with their schemas and some of which is inconsistent, the current research design can be compared with subsequent investigations that are transformed to include both types of information in a single stimulus. It is also recommended that the effect of schema on memory be explored in realms outside of criminal events such as advertising. This will make it possible to investigate the effects of schemas in diverse real life circumstances.

The present study was of an experimental nature, interested in the effect of cognitive schemas on memory. The results obtained may not necessarily be generalisable to "real life" hijackings since these events occur in unique circumstances and have varied outcomes. The reason why a hijacking event was decided upon for the current research is that it was assumed that people in South Africa may have strong schemas and ideas about hijacking, given the high incidence of hijacking in this country.

To date, research investigating the effect of schemas on memory has not received much attention among South African researchers. The findings of the current study serve as a yardstick against which future investigations of this nature can be compared.

References

Bjorklund, D.F., Cassel, W.S., Brorklund, B.R., Brown, R.D., Park, C.L., Ernst, K., & Owen, F.A. (2000). Social demand characteristics in children's and adult's eyewitness memory and suggestibility: the effect of different interviewers on free recall and recognition. *Applied Cognitive Psychology, 14,* 421-433.

Bodenhausen, G.V., & Lichtenstein, M. (1987). Social stereotypes and information-processing strategies: The impact of task complexity. *Journal of Personality and Social Psychology, 52*, 871-880.

Brown, J.D. (2006). *Social psychology*. New York: McGraw-Hill.

Bull, R., Holley, A., Koehnken, G., Memon, A., & Wark, L. (1997). Eyewitness performance in cognitive and structured Interviews. *Memory, 5*(5), 639-656.

Butler, M.A., & Pallone, N.J. (2002). Accuracy of recall among "eyewitnesses" to a simulated robbery: Intrapersonal and stimulus determinants. *Current Psychology, 21*(3).

Ciccarelli, S.K., & Meyer, G.E. (2006). *Psychology*. Upper Sadle River, NJ: Pearson Prentice Hall.Chiroro, P., & Sibanda, M (2004). Age and suggestibility effects in eyewitness testimony. *Zimbabwe Law Review,* 27-37.

Christianson, S. (1992). Emotional stress and eyewitness memory: A critical review. *Psychological Bulletin, 112*, 284–309.

Davidson, D. (1994). Recognition and recall of irrelevant and interruptive atypical actions in script-based stories. *Journal of Memory and Language, 33*, 757-75.

Davies, G., & Alonso-Quecuty, M. (1997). Cultural factors in the recall of a witnessed event. *Memory, 5*(5), 601-614.

Dijksterhuis, A.P., & Van Knippenberg, A.D. (2006). Memory for stereotype-consistent and stereotype-inconsistent information as a function of processing pace. *European Journal of Social Psychology, 25*(6), 689-693.

Dobson, M., & Markham, R. (2001). Individual differences in anxiety level and eyewitness memory. *The Journal of General Psychology, 119*(4), 343-350.

Feldman, R.S. (1998). *Social psychology*. Upper Saddle River, NJ: Prentice-Hall.

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

Galotti, K.M. (2004). *Cognitive psychology in and out of the laboratory* (3rd ed.). Belmont, CA: Thomson Wadsworth.

Geiselman, R.E. (1994, July). *Ten years of cognitive interviewing*. Paper presented at the Third Practical Aspects of Memory Conference, Maryland, USA.

Greenberg, M.S., Westcott, D.R., & Bailey, S.E. (1998). When believing is seeing: The effects of scripts on eyewitness memory. *Law and Human Behaviour, 22*(6), 685-693.

Guillem,M., & Mograss, M. (2005). Gender differences in memory processing: Evidence from event-related potentials to faces. *Brain and Cognition, 57*, 84–92.

Henkel, L.A., & Mather, M. (2007). Memory attributions for choices: How beliefs shape our memories. *Journal of Memory and Language, 75*, 163-176.

Herlitz, A., & Rehnman, J. (2008). Sex differences in episodic memory. *Current Directions in Psychological Science, 17*(1), 52-56.

Holst, F.H., & Pezdek, K. (1992). Scripts for typical crimes and their effects on memory for eyewitness testimony. *Applied Cognitive Psychology, 6*, 573-587.

Ihledaek, C., Love, T., Eilertsen, D.E., & Magnussen, S. (2003). Memory for a staged event witnessed live and on video. *Memory, 11*(3), 319-327.

Jaschinski, U., & Wentura, D. (2002). Misleading postevent information and working memory capacity: An individual differences approach. *Applied Cognitive Psychology, 16*, 223-231.

Johnson, R.E. (1970). Recall of prose as a function of the structural importance of the linguistic units. *Journal of Verbal Learning and Verbal Behavior, 9*, 12-20.

Kleider, H.M, Pezdek, K., Goldinger, S.D., & Kirk, A. (2008). Schema-driven source misattribution errors: Remembering the expected from a witnesses event. *Applied Cognitive Psychology, 22*, 1-20.

Koriat, A., Goldsmith, M., & Pansky, A. (2000). *Toward a psychology of memory accuracy. Annual Revue of Psychology, 51*, 481-537.

Lampinen, J.M., Faries, J.M., Neuschatz, J.S., & Toglia, M.P. (2000). Recollections of things schematic: The influence of scripts on recollective experience. *Applied Cognitive Psychology, 14*, 543-554.

Lezak, M.D. (1995). *Neuropsychological Assessment* (3rd ed.). New York: Oxford University Press, Inc.

Mayer, R.E. (2003). Memory and information processes. In B. Weiner (Ed.), *Handbook of psychology* (Vol. VIII). New York: Wiley.

Nairne, J.S. (2003). *Psychology: The Adaptive Mind* (3rd ed.). Belmont, CA: Thomson Wadsworth.

Nakamura, G.V., Graesser, A.C., Zimmerman, J.A., & Riha, J. (1985). Script processing in a natural situation. *Memory and Cognition, 13*, 140-144.

Neisser, U. (1967). *Cognitive Psychology*. New York: Appleton-Century-Crofts.

Neuschatz, J.S., Lampinen, J.M., Preston, E.L., Hawkins, E.R., & Toglia, M.P. (2002). The effect of memory schemas on memory and the phenomenological experience of naturalistic situations. *Applied Cognitive Psychology, 16*, 687-708.

Pozzulo, J., & Weeks, M. (2007). Visual stereotypes in an eyewitness context. In J. Zebrowski (Ed.), *New research on social perception* (pp.109-126). Hauppauge, NY: Nova Science Publishers, Inc.

Rice, G.E., & Okun, M.A. (1994). Older readers' processing of medical information that contradicts their beliefs. *Journal of Gerontology, 49*, 119–128.

Rumelhart, D.E., & Ortony, A. (1977). The Representation of Knowledge in Memory. In R.C. Anderson, R.J. Spiro, & W.E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 99 – 135). Hillsdale, NJ: Erlbaum.

Santrock, J.W. (2005). *A Topical Approach to Life-span Development* (2nd ed.). New York: McGraw-Hill.

Schacter, D.L. (2001). *The seven sins of memory*. Boston: Hoghton Mifflin.

Shaw, J., & Skolnick, P. (1994). Gender differences, weapon focus, and eyewitness reliability. *Journal of Social Psychology, 134*(4), 413-420.

Slone, A.E. , Brigham, J.C., & Meissner, C.A. (2000). Social and cognitive factors affecting the own race bias in whites. *Basic and Applied Social Psychology, 22*(2) , 71-84.

South African Police Service (2008). *Crime statistics: carjacking (subcategory of aggravated robbery)*. Retrieved April 20, 2009, from http://www.saps.gov.za/statistics/reports/crimestats/2008/march_april_2001_2008/catagory/carjacking.pdf.

Sternberg, R.J. (2006). *Cognitive Psychology* (4th ed.). Belmont, CA: Thomson Wadsworth.

Strydom, H. (2002). Ethical aspects of research in the social sciences and human service professions. In A.S. de Vos (Ed.), *Research at grass roots: For the social sciences and human service professions* (2nd ed.). (pp. 62-75). Pretoria: Van Schaik.

Terry, W.S. (2003). *Learning and memory* (2nd ed.). Boston: Allyn & Bacon.

Tomes, J.L., & Katz, A.N. (1997). Habitual susceptibility to misinformation and individual differences in eyewitness memory. *Applied Cognitive Psychology, 11,* 233-251.

Tuckey, R.M., & Brewer, N. (2003). How schemas affect eyewitness memory over repeated retrieval attempts. *Applied Cognitive psychology, 17*(7), 785 – 800.

Ward, R.A., & Loftus, E.F. (1985). Eyewitness performance in different psychological types. *The Journal of General Psychology, 112*, 191–200.

Yarmey, D. (1993). Adult age and gender differences in eyewitness recall in field settings. *Journal of Applied Social Psychology, 23*(23), 1921 – 1932.

Yarmey, D.A., & Yarmey, J.M. (1997). Eyewitness recall and duration estimates in field settings. *Journal of Applied Social Psychology, 27*(4), 330-344.

Yonker, J.E., Eriksson, E., Nilsson, L.-G., & Herlitz, A. (2003). Sex differences in episodic memory: The minimal influence of estradiol. *Brain and Cognition, 52*, 231-238.

Yonker, J.E., Nilsson, L.-G., Herlitz, A., & Anthenelli, R.M. (2005). Sex differences in spatial visualisation and episodic memory as a function of alcohol consumption. *Alcohol & Alcoholism, 40*(3), 201-207.

Zillmer, E.A., & Spears, M.V. (2001). *Principles of Neuropsychology*. Belmont, CA: Thomson Wadsworth.

Appendix A: Schema Identifying Questionnaire (SIQ)

Dear respondent

I am a registered postgraduate student at the University of Pretoria. As part of my studies, I have chosen to study people's views on hijacking. This questionnaire seeks to gather information on this topic. Your participation in this study will be highly appreciated. You are not required to fill in your name or any other personally identifying information on this questionnaire. This ensures that you remain anonymous. Also, your responses will be treated confidentially.

Demographic information

Age:	

Gender:	Male:	Female:

Race:	Black:	White:	Coloured:	Indian:	Other:

Have you ever been a victim of a hijacking?	Yes:	No

If so, in what capacity (direct victim, witness etc)?

_____

_____

_____

_____

_____

Please note: *this questionnaire requires you to provide information on what you think to be a typical hijacking, regardless of whether or not you have experienced it. Individuals who have not experienced a hijacking may also complete this questionnaire, since its goal is to collect information on the publics' image of hijacking and not actual recall of hijacking events.*

Please make sure that the above information is filled in and correct before turning over.

Section 1

For each of the following elements, please indicate what you believe to be a characteristic of a typical hijacking scenario, by making a cross in the corresponding box:

1.1) **Number of hijackers:**

One:	Two:	More:	Specify how many:

1.2) **Number of victims:**

One:	Two:	More:	Specify how many:

For each of the elements in the table below, please indicate what you believe to be a characteristic of both hijackers and victims, by circling one of the corresponding numbers, for both hijackers and victims

	Hijacker					**Victim**				
Gender	Male		Female			Male		Female		
	1		2			1		2		
Race	Black	White	Coloured	Asian		Black	White	Coloured	Asian	
	1	2	3	4		1	2	3	4	
Age:	15-24	25-34	35-44	45-54	55 +	15-24	25-34	35-44	45-54	55 +
	1	2	3	4	5	1	2	3	4	5
Socio-economic status	Poor	Average		Wealthy		Poor	Average		Wealthy	
	1	2		3		1	2		3	

Section 2`

*For each of the following elements, please indicate what you believe to be the likelihood of such an element occurring in a typical hijacking scenario, by **circling one** of the corresponding numbers:*

Characteristics of hijacker(s)

Clothing and appearance	Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	
Wears a disguise	1	2	3	4	5	
Wears a balaclava (copper-head)	1	2	3	4	5	
Wears a mask	1	2	3	4	5	
Wears dark clothes	1	2	3	4	5	
Wears black clothes	1	2	3	4	5	
Wears jeans	1	2	3	4	5	
Wears a jacket	1	2	3	4	5	
Wears a cap or hat	1	2	3	4	5	
Wears a jewellery	1	2	3	4	5	
Carries a weapon	1	2	3	4	5	
Carries a gun	1	2	3	4	5	
Carries a bag	1	2	3	4	5	

If you feel that there are other important characteristic clothing items and accessories that hijackers are likely to wear or use, please explain:

Behaviour of Hijacker(s)	Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	
Says something	1	2	3	4	5	
Yells at victim	1	2	3	4	5	
Work in teams	1	2	3	4	5	
Behaves aggressively	1	2	3	4	5	
Behaves nervously	1	2	3	4	5	
Makes threats	1	2	3	4	5	
Warns of consequences	1	2	3	4	5	
Talks in a calm voice	1	2	3	4	5	
Instructs passengers	1	2	3	4	5	
Makes demands	1	2	3	4	5	
Orders victim to get out	1	2	3	4	5	
Shots fired	1	2	3	4	5	
Takes victims belongings	1	2	3	4	5	
Speeds away	1	2	3	4	5	

If you feel that there are other important behavioural characteristics that hijackers are likely to display, please explain: use, please explain:

_____

_____

_____

Characteristics of Victim(s)

Behaviour of Victim(s)	Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	
Victim(s) cooperate	1	2	3	4	5	
Behave nervously	1	2	3	4	5	
Behave aggressively	1	2	3	4	5	
Victim(s) faint	1	2	3	4	5	
Victim(s) don't cooperate	1	2	3	4	5	
Victim(s) plea for life	1	2	3	4	5	
Victim(s) look at hijackers	1	2	3	4	5	
Victim(s) runaway	1	2	3	4	5	
Victim(s) fall on ground	1	2	3	4	5	
Victim(s) inside car when attacked	1	2	3	4	5	

If you feel that there are other important behavioural characteristics that victim(s) are likely to display, please explain:

_____

_____

_____

_____

_____

Section 4

*For each of the following elements please indicate what you believe to be typical of a hijacking event by **circling one** of the corresponding numbers:*

The event	Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	
Takes place during the evening	1	2	3	4	5	
Takes place at a stop sign	1	2	3	4	5	
Takes place at a yield sign	1	2	3	4	5	
Takes place in a driveway	1	2	3	4	5	
Target vehicle expensive car	1	2	3	4	5	
Target vehicle inexpensive car	1	2	3	4	5	
Hijacking takes seconds	1	2	3	4	5	
Hijacking takes minutes	1	2	3	4	5	
Hijacking successful	1	2	3	4	5	
Victim(s) survive	1	2	3	4	5	
Victim(s) are injured	1	2	3	4	5	
Back-up/Getaway vehicle present	1	2	3	4	5	

If there is anything else you would like to add that you feel is typical of a hijacking event, please do so in the space provided (this could be regarding the perpetrators, the victims and the event).

Section 5

Please turn over for section 5

Section 5

In the table below please indicate what you believe to be the order or sequence of events of a typical hijacking by ranking the statements in the order that you believe they take place, placing a number (from 1 to 9) next to each statement. ***A number 1*** *next to a statement will for example indicate that it is the 1st thing to happen during the hijacking and a* ***number 9*** *will indicate that it is the last thing to happen. If you believe that any of the statements don't occur during typical hijackings please indicate so by marking the applicable statements(s) with* ***NA****.*

Occurrence	**Number/Rank**
Hijacker(s) injures victims	
Victim(s) get out of the vehicle	
Hijacker(s) order victim(s)	
Victim(s) stops vehicle	
Victim(s) stunned	
Hijacker(s) appear	
Hijacker(s) drives away	
Hijacker(s) gets in vehicle	
Victim(s) driving	

**********THANK YOU FOR YOUR COOPERATION**********

Appendix B: SIQ tables and results

Table A1: Breakdown of the SIQ sample

Demographic		Frequency	Percent
Age	**18 - 20**	15	33.3
	21 - 23	16	35.6
	24 - 26	8	17.8
	27 - 30	6	13.3
	Total	**45**	**100**
Gender	**Male**	24	53.3
	Female	21	46.7
	Total	**45**	**100**
Population group	**Asian**	8	17.8
	Black / African	17	37.8
	Coloured	6	13.3
	White	13	28.9
	Other	1	2.2
	Total	**45**	**100**

Table A2: Number of hijacker(s) and victim(s)

Number of hijackers	**1 hijacker**	**2 hijackers**	**3 hijackers**	**4 hijackers**	**5 hijackers**	**Total**
Frequency	3	23	14	4	1	**45**
Percent	6.7	51.1	31.1	8.9	2.2	**100.0**
Number of victims	**1 victim**	**2 victims**	**3 victims**	**4 victims**	**5 victims**	**Total**
Frequency	28	12	1	2	2	**45**
Percent	62.2	26.7	2.2	4.4	4.4	**100.0**

Table A3: Demographic details of the hijacker(s)

Demographic		Frequency	Percent
Age	**15 - 24**	14	31.1
	24 - 34	29	64.4
	35 - 44	0	0
	45 - 54	2	4.4
	55 +	0	0
	Total	**45**	**100**
Gender	**Male**	44	97.8
	Female	1	2.2
	Total	**45**	**100**
Population group	**Asian**	1	2.2
	Black / African	39	86.7
	Coloured	1	2.2
	White	4	8.9
	Total	**45**	**100**
Socio-Economic status	**Poor**	23	51.1
	Average	19	42.2
	Wealthy	3	6.7
	Total	**45**	**100**

Table A4: Demographic details of the victim(s)

Demographic		Frequency	Percent
Age	**15 - 24**	5	11.1
	24 - 34	25	55.6
	35 - 44	0	0
	45 - 54	12	26.7
	55 +	3	6.7
	Total	**45**	**100**
Gender	**Male**	5	11.1
	Female	40	88.9
	Total	**45**	**100**
Population group	**Asian**	2	4.4
	Black / African	3	6.7
	Coloured	0	0
	White	40	88.9
	Total	**45**	**100**
Socio-Economic status	**Poor**	1	2.2
	Average	15	33.3
	Wealthy	29	64.4
	Total	**45**	**100**

Table A5: Characteristics of the hijacker(s)

Characteristic		Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	Total
Wears a disguise	**Frequency**	2	18	8	16	1	**45**
	Percent	4.4	40.0	17.8	35.6	2.2	**100**
Wears a balaclava	**Frequency**	1	9	14	20	1	**45**
	Percent	2.2	20.0	31.1	44.4	2.2	**100**
Wears a mask	**Frequency**	6	15	14	10	0	**45**
	Percent	13.3	33.3	31.1	22.2	0.0	**100**
Wears dark clothes	**Frequency**	0	7	9	25	4	**45**
	Percent	0.0	15.6	20.0	55.6	8.9	**100**
Wears black clothes	**Frequency**	0	7	14	21	3	**45**
	Percent	0.0	15.6	31.1	46.7	6.7	**100**
Wears jeans	**Frequency**	0	4	17	19	5	**45**
	Percent	0.0	8.9	37.8	42.2	11.1	**100**
Wears a jacket	**Frequency**	0	3	15	25	2	**45**
	Percent	0.0	6.7	33.3	55.6	4.4	**100**
Wears a cap or a hat	**Frequency**	0	7	10	25	3	**45**
	Percent	0.0	15.6	22.2	55.6	6.7	**100**
Wears jewellery	**Frequency**	3	26	12	2	2	**45**
	Percent	6.7	57.8	26.7	4.4	4.4	**100**
Carries a weapon	**Frequency**	0	1	1	15	28	**45**
	Percent	0.0	2.2	2.2	33.3	62.2	**100**
Carries a gun	**Frequency**	0	1	2	15	27	**45**
	Percent	0.0	2.2	4.4	33.3	60.0	**100**
Carries a bag	**Frequency**	4	14	14	10	3	**45**
	Percent	8.9	31.1	31.1	22.2	6.7	**100**

Table A6: Behaviour of the hijacker(s)

Characteristic		Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	Total
Says something	**Frequency**	1	2	2	17	23	**45**
	Percent	2.2	4.4	4.4	37.8	51.1	**100**
Yells at victim	**Frequency**	2	2	1	21	19	**45**
	Percent	4.4	4.4	2.2	46.7	42.2	**100**
Works in teams	**Frequency**	0	0	5	22	18	**45**
	Percent	0.0	0.0	11.1	48.9	40.0	**100**
Behaves aggressively	**Frequency**	0	1	4	23	17	**45**
	Percent	0.0	2.2	8.9	51.1	37.8	**100**
Behaves nervously	**Frequency**	2	9	13	15	6	**45**
	Percent	4.4	20.0	28.9	33.3	13.3	**100**
Makes threats	**Frequency**	0	0	3	20	22	**45**
	Percent	0.0	0.0	6.7	44.4	48.9	**100**
Warns of consequences	**Frequency**	0	4	9	18	14	**45**
	Percent	0.0	8.9	20.0	40.0	31.1	**100**
Talks in a calm voice	**Frequency**	13	21	8	2	1	**45**
	Percent	28.9	46.7	17.8	4.4	2.2	**100**
Instructs passengers	**Frequency**	0	4	7	15	19	**45**
	Percent	0.0	8.9	15.6	33.3	42.2	**100**
Makes demands	**Frequency**	0	0	1	16	28	**45**
	Percent	0.0	0.0	2.2	35.6	62.2	**100**
Orders victims to get out	**Frequency**	0	3	3	19	20	**45**
	Percent	0.0	6.7	6.7	42.2	44.4	**100**
Shots fired	**Frequency**	0	18	16	10	1	**45**
	Percent	0.0	40.0	35.6	22.2	2.2	**100**
Takes victims belongings	**Frequency**	0	3	1	23	18	**45**
	Percent	0.0	6.7	2.2	51.1	40.0	**100**
Speeds away	**Frequency**	0	0	1	15	29	**45**
	Percent	0.0	0.0	2.2	33.3	64.4	**100**

Table A7: Behaviour and Characteristics of the victim(s)

Characteristic		Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	Total
Victim cooperates	**Frequency**	0	1	7	32	5	**45**
	Percent	0.0	2.2	15.6	71.1	11.1	**100**
Behave nervously	**Frequency**	1	1	1	19	23	**45**
	Percent	2.2	2.2	2.2	42.2	51.1	**100**
Behave aggressively	**Frequency**	6	21	9	6	3	**45**
	Percent	13.3	46.7	20.0	13.3	6.7	**100**
Victim faints	**Frequency**	2	26	10	7	0	**45**
	Percent	4.4	57.8	22.2	15.6	0.0	**100**
Victim doesn't cooperate	**Frequency**	6	23	14	1	1	**45**
	Percent	13.3	51.1	31.1	2.2	2.2	**100**
Victim pleads for life	**Frequency**	1	4	3	19	18	**45**
	Percent	2.2	8.9	6.7	42.2	40.0	**100**
Victim looks at hijacker	**Frequency**	0	12	12	17	4	**45**
	Percent	0.0	26.7	26.7	37.8	8.9	**100**
Victim runs away	**Frequency**	2	15	14	12	2	**45**
	Percent	4.4	33.3	31.1	26.7	4.4	**100**
Victim falls on ground	**Frequency**	0	6	21	17	1	**45**
	Percent	0.0	13.3	46.7	37.8	2.2	**100**
Victim inside car when attacked	**Frequency**	1	1	5	28	10	**45**
	Percent	2.2	2.2	11.1	62.2	22.2	**100**

Table A8: Characteristics of the hijacking event

Characteristic		Never	Unlikely	Neither Unlikely nor Likely	Likely	Always	Total
Takes place during the evening	**Frequency**	0	2	8	32	3	**45**
	Percent	0.0	4.4	17.8	71.1	6.7	**100**
Takes place at a stop sign	**Frequency**	1	4	14	22	4	**45**
	Percent	2.2	8.9	31.1	48.9	8.9	**100**
Takes place at a yield sign	**Frequency**	1	13	17	14	0	**45**
	Percent	2.2	28.9	37.8	31.1	0.0	**100**
Takes place in a driveway	**Frequency**	0	7	6	26	6	**45**
	Percent	0.0	15.6	13.3	57.8	13.3	**100**
Target vehicle expensive	**Frequency**	0	4	11	23	7	**45**
	Percent	0.0	8.9	24.4	51.1	15.6	**100**
Target vehicle inexpensive	**Frequency**	0	18	17	10	0	**45**
	Percent	0.0	40.0	37.8	22.2	0.0	**100**
Hijacking takes seconds	**Frequency**	0	4	5	30	6	**45**
	Percent	0.0	8.9	11.1	66.7	13.3	**100**
Hijacking takes minutes	**Frequency**	2	12	16	9	6	**45**
	Percent	4.4	26.7	35.6	20.0	13.3	**100**
Hijacking successful	**Frequency**		1	15	25	4	**45**
	Percent		2.2	33.3	55.6	8.9	**100**
Victim survives	**Frequency**	1	1	18	25	0	**45**
	Percent	2.2	2.2	40.0	55.6	0.0	**100**
Victim injured	**Frequency**	1	8	14	18	4	**45**
	Percent	2.2	17.8	31.1	40.0	8.9	**100**
Backup/Getaway vehicle present	**Frequency**	2	8	8	19	8	**45**
	Percent	4.4	17.8	17.8	42.2	17.8	**100**

Table A9: Sequence of events

Hijacking Element		Frequency	Percent
Victim is driving	**1st**	43	95.6
Hijacker appears	**2nd**	26	57.8
Victim is stunned	**3rd**	23	51.1
Victim stops the vehicle	**4th**	22	48.9
Hijacker orders the victim to get out	**5th**	28	62.2
Victim gets out	**6th**	31	68.9
Hijacker injures victim	**7th**	30	66.7
Hijacker gets into the vehicle	**8th**	30	66.7
Hijacker drives away	**9th**	37	82.2

Appendix C: Schema-consistent questionnaire

SC 1

Section A

Demographic details:

1.1	Sex:	Male	1
		Female	2
1.2	Race:	Asian	1
		Black / African	2
		Coloured	3
		White	4
		Other	5
1.3	Academic level:	First year	1
		Second year	2
		Third year	3
1.4	What is you age?		
1.5	Have you ever been involved in a hijacking, either directly or indirectly?	Yes	
		No	

1.6 If so, in what capacity?

SC 2

Section B

2.1	How many hijackers were there?		
2.2	What was the gender of the hijacker(s)?	Male	1
		Female	2
2.3	What was the race of the hijacker(s)?	Asian	1
		Black / African	2
		Coloured	3
		White	4
		Other	5
2.4	What was the age of the hijacker(s)	15 –24	1
		25 – 34	2
		35 – 44	3
		45 – 54	4
		55 +	5
2.5	Did the perpetrator who carried out the hijacking wear a disguise / mask?	Yes	
		No	
2.6	What colour shirt was the perpetrator who carried out the hijacking wearing?		
2.7	Was the perpetrator who carried out the hijacking carrying a weapon? (If answered 1 in Q2.7, go to Q2.8) (If answered 2 in Q2.7, go to Q2.9)	Yes	
		No	
2.8	What was the weapon?		
2.9	What colour pants was the perpetrator wearing who carried out the hijacking?		
2.10	What type of shoes was the perpetrator who carried out the hijacking wearing?		
2.11	What was the colour of the perpetrator shoes who carried out the hijacking?		
2.12	Besides a mask was the perpetrator who carried out the hijacking wearing anything else on his/her head? What was it?		
3.1	How did the perpetrator who carried out the hijacking behave?		
3.2	From which direction did the perpetrator who carried out the hijacking approach the vehicle?	From the front	1
		From the back	2
		From the side	3
3.3	Regarding the perpetrator who carried out the hijacking and the door of the vehicle:	The door was open when the hijacker arrived at the car	1
		The victim(s) opened the door when the hijacker arrived	2
		The hijacker opened the vehicle's door	3

SC 3

4.1 Regarding the verbalisation of the perpetrator who carried out the hijacking:

He/she said nothing to the victim(s)r	1
He/she spoke quietly to the victim	2
He/she raised his/her voice at the victim(s)	3

(If answered 1 in Q4.1 go to Q5.1)
(If answered 2, 3 or 4 in Q4.1 to Q4.2)

4.2 What did the perpetrator who carried out the hijacking say?

5.1 How many victims were there?

5.2 What was the gender of the victim(s)?

Male	1
Female	2

5.3 What was the race of the victim(s)?

Asian	1
Black / African	2
Coloured	3
White	4
Other	5

5.4 What was the age of the victim(s)?

15 –24	1
25 – 34	2
35 – 44	3
45 – 54	4
55 +	5

5.5 What colour shirt was the victim(s) wearing?

5.6 What colour pants was the victim(s) wearing?

5.7 What was the hair colour of the victim(s)?

6.1 How did the victim(s) behave?

6.2 Regarding the reaction of the victim(s):

The victim(s) stepped / moved away from the vehicle	1
The victim(s) ran after the vehicle	2
The victim(s) just stood there	3

7.1 Regarding the verbalisations of the victim(s):

He/she said nothing to the hijacker	1
He/she spoke quietly to the hijacker	2
He/she spoke normally to the hijacker	3
He/she raised his / her voice at the hijacker	4

(If answered 1 in Q7.1 go to Q8.1)
(If answered 2, 3 or 4 in Q7.1 go to Q7.2)

SC 4

7.2 What did the victim(s) say?

8.1 In which setting did the hijacking take place?

Rural	1
Urban	2
Suburban	3

8.2 Where did the hijacking take place?

8.3 What vehicle was being hijacked?

8.4 What was the colour of the hijacked vehicle?

8.5 What was the licence plate number of the hijacked vehicle?

8.6 Was there a getaway / back-up vehicle present?

Yes	1
No	2

(If answered 1 in Q8.6, go to Q8.8 and Q8.9)
(If answered 2 in Q8.6, go to Q9.1)

8.7 What vehicle was the getaway / back-up vehicle?

8.8 What colour was the getaway / back-up vehicle?

8.9 What was the licence plate number of the getaway / back-up vehicle?

8.10 Did you see another vehicle besides the getaway / back-up vehicle and the vehicle being hijacked?

Yes	1
No	2

8.11 What was the colour of the house?

9.1 How long did the entire event take, from the first thing you saw till the last?

10.1. During what time of the day did the event take place?

Early morning	1
Late morning	2
Early afternoon	3
Late afternoon	4
Evening	5

SC 5

11. In the table below please indicate what you believe to be the **order or sequence of the events** by ranking the statements in the order that you believe they took place, placing a number (from 1 – 13) next to each statement. A **number 1** next to a statement will for example indicate that it was the first thing that happened and a **number 13** will indicate that it was the last thing that happened. If you believe that a certain statement did not occur, please indicate so by marking the applicable statement(s) with **NA**:

Statement / Event	Number / Rank
Hijacker(s) waiting in getaway / back-up vehicle	
Victim approaches in vehicle	
Victim enters driveway	
Hijacker approaches victim	
Hijacker pulls down his mask	
Hijacker points the gun at victim	
Hijacker orders victim	
Hijacker opens the door to the car of the victim	
Victim gets out	
Hijacker gets into vehicle	
Hijacker reverses vehicle	
Hijacker speeds away	
Getaway / back-up follows hijacked vehicle	

END
THANK YOU FOR YOUR PARTICIPATION AND CONTRIBUTION

* Please note that with Q11, the participants were handed a set of shuffle cards containing different occurrences during the hijacking, which they were required to rank sequentially.

Appendix D: Schema-inconsistent questionnaire

SI 1

Section A

Demographic details:

1.1	Sex:	Male	1
		Female	2
1.2	Race:	Asian	1
		Black / African	2
		Coloured	3
		White	4
		Other	5
1.3	Academic level:	First year	1
		Second year	2
		Third year	3
1.4	What is you age?		
1.5	Have you ever been involved in a hijacking, either directly or indirectly?	Yes	
		No	

1.6 If so, in what capacity?

SI 2

Section B

2.1	How many hijackers were there?	
2.2	What was the gender of the hijacker(s)?	Male 1 Female 2
2.3	What was the race of the hijacker(s)?	Asian 1 Black / African 2 Coloured 3 White 4 Other 5
2.4	What was the age of the hijacker(s)	15 –24 1 25 – 34 2 35 – 44 3 45 – 54 4 55 + 5
2.5	Did the perpetrator who carried out the hijacking wear a disguise / mask?	Yes No
2.6	What colour shirt was the perpetrator who carried out the hijacking wearing?	
2.7	Was the perpetrator who carried out the hijacking carrying a weapon? (If answered 1 in Q2.7, go to Q2.8) (If answered 2 in Q2.7, go to Q2.9)	Yes No
2.8	What was the weapon?	
2.9	What colour pants was the perpetrator wearing who carried out the hijacking?	
2.10	What was the hair colour of the perpetrator who carried out the hijacking?	
2.11	What type of shoes was the perpetrator wearing who carried out the hijacking?	
2.12	Was the perpetrator who carried out the hijacking wearing any accessories on his/her head? What accessories?	
3.1	How did the perpetrator who carried out the hijacking behave?	
3.2	From which direction did the perpetrator who carried out the hijacking approach the vehicle?	From the front 1 From the back 2 From the side 3
3.3	Regarding the perpetrator who carried out the hijacking and the door of the vehicle:	The door was open when the hijacker arrived at the car 1 The victim(s) opened the door when the hijacker arrived 2 The hijacker opened the vehicle's door 3

SI 3

4.1 Regarding the verbalisation of the perpetrator who carried out the hijacking:

He/she said nothing to the victim(s)r	1
He/she spoke quietly to the victim	2
He/she spoke normally to the victim(s)	3
He/she raised his/her voice at the victim(s)	4

(If answered 1 in Q4.1 go to Q5.1)
(If answered 2, 3 or 4 in Q4.1 to Q4.2)

4.2 What did the perpetrator who carried out the hijacking say?

5.1 How many victims were there?

5.2 What was the gender of the victim(s)?

Male	1
Female	2

5.3 What was the race of the victim(s)?

Asian	1
Black / African	2
Coloured	3
White	4
Other	5

5.4 What was the age of the victim(s)?

15 –24	1
25 – 34	2
35 – 44	3
45 – 54	4
55 +	5

5.5 What colour shirt was the victim(s) wearing?

Victim 1	
Victim 2	

5.6 What colour pants was the victim(s) wearing?

Victim 1	
Victim 2	

6.1 How did the victim(s) behave?

6.2 Regarding the reaction of the victim(s):

The victim(s) ran away from the vehicle	1
The victim(s) ran after the vehicle	2
The victim(s) just stood there	3

7.1 Regarding the verbalisations of the victim(s):

He/she said nothing to the hijacker	1
He/she spoke quietly to the hijacker	2
He/she spoke normally to the hijacker	3
He/she raised his/her voice at the hijacker	4

(If answered 1 in Q7.1 go to Q8.1)
(If answered 2, 3 or 4 in Q7.1 go to Q7.2)

SI 4

7.2 What did the victim(s) say?

8.1 In which setting did the hijacking take place?

Rural	1
Urban	2
Suburban	3

8.2 Where did the hijacking take place?

8.3 What vehicle was being hijacked?

8.4 What was the colour of the hijacked vehicle?

8.5 What was the licence plate number of the hijacked vehicle?

8.6 Was there a getaway / back-up vehicle present?

Yes	1
No	2

(If answered 1 in Q8.6, go to Q8.8 and Q8.9)
(If answered 2 in Q8.6, go to Q9.1)

8.7 What vehicle was the getaway / back-up vehicle?

8.8 What colour was the getaway / back-up vehicle?

8.9 What was the licence plate number of the getaway / back-up vehicle?

8.10 Did you see another vehicle besides the getaway / back-up vehicle and the vehicle being hijacked?

Yes	1
No	2

8.11 What did you see in the background?

9.1 How long did the entire event take, from the first thing you saw till the last?

10.1. During what time of the day did the event take place?

Early morning	1
Late morning	2
Early afternoon	3
Late afternoon	4
Evening	5

SI 5

11. In the table below please indicate what you believe to be the **order or sequence of the events** by ranking the statements in the order that you believe they took place, placing a number (from 1 – 13) next to each statement. A **number 1** next to a statement will for example indicate that it was the first thing that happened and a **number 13** will indicate that it was the last thing that happened. If you believe that a certain statement did not occur, please indicate so by marking the applicable statement(s) with **NA**:

Statement / Event	Number / Rank
Hijacker hides behind bush	
Victim approaching in vehicle	
Hijacker jumps in front of the vehicle	
Hijacker orders the victims	
Hijacker moves to door of vehicle	
Victims don't want to cooperate	
Hijacker opens the door of the vehicle	
Victims realise what is happening	
Victims give in to hijackers demands	
Victims get out of vehicle	
Hijacker gets into vehicle	
Hijacker speeds away	
Victims run after hijacker	

END
THANK YOU FOR YOUR PARTICIPATION AND CONTRIBUTION

* Please note that with Q11, the participants were handed a set of shuffle cards containing different occurrences during the hijacking, which they were required to rank sequentially.

Appendix E: Informed consent forms

Universiteit van Pretoria
DEPARTMENT OF PSYCHOLOGY

Dear Actor/Actress

I am a registered M.A. (Research Psychology) student in the Department of Psychology at the University of Pretoria. As part of the requirements for my Masters Degree in research psychology, I am expected to conduct an independent piece of research. I have chosen to conduct a study on the effect of cognitive schemata on information processing.

Title of study: The effect of cognitive schema on eyewitness memory.

Purpose:

The purpose of the study is to investigate the effect of cognitive schema on the eyewitness memory of a simulated (staged) hijacking.

Procedure:

As an actor/actress you will be taking part in the filming of two short hijacking scenes. You will be provided with a detailed script, necessary for the filming, which is needed to become acquainted with the nature of the acted out hijacking.

Risks:

There are no risks associated with taking part in the study.

Actor/Actress'st's Rights:

Your Participation in this study is completely voluntary and you may withdraw at anytime without negative consequences. More detailed information regarding the purpose of the study is contained in the proposal (attached). If you wish, a brief summary of the findings of the study will be made available to you after the study has been completed.

Your participation in this study will be highly appreciated. Please contact me if you have any queries or need further information.

I, _____, have read the above and understand the conditions of the study and I give my full consent for my participation in the study.

_____ on the _____ day of _____ 2006 at _____

Actor/Actress's signature

_____ on the _____ day of _____ 2006 at _____

Researcher's signature

Researcher: Wayne Viljoen
Tel: 072 117 1140
E-mail: wdviljoen@hotmail.com

_____

Supervisor signature

Prof. Patrick Chiroro
Tel: (012) 420 2653

Universiteit van Pretoria
DEPARTMENT OF PSYCHOLOGY

Dear Student

I am a registered M.A. (Research Psychology) student in the Department of Psychology at the University of Pretoria. As part of the requirements for my Masters Degree in research psychology I am expected to conduct an independent piece of research. I have chosen to conduct a study on the effect of cognitive schema on information processing. I would be grateful for your contribution in the study as a participant.

Title of study: The effect of cognitive schema on information processing.

Purpose of the research:

The purpose of the study is to investigate the effect of cognitive schema on information processing.

Procedure:

If you agree to take part, you will watch a video of a simulated car hijacking scenario, on a computer screen. You will then be asked to respond to a number of questions about the video. It is therefore important that you pay close attention to what you will be seeing on the video.

Risks:

There are no risks associated with taking part in the study.

Participants' rights:

Your participation in this study is completely voluntary and you may withdraw at anytime. After completion of the study, you will receive additional information regarding the study. If you wish, a brief summary of the findings of this study will be made available to you after the study has been completed.

Confidentiality:

You are not required to fill in your name or disclose any other personally identifying information about yourself. This ensures that you remain anonymous. Also, your responses will be treated confidentially.

Your participation in this study will be greatly appreciated. Please contact me if you have any queries or need any further information.

I, _____, have read the above and understand the conditions of the study and I give my full consent for my participation in the study.

_____ on the _____ day of _____ 2006 at _____

Participant's signature

_____ on the _____ day of _____ 2006 at _____

Researcher's signature

Researcher: Wayne Viljoen
Tel: 072 117 1140
E-mail: wdviljoen@hotmail.com

_____

Supervisor signature

Prof. Patrick Chiroro
Tel: (012) 420 2653