Investigative Interviewing, Spatial Memory and Hiding Behaviour in Missing Body Homicide Cases

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Statement of Overall Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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Acknowledgement of Papers included in this Dissertation

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Included in this dissertation are papers in Chapters 2, 3, 4 & 5 which are co-authored with other researchers. My contribution to each co-authored paper is outlined at the front of the relevant chapter. The bibliographic details for these papers including all authors are:

- **Ryan, N. C.,** Westera, N. J., Kebbell, M. R., Milne, R., Harrison, M. (2019). Where is the body? Investigative interviewing strategies in missing body homicide cases. *Investigative Interviewing Research and Practice, 10*(1), 62-77.
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it is never too late to do something different. The path you are on now can be changed at any time.

Abstract

Missing body homicide cases are rare and often high profile. In some cases where it has been determined that a homicide has been committed, but no body has been found, there are co-operative suspects or perpetrators who attempt to provide the location of the victim's remains but are unable to give accurate information due to the length of time between hiding the body and attempting to retrieve it, or issues when encoding the memory such as being under the influence of drugs and/or alcohol. One such case is the death of Matthew Leveson in Australia, who was buried in a tract of bushland by his partner. During a coroner's inquiry into the death several years later, the perpetrator, Michael Atkins, was compelled to disclose the location of Matthew's remains without the risk of prosecution, essentially removing any logical reason for deception. Police investigators took Atkins to the proposed deposition site on three separate occasions to identify possible locations and excavated and sieved 7500 square meters of bushland. It was not until the last hour, of the last day, of the final search attempt, that Matthew's body was found approximately 30m from one of the potential deposition sites identified by Atkins. In cases such as this, the way police gather and use information to locate the victim's remains is critical to the outcome of the case. Improving the spatial recall of the perpetrator and understanding some of the patterns of behaviour that are used when hiding a victim's remains could reduce the time and cost of search attempts, as well as improving the probability of locating the remains. This thesis presents a body of research that expands on the limited literature of missing body homicide investigations.

Study 1 (Chapter 2) reports the findings of 11 semi-structured interviews with a highly experienced sample of homicide investigators with direct experience in missing body homicide cases or other applicable cases. Investigators were asked about their critical decision points, and how interviews in these cases should be conducted. Four main themes were identified from the interviews. These were; (a) establishing rapport; (b) strategies for

gaining information about the site location; (c) strategies for checking suspect veracity; and, (d) impediments to the interview process. Further, the information provided by investigators, revealed an absence of a clear strategy for interviewing on-site. This finding was the inspiration for study 2.

Study 2 (Chapter 3) used an experimental research design to test the effect of the Enhanced Cognitive Interview (ECI) on the spatial memory retrieval of participants in a real-world hiding task. The practical impediments identified in study 1, such as the mnemonics of the Enhanced Cognitive Interview that can and cannot be applied in practice within a missing body homicide investigation, were used to create an abbreviated version of that might be applied in an on-site interview when searching for the victim's remains. Participants were required to hide a sack in a tract of bushland using a mock homicide scenario. Next participants were required to return to the same tract of bushland approximately 30 days later and were randomly assigned to either the abbreviated ECI or a free recall condition. The results of this study indicated that there was no significant difference between the ECI and free recall condition with participants' accuracy in locating the hidden bag. However, the ECI generated significantly more information about environmental details, such as landmarks. This study provides an evidence-based interview strategy for practitioners to apply on-site in a missing body homicide case that generates valuable detail that many improve the outcomes of search attempts.

Study3 (Chapter 4) examined the hiding behaviours of male and female participants in a bushland setting during a mock homicide scenario. This study found that participants tended to hide their objects in similar ways to actual perpetrators. Further, distinct patterns of hiding behaviours were found with female participants tending to exit the pathway at non-random points. Further, there were differences between males and females on the distance travelled to dispose of their object, with females travelling significantly less distance than

males. This study adds to the existing research regarding the way humans hide objects, particularly in bushland. Further, it provides insight into the hiding behaviours of females, who are not represented in body disposal research. Finally, this study begins to fill a gap between the field research and laboratory studies on hiding behaviours by using a real-world naturalistic setting.

Together, these three studies provide a significant contribution to the literature on missing body homicide investigations and provides homicide investigators with an evidence base to inform important investigative decisions, particularly in the field of investigative interviewing. Further, investigators who may be approaching these rare cases now have access to the expansive knowledge of experienced homicide investigators who have identified the challenges faced when approaching a missing body homicide case, and provided some practical solutions, an empirical evidence base for an onsite investigative interviewing strategy through an experimental study and valuable information regarding the hiding strategies employed by participants when faced with some of the practical constraints found in real homicide cases. This thesis contributes to the advancement of knowledge in both a theoretical and practical way with its focus on synthesising the literature on spatial memory, hiding behaviours, and investigative interviewing within the practical challenges faced by practitioners. This thesis concludes with a synthesis of the literature, limitations of the current research and some suggestions for future research.

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1.1 Introduction

In some murder cases the location of the victim's body is unknown, but there is evidence to establish the crime has taken place and to charge a suspect. Police may have information about the general location of the body deposition site but have been unsuccessful in locating this site. In these circumstances, the information provided by the suspect is essential to locating the victim's body, and it may be in the best interest of the suspect to reveal the location of the deposition site (i.e.; an expectation of a lenient sentence or access to parole under increasingly common 'no body, no parole' laws) (Hodge, 2017; Layt, 2017; Queensland Parole System Review, 2016). However, due to the length of time between the offence and the task of recalling the location or impediments to the encoding of spatial information at the time of the event, such as drug use, some suspects struggle to remember the location of the deposition site. In some missing body homicide cases the suspect is willing and motivated to assist in the search for the victim's remains and the investigative interview conducted becomes essential to unlocking the suspect's memory (State Coroner's Court of New South Wales, 2017). However, to date there has been no research examining the current information gathering investigative interviewing techniques and their effectiveness in improving a suspect's ability to locate a deposition site. Research into investigative interviewing techniques has commonly focused on retrieving episodic memory (the memory for events) (Köhnken, Milne, Memon & Bull, 1999; Memon, Meissner & Fraser, 2010), while the location of an object is largely a spatial memory task (the memory for relationships in space) (Jones & Martin, 2009; Ruddle, Volkova, Mohler, & Bülthoff, 2011; Tversky, 2003). This research commonly uses videos of a crime and then allocates participants to various interview conditions. While this addresses the more common need of investigators to identify the nature of a crime and the actors within it, it does not adequately address the less common need of investigators to assist a suspect to locate a missing object, which is a task

that requires a different set of considerations. It is important to note that spatial memory is not distinct from episodic memory, (remembering where you left your keys includes both spatial and episodic aspects), however, the unique aspects of how spatial memory is encoded warrants a specific area of inquiry.

The way people retrieve spatial memory is linked to how they encoded the memory. There are several key factors involved when considering how spatial memory is encoded. First is whether an individual is familiar or unfamiliar with the environment. The level of familiarity with the environment will alter the strength of the encoded memory, the ability to form a 'cognitive map' (an imagined topographical representation of a space) which allows an individual to imagine novel pathways through an environment (Meilinger et al., 2015; Thorndyke & Hayes-Roth, 1982), and whether they perceive the objects within the environment in relation to themselves (egocentric) or in relation to other objects in the environment (allocentric) (Mou & McNamara, 2002; Burgess, 2006). The second is the frame of reference in which they familiarised themselves with the environment. This frame of reference would most commonly be at the eye level but could also be topographical if the individual first perceives the space via a map (Meilinger et al., 2015; Thorndyke & Hayes-Roth, 1982). This impacts the way the memory should be retrieved as spatial memory is more accurately retrieved within the frame of reference in which it was encoded (Thorndyke & Hayes-Roth, 1982). Third is physical movement through the environment. The relationship between physical movement through an environment and how we encode spatial memory is essential to retrieving spatial memory (Kelly, Avraamides, & Loomis, 2007; Loomis, Beall, Klatzky, Golledge, & Philbeck, 1995; Presson & Montello, 1994; Reiser, 1989; Ruddle & Lessels, 2006). The ability to find an object in space is strongly linked to how we navigated the environment when encoding the memory and how we choose to recall the location. Returning to an environment to locate the object and physically moving through it results in

more accurate estimations of angle, distance, and probability of locating an object (Loomis et al., 1995; Ruddle & Lessels, 2006). Fourth relates to how an individual perceives objects within an environment, such as the perceptual salience of a landmark (colour, size, texture etc.), the cognitive salience (the individual's past experiences or knowledge), and contextual salience (the task an individual is engaged in within the environment) (Carduff & Timpf, 2008). These factors dictate what features of the environment will 'stand out' to a particular individual and while there will be some features that more commonly stand out in an environment, these features will vary between individuals. Finally, the scale of the environment. A spatial task within a small-scale space (figural space) will not engage the same kinds of physical relationship with the environment involved in the encoding of an environmental scale space (a space that cannot be perceived from a singular point) which will require an individual to physically move around within it such as a journey through a tract of bushland (Hegarty et al., 2002; Loomis et al., 1995; Ruddle & Lessels, 2006). These factors coupled with the choices an interviewer may make, and how the interview is conducted, such as whether to conduct an interview in an interview room or take them to the deposition site or the choice of interview technique, will determine the nature of the information revealed in an interview and may have impacts on the accuracy of the suspect's account.

The following thesis presents a body of research which explores better ways to conduct investigative interviews in missing body homicide cases through three research papers. The thesis poses the following research questions:

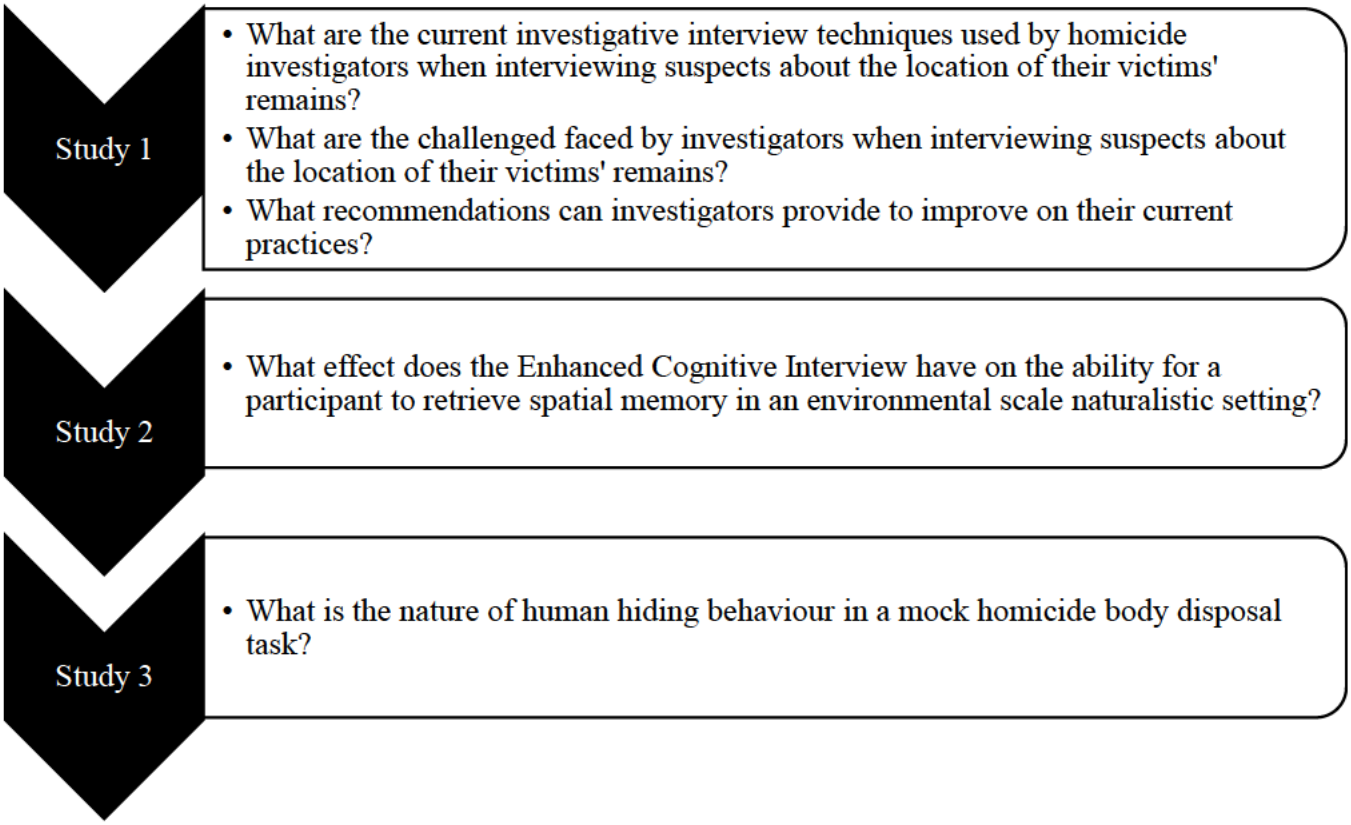

Figure 1. Research questions for study 1, 2 & 3

Study 1 (Chapter 2) reports the findings of 11 semi-structured interviews with a highly experienced sample of homicide investigators with direct experience in missing body homicide cases or other applicable cases. Study 2 (Chapter 3) used an experimental research design to test the effect of the Enhanced Cognitive Interview (ECI) on the spatial memory retrieval of participants in a real-world hiding task. Study3 (Chapter 4) examined the hiding behaviours of male and female participants in a bushland setting during a mock homicide scenario. Chapter 4 presents a published book chapter, offered as a reflection of the process through which this body of research was conducted and discusses the importance of using the experience of practitioners when developing research projects.

1.2 Why This Research is Important - The case of Matthew Leveson

While rare, there have been many missing body homicide cases that have presented with perpetrators who have been willing to assist police in the search for the victim's remains (Calligeros, 2014; Fulcher, 2017; Hodge, 2017; Layt, 2017). One recent example of a missing body homicide case where the perpetrator was willing to assist police in locating the remains of the victim was the case of Matthew Leveson. While this case is unique in the way that the suspect was motivated to disclose the location of Matthew's remains, it is a clear demonstration of a possible way that a suspect could be motivated to give truthful information, and where the need for an evidence-based investigative interview technique is highlighted.

Matthew Leveson was a 20-year-old man who was reported missing by his parents after failing to appear at work on the 25th of September 2007 (State Coroner's Court of New South Wales, 2017). Matthew had been in an intimate relationship with Michael Atkins, who ultimately became the primary suspect in his murder case. Matthew had died two days prior to him being reported missing in circumstances known to Michael Atkins. Initially when contacted by Matthew's parents, Michael Atkins had told them that Matthew had headed to work on the 25th and he did not know why he had not arrived at his workplace. This was a deception that Atkins maintained when giving statements to police and assisting in the filing of a missing person's report. On the 27th of September police located Matthew's car and ultimately found evidence that led to Atkins being charged with his murder in August of 2008. After an 8-week trial in which he exercised his right to silence, Atkins was acquitted of murder with the defence citing that Matthew was alive and living in Thailand with several witnesses presenting evidence of possible sightings (State Coroner's Court of New South Wales, 2017).

An inquest into the murder investigation commenced in 2008 was suspended and recommenced in 2016 after a petition from Matthew's parents (Lu & Stuart, 2018; State Coroner's Court of New South Wales, 2017). Atkins was called to the inquest and under the laws pertaining to inquests was compelled to give a statement. Through this induced statement Atkins lied about the circumstances of Matthew's disappearance and in doing so perjured himself. Following this a deal was negotiated with Atkins whereby he would be granted indemnity from the perjury charge in exchange for information regarding the location of Matthew's remains. It was further granted that any information given to investigators would not be used against him in a future case regarding Matthew's death. Essentially this removed any legal reason for Atkins to deceive the investigators as even an admission of murder would see him immune from prosecution and therefore, it would be in his best interest to disclose all information to remove the possibility of investigators discovering new evidence that may allow them to pursue him in the future. While Atkins did not admit to murdering Matthew, he did admit to moving his remains after a lethal drug overdose and burying his remains in bushland (State Coroner's Court of New South Wales, 2017).

In total, three separate search attempts were conducted spanning six months, each of which included Atkins being interviewed on-site. Each site visit used a different interview technique to assist in Atkin's recall. The first on-site interview was conducted in the early hours of the morning in a broad area of bushland identified by Atkins. During this interview three possible deposition sites were identified. The second was conducted with the aid of a psychologist using relaxation techniques, where one of the previous possible deposition sites was eliminated. During the final site visit, Atkins was required to engage in a complete re-enactment, driving from the murder site to the deposition site and moving a 70 kg manikin to where he believed the body to be buried. None of these methods resulted in an accurate indication by Atkins of the deposition site (State Coroner's Court of New South Wales,

2017). During the search for Matthew's remains police excavated 7500 square meters of bushland. On the last hour of the final search attempt, investigators removed a palm tree that revealed human remains that were identified as those of Matthew Leveson. The location of the deposition site was approximately 30 meters away from the initial site identified by Atkins (State Coroner's Court of New South Wales, 2017).

This case demonstrates the need for an evidence-based interview strategy that can improve the accurate retrieval of a suspect's spatial memory. Essentially a small but significant improvement in the accuracy of the spatial information provided by the suspect in this case would have resulted in less time and resources required in the search effort and a higher probability of success in locating the remains. For cases in general, a more accurate method of gaining this information could have an economic benefit in terms of the search costs, and probability of locating the victim, but more importantly reduce the amount of time a family has to wait to reclaim the victim's remains, thus reducing the amount of emotional suffering they have to endure. In this case, the parents of Matthew experienced nine years of uncertainty around what had happened to their son. Although most of this time could not be reduced by a more accurate interview strategy, due to the factors around the case and delays in continuing the inquest, it is possible that a substantial amount of time could have been reduced once the search attempts began. Furthermore, this case highlights the fine line between finding the victim's remains, and possibly never finding them. If it were not for the tenacity of the investigators involved in the search effort, a distance of 30 meters would have prevented Matthew from being found. If Matthew's remains had never been located, his family would have to endure a lifetime of uncertainty and unanswered questions around their son's disappearance.

Section 1.3: Current Information Gathering Interview Techniques

The following section describes the current evidence-based information gathering investigative interview techniques that are commonly used in various law enforcement agencies around the world. The aim of this section is to highlight some of the theoretical background to these techniques, identify some of the methods used to test their effectiveness, and demonstrate that although research has been conducted into each of these interviewing styles no research has specifically examined (a) how interviewing is used by homicide detectives in missing body homicide cases; and (b) what interview technique is effective in the retrieval of spatial memory to retrieve an object's location.

1.3.1 The Cognitive Interview

One of the most commonly used and researched interview techniques is the Cognitive interview (CI) (Köhnken, Milne, Memon & Bull,1999; Memon, Meissner & Fraser, 2010). The CI is a mnemonic device developed by Fisher and Geisleman (1992). This investigative interview technique is based on two principles of memory. The first principle is that memory is complex and is encoded in multiple memory traces (Bower, 1967; Wickens, 1970) and the strength of any given memory cue is dependent on the amount of overlap between the various memory traces (Flexer & Tulving, 1978). The second is that a memory that may not be retrieved via one memory trace may be retrieved via another (Tulving, 1974). In addition to these primary principles of memory, the CI also works via several secondary principles. First is that retrieving memory is difficult and requires effort, meaning that the CI should be conducted in a place that is free of distraction (Fisher & Geiselman, 1992). Second, is that a memory is more accurately retrieved in the same psychological, physical, and emotional state in which it was encoded (Fisher & Geiselman, 1992). Third, is that the more attempts that are made to retrieve a memory, the more likely the memory will be retrieved (Fisher & Geiselman, 1992). It is with these primary and secondary principles that the mnemonics for the CI were created.

In keeping with the previously mentioned memory principles the CI consists of four memory retrieval processes designed to increase the amount of information recalled from memory without comprising accuracy (Fisher & Geiselman, 1992). The first of these is 'Cognitive reinstatement' where the witness or suspect is instructed to mentally recreate the scene and provide a free report of the events. It is in this stage that the interviewee is instructed to concentrate (focused retrieval) and take themselves back to the particular event they are trying to retrieve, essentially cognitively reinstating the psychological, emotional and physical state in which the memory was encoded. Second is 'report everything' the witness or suspect is prompted to report in as much detail as possible on as many aspects of the memory possible no matter how insignificant the detail is considered. Third is 'change perspective' where the suspect or witness is instructed to describe the events from the perspective of another witness or location. Fourth is 'change in temporal order' where the witness or suspect is instructed to tell the story in an alternate sequence, typically in reverse. These final two instructions attempt to activate different memory pathways and give multiple attempts at retrieval. In addition to these memory retrieval processes, the interviewer in encouraged to probe for information after an uncontaminated account has been retrieved (Fisher & Geiselman, 1992).

The CI is effective in generating more information and more accurate information from interviewees with research showing 41% more detail correctly recalled when compared to a standard interview (Khönken, et al., 1999; Memon et al., 2010). However, typically this information does not include a detailed examination of spatial information or a stimuli congruent with a body retrieval task. In general, the method used in studies of the CI is the presentation of a short video of an event followed by the allocation of participants to either a CI or other interview condition with their responses being coded in terms of the number of correct details, errors and confabulations etc. (Dando, Wilcock & Milne, 2009; Davis, McMahon & Greenwood, 2005; Odinot, Memon, LaRooy & Milne, 2013). A specific example

of this method is a study conducted by Odinot et al. (2013) which investigated the effect of repeated CIs on eyewitness recall of an event. Participants watched a short video of a woman being stalked and were interviewed 15mins, 7 days or 9 days after viewing the video. Each participant was then interviewed a second time. Results were measured with error rates, accuracy, hypermnesia, reminiscence, consistency, and omissions. The results indicated a 21% increase in new information generated from the second interview (Odinot et al., 2013). While this highlights the typical method used in a CI study, this study also demonstrates the one of underlying theories of the CI (multiple retrieval attempts will increase the likelihood of retrieving the memory) (Fisher & Geiselman, 1992). Using a video of an event as the stimuli for encoding and retrieving a memory is not congruent with the task of hiding and retrieving a body as outlined in the introduction and explained in detail in the following sections.

While many studies of the CI do include an element of spatial information, these are usually in the form of statements (Clifford & George, 1999; Colomb & Ginet, 2012; Milne & Bull, 2002) and do not adequately capture the level of spatial memory retrieval engaged in an object retrieval task consistent with a missing body homicide case (distances, route details and landmarks etc.). An example of this is a study conducted by Clifford and George (1999) which used police officers who were trained in the use of the CI to interview participants that had witnessed a real crime event and examine specific mnemonics within the CI and their impact on various types of information, including information about location. Interview transcripts were coded into who, what, when, where, why, and how responses. Results showed that significantly more information was generated in each of these categories when interviewers used the reinstatement of context and focused retrieval mnemonics compared to another interview technique (conversation management) (Clifford & George, 1999). Most relevant to the current thesis is the increase in information generated from the ‘where’ responses which demonstrates that the CI is effective in generating general location-based information.

However, this study did not delve into the accuracy of specific aspects of the spatial information such as distance, angles, and relationships between objects, that are important in the retrieval of a victim's remains. Instead, the focus of this study was on the quantity of 'where statements' made by witnesses (Clifford & George, 1999). Further, the nature of each crime event experienced by the witnesses was not provided meaning that important aspects relevant to the topic of this thesis, such as physically moving through an environment, the nature of the environment in which the crime occurred, or the effect of the decision making process on which aspects of the environment are relevant to suspects when disposing of a victim's remains, could not be gauged.

When discussing the CI, it is important to discuss the Enhanced Cognitive Interview (ECI). While the core of this interview technique remains true to the CI, (so much so, the terms CI and ECI are commonly used interchangeably) the ECI included important additions that improve the communication process such as the need to build rapport, handing control of the interview over to the interviewee, and using witness compatible questioning (Fisher & Geiselman, 1992; Paulo, Albuquerque, & Bull, 2013). The ECI consists of eight phases (Fisher & Geiselman, 1992) (1) Establish Rapport, building the initial relationship with the interviewee (2) Focused retrieval, encouraging the participant to concentrate when attempting to recall information (3) Report everything, instructing the interviewee to give fine detail no matter the perceived relevance (4) Transfer of control, handing the interview over to the interviewee (5) Mental reinstatement, encouraging the interviewee to focus on the details of the scene such as smells, feelings, sounds etc (6) Interviewee compatible questioning (7) Varied retrieval, which includes: Reverse order, instructing the participant to recall events in a different order and Change perspective, instructing the participant to imagine the events from another position (8) a summary, closure and evaluation phase (Fisher & Geiselman, 1992). As with the CI, the ECI has not been researched specifically to test spatial memory retrieval and therefore it is unknown

if it may be effective in the context of a missing body homicide case. However, the additional phases within the ECI have been shown to improve the amount and accuracy of information generated by interviewees (Dando & Milne, 2009; Powell, Hughes-Scholes, Smith & Sharman, 2012; Read, Powell, Kebbell, & Milne, 2009)

1.3.2 Other Interview Techniques

When discussing the literature on information gathering approaches to investigative interviewing it is important to mention some of the other interview techniques or models commonly mentioned in police investigative interviewing. Two of these are Conversation Management (CM) and the PEACE model. Conversation management essentially integrates advanced interpersonal skills with the CI to create a method intended for interview experts. The PEACE model is a process that was developed to address deficiencies in the way police conducted interviews such as not being prepared to conduct the interview. However, this model is meant to encompass other interview methods in the 'account' phase. It is important to note that in the scientific literature of information gathering investigative interviewing research on the memory retrieval capacity of alternatives to the CI is scarce. In this field the CI is the most tested information gathering approach to investigative interviewing. Therefore, the following methods will only be discussed briefly as their relevance to the focus of this thesis is limited.

1.3.3 Conversation Management

Conversation Management is an interviewing technique based on advanced interpersonal skill literature (Shephard & Griffiths, 2013). The focus of this technique is on removing potential barriers to memory retrieval such as the anxiety or mood of the interviewee, the interpersonal barriers formed by the imbalance of power in the interviewer/ interviewee relationship, establishing a strong rapport and other such factors commonly associated with building a positive working relationship between two individuals (Shephard & Griffths, 2013). These

advanced interpersonal skills extend from the use of eye contact and silence to the positioning of furniture in the interview room etc. However, the memory mnemonics within this interview technique are those used in the CI (Fisher & Geiselman, 1992; Shephard & Griffiths, 2013). Essentially CM incorporates an extremely detailed technique for interviewing witnesses and suspects consistent with the level of interpersonal skills possessed by professionals such as psychologists and incorporating the mnemonics of the CI. Therefore

Empirical research investigating the effectiveness of CM as a tool to generate information is scarce. The previously mentioned real- world study by Clifford and George (1999) (see section 1.4) employed police interviewers who were trained in CI and/or CM or 'standard interview' technique to compare the amount of information generated by the CI, CM and combinations of these styles of interview. The police interviewers were required to interview a witness to a real crime event, and these interviews were then compared with their initial interviews (standard interview) immediately following the crime. Results showed that the amount of information generated from the CM was less than that found in the initial or 'standard' interview and neither the CM or the combined CM and CI condition yielded as much information as the CI only condition (Clifford & George, 1999). To date, there has been no research that has examined whether CM has been used by practitioners in cases that require the suspect to retrieve a memory of object location, or whether it improves the level of information gathered regarding the retrieval of spatial memory which is crucial in missing body homicide cases.

1.3.4 The PEACE Model

The PEACE model was created in 1992 in England and Wales as a response to research showing that current police interviewers were lacking in several key areas of the interview process resulting in inaccurate, poorly conducted interviews that resulted in incomplete and coerced accounts from witnesses. These key areas were lack of preparation, general

ineptitude, poor technique, assumption of guilt, being repetitive, persistent or laboured questioning, failure to establish relevant facts and exertion of too much pressure (Baldwin, 1992; as cited in Clarke & Milne, 1998). The PEACE model was designed to address these key areas by introducing a five-stage model. The first of these stages is 'Planning' which stresses the need to have a clear agenda or interview plan that narrows down the areas of interest to suit the needs of the investigation. Second is 'Engage and explain' which involves a clear explanation of the goals of the interview and the process that will be undertaken. Third is 'Account' this stage involves getting the witness or suspects account of the events and can incorporate many strategies including the CI. Fourth is 'Closure' emphasis on this stage is on closing the interview whilst maintaining a good level of rapport by leaving the witness or suspect with a positive feeling. Fifth is 'Evaluate' which is a reflective process for the interviewer to assess their performance and the results of the interview process (Milne & Bull, 2003).

A key aspect of the PEACE model occurs in the 'account' phase of the model. The Account phase commonly contains the interviewee's account; a clarification stage and a challenge stage (Clarke & Milne, 1998; Shephard & Griffiths, 2013). The 'suspect agenda' or initial account is where the suspect is encouraged to tell their story without interruption with a view to obtaining an uncontaminated account. Second is the 'police agenda' or clarification phase this stage is where the interviewer will ask clarifying questions to improve the amount of detail the suspect has provided as well as seeking to generate information that can be corroborated or challenged with the evidence presented in the challenge phase. Third is the 'challenge phase' in this phase the interviewer clarifies any inconsistencies in the suspect's account and between the suspect's account and known evidence (Clarke & Milne, 1998; Shephard & Griffiths, 2013). Breaks are taken between the phases to assess the interview process and make changes to any questioning strategies (Shephard & Griffiths, 2013). It must

also be noted that this phase of the PEACE model fits well with the CI. This application of the CI is recommended by the UN and is increasingly used by police agencies around the word (see https://digitallibrary.un .org/record/839995/files/A_71_298-EN.pdf)

In an evaluation of the PEACE model research showed that police interview practices and the quality of the statements received from PEACE trained officers was notably improved when compared to untrained officers (Clarke & Milne, 1998). In the evaluation 177 recorded interviews from various police forces around the UK were selected and rated on interview outcome, use of questioning and various interpersonal aspects of the interviewer such as rapport building. The PEACE trained officers tended to outperform the non-trained officers. Most importantly for the aims of this research, PEACE trained officers were more likely to obtain a comprehensive account from the suspect, meaning more information was gathered from suspects (Clarke & Milne, 1998). However, it is important to note that this study was conducted with actual recorded interviews. Due to the fallibility of human memory (Loftus & Palmer, 1974; Rose & Beck, 2016), without some concrete representation to compare witness statements to, no judgements of accuracy could be made. Furthermore, it could be assumed that since the PEACE model is a framework containing either the CI or CM in the account phase and CM is based off the same mnemonics as the CI, its ability to assist in the retrieval of spatial memory would be limited to those of the CI, which is untested in a spatial memory retrieval task consistent with a missing body homicide case.

Section 1.4: Spatial Memory and Spatial Cognition

The aim of this section is to present the core theories in spatial cognition and spatial memory and highlight why the current research which focuses on specific aspects of an event are inadequate to address the complexities associated with the encoding and retrieval of spatial memory. This is important to this thesis as the task of locating an object is largely in the realms of spatial memory and adds a neglected aspect of inquiry in the investigative

interviewing literature. It is important to note that in this section it is not being proposed that spatial and episodic memory are working in isolation. Memory networks are complicated and overlay each other. However, in human studies of perception a clear distinction exists between recognising ‘what’ and object is and ‘where’ it is (Ungerleider & Mishkin, 1982). The pathway for recognition of what an object, known as the occipitotemporal pathway, engages the occipital lobe and the temporal lobes which includes many sections of the brain associated with speech (the ability to label an object). Whereas, the pathway involved in the perception of space, known as the occipitoparietal pathway, uses the occipital lobe and the parietal lobes which are the sections of the brain involved in movement (Ungerleider & Mishkin, 1982) which creates a distinctly different method of encoding, and therefore retrieval of these kinds of memory. In a forensic context this is important as investigations typically focus on recognition of objects or the ‘what’ pathway. such as, who was present? What did they look like? What did they do? What were they wearing? The questions who?, What?, Why?, When? and how?, are those typically the focus of research and investigations, as the location of a crime is often obvious. The key distinction that is focused on in this body of work is the Where? The question of ‘where’ is encoded as a part of the episodic memory but contains specific properties of spatial knowledge (i.e.; judgements of distances, angles, landmarks, rout-road and survey knowledge). This section will conclude that although spatial and episodic memory does not work in isolation, a specific focus on the retrieval of spatial memory within an interview may be advantageous to assist in the location of objects of interest in criminal investigations.

1.4.1 What is spatial memory?

Spatial memory is the memory of physical spaces and the relationship between objects within this space. In essence spatial memory can be used to assist individuals to navigate through an environment and find locations that have been previously visited or locations that have been

identified through other means such as maps (Thorndyke & Hayes-Roth, 1982; Tversky, 2003; Mou & McNamara, 2002). In the context of a missing body homicide case, finding way to improve an individual's ability to locate an object is particularly relevant. Individuals who are required to retrieve a memory of an object's location would be tapping into not only memories of events, but more importantly to their memories of landmarks, routes, and the distances and angles between these. It is for this reason that the focus of research in terms of assisting suspects to retrieve the location of a missing object should be examined with theories of spatial memory.

Some of the most fundamental and widely accepted units of spatial memory and spatial cognition is that of Landmark, route-road, and survey knowledge (Allen & Kirasic, 1985; Carduff & Timpf, 2008; Steck & Mallot, 2000; Thorndyke, 1981; Thorndyke & Hayes-Roth, 1982). Landmark knowledge refers to our representation of a specific object in an environment that assists in an individual to orientate within and navigate through an environment (Thorndyke, 1981). Landmarks can be divided into global and local landmarks (Steck & Mallot, 2000). Global landmarks are those that can be seen from any point in a spatial environment (e.g., a mountain). These are essential for assisting individuals to maintain orientation. Without global landmarks individuals tend to walk in circles and become disorientated (Souman, Frissen, Sreenivasa &Ernst, 2009). Local landmarks are those that can only be viewed from a particular position within an environment and are used by individuals to navigate along a particular route (e.g. a boulder). Route-road knowledge refers to an individual's representation of pathways between landmarks, and survey knowledge is an individual's topographical representation of the spatial environment or 'cognitive map'. Essentially as we traverse an area and become familiar with a particular spatial environment, we develop a stronger understanding of the relationships between landmarks and routes. This familiarity enables us to develop an imagined representation of a topographical map or

survey knowledge. However, each of these types of knowledge are prone to systematic error, these will be discussed along with cognitive mapping in section 1.3.2.

Key to the forming the knowledge of the environment is which landmarks or aspects of a route-road are attended to by individuals. What makes a particular spatial feature prominent to an induvial navigating through an environment? Some landmarks or aspects of the route will be more prominent than others and it has been proposed by Carduff and Timpf (2008) that this is dependent on three factors, the individual perceiving them (cognitive salience), what their purpose is within the environment (contextual salience) and the physical features of the environment (perceptual salience) (Carduff & Timpf, 2008). For example, when disposing of a victim's remains the task is to locate a suitable deposition site making some features of the environment more salient than others. A perpetrator may be scanning an environment for tracts of dense bushland as they navigate the environment. They may navigate an area and identify a particularly large section of shrubbery that is salient due to its size, shape, colour, and density (perceptual salience), of which the suitability is determined by the task of hiding human remains (contextual salience) and based off previous knowledge or experience with hiding an object (cognitive salience). The difference between what individuals perceive is an important consideration as it may change substantially due to any of these factors being altered. For example, if in the above scenario two individuals were engaged in the same task, (locating a suitable deposition site), however, one was driving a vehicle and the other was a passenger. They will both be involved in similar tasks, however, the contextual salience and cognitive load is different for each individual and therefore, what is salient in the environment will also change. The driver will have to distribute his cognitive resources to the task of driving the vehicle which may mean that landmarks related to the task of driving may become more salient. The passenger may notice aspects of the environment that are different due to their visual perspective (looking out the window) but will also

capture more fine-grained detail due to having more cognitive resources free, not having to operate the vehicle.

As with the example above a key aspect to how we perceive and process the spatial environment is the frame of reference in which an individual encodes the environment. A frame of reference may be whether we perceive a space at the eye level or encode it topographically by viewing the space from an elevation or topographical map. However, we can also perceive the environment in relation to our own location in space (egocentric) or between objects external to ourselves, such as judging the distance between two buildings (allocentric) (Mou & McNamara, 2002). Egocentric refers to the encoding of spatial information through the positioning of the individual in relation to objects within a space (Mou & McNamara, 2002). For example, when exploring a new city an individual will encode and update the location of objects within relation to their own position in space (Chance, Gaunet, Beall & Loomis, 1998, Mou & McNamara, 2002). The location of a particular building may be judged by remembering where you were physically located in this space when encountering it. Therefore, its location was judged by your relationship to that object. This is supported by research that demonstrates that an individual who memorises the position of objects from their own perspective will be faster at identifying those objects compared to the same objects presented from a different perspective (more cognitive effort was required to imagine a perspective different from that in which it was encoded) (Mou & McNamara, 2002). However, this representation of spatial memory alone does not account for the ability to imagine objects from varying positions that have not previously been viewed (Burgess, 2006).

Allocentric spatial memory refers to the memory of relationships between objects separate from the individual (Mou & McNamara, 2002; Burgess, 2006), for example, the memory of a prominent environmental feature or landmark and their relationship with

another prominent feature or landmark. The benefit of allocentric memory is in the ability to imagine objects from novel perspectives which allows an individual to imagine the environment in a way that creates novel movement. However, it has been suggested that the retrieval of allocentric views of an environment may be more difficult as a detachment from the egocentric perspective is required (Burgess, 2006). This distinction is important when thinking about the frame of reference that a spatial memory is encoded within. It is believed that allocentric information is best associated with a topographic view of a space, otherwise known as 'survey knowledge', and egocentric is best associated with an eye level view of a space (Mou & McNamara, 2002; Burgess, 2006). However, this is not entirely accurate as allocentric knowledge can be gained by navigating the space without viewing a topographical map and a topographical map can be used to aid in eye level navigation (Burgess, 2006). In a forensic application this distinction is important to note, as the frame of reference that a space is encoded in will affect the optimal way for suspect to retrieve information. This distinction will be discussed in more detail in section 1.3.2. However, it is generally the case that retrieval of certain spatial memories is best done in the frame of reference in which they were encoded (Thorndyke & Hayes-Roth, 1982; Mou & McNamara, 2002; Burgess, 2006).

1.4.2 Cognitive mapping

As with egocentric and allocentric, there is a difference in frame of reference between spatial knowledge acquired from physically exploring the environment and learning the environment from a cartographic map (Meilinger et al., 2015; Thorndyke & Hayes-Roth, 1982). Although there are many theories about the way we learn this information, it is generally accepted by researchers that after physically exploring an environment for a period of time, individuals develop a 'cognitive map' of the space which is likened to a cognitive representation of a topographic map (Golledge, 1992; Melinger et al., 2015; Thorndyke & Hayes-Roth, 1982). However, there are systematic errors involved in the retrieval of such information (Allen &

Kirasic, 1985; Moar & Bower, 1983; Sadella &Magel, 1980; Thorndyke & Hayes-Roth, 1982; Tversky, 1981). Importantly, the frame of reference in which a spatial memory is encoded affects the way it is retrieved. An example of research that demonstrates this is by Thorndyke and Hayes-Roth (1982). This study required participants to learn the layout of a building either through the use of a map or by physically navigating the building. Participants were then required to move through the building and make estimations of Euclidean distance (direct distances between objects ignoring route information), orientation and route distances at several different points. The results of this study showed that participants who learned via a map were best at judgements of Euclidean distance and estimations that required survey knowledge. Whereas participants that learned the environment through navigation were best at route knowledge tasks such as estimations of orientation and route length. In addition to this it was discovered that as the navigation learners gained more experience in the environment, their estimations of Euclidean distance improved (Thorndyke & Hayes-Roth, 1982).

In terms of the location of objects in a criminal investigation this is particularly relevant to investigators. A suspect that is familiar with a particular site may be able to provide a sketch plan or identify a location on a topographic map with relative ease. However, a suspect with only a limited knowledge of a site will struggle to provide any useful information via a topographic map. It must also be noted that even individuals who are very familiar with a location are prone to error when producing maps as described in the next section (Tversky, 1981). It could be assumed that the majority of suspects in a homicide investigation would have first encoded the spatial details of an area through navigation rather than studying a map. If this is the case investigators should concentrate on retrieving the spatial information through the frame of reference in which it was encoded.

1.4.3 The use of maps and heuristics

Although the preference to retrieve spatial memory is in the frame of reference in which it is encoded, a common tool used by investigators is the map, whether this is a sketch plan or a topographical map such as Google maps. With this in mind it is important to understand the flaws in using such memory aids. Human attention is limited. We are unable to process the enormous amounts of information that we are exposed to at any given moment (Kinchler, 1992). Spatial information is no exception. We cannot store all of the rich detail that the spatial environment presents us with and therefore use short cuts or heuristics to process and retrieve these large amounts of information (Allen & Kirasic, 1985; Moar & Bower, 1983; Sadella &Magel, 1980; Tversky, 1981). These heuristics allow us to keep a fairly accurate representation of the spatial environment in long term memory to retrieve at a time that is convenient to us. However, the use of these heuristics results in retrieval of information that is not quite accurate (Allen & Kirasic, 1985; Moar & Bower, 1983; Sadella &Magel, 1980; Tversky, 1981), and this will in turn impact the quality of information provided to investigators.

Estimations of angle. The 'Right angle bias' is a tendency for individuals to misjudge the angles of intersections (Moar & Bower, 1983). Research shows that when participants are required to make estimations of the angle of an intersection, they tended to judge the angle closer to 90˚ than the actual angle of the intersection (Moar & Bower, 1983). To examine individuals' judgements of the angles at intersections the researchers required participants to make judgements on the angle of three well known intersections in Cambridge (in the UK) that formed a triad. If participants were to judge correctly the sum of the angles provided should be no more than 180˚, the total degrees in a triangle. However, results showed that participants tended to overestimate the angles of each intersection making judgements closer to 90˚ (Moar & Bower, 1983). These results show the inaccuracy of the cognitive

representation of the cognitive map which can be attributed to the fact that cognitive maps are formed by piecing together a series of eye level judgements of an environment (Moar & Bower, 1983). It is simply not possible to view all intersections together from the ground level. Therefore, judgements of angles are made independent of each other and the inaccuracy of the cognitive map is displayed (Moar & Bower, 1983). This means that when a suspect retrieves route knowledge of intersections, the angles provided are not reliable and will lead to inaccuracies in the spatial information provided to investigators that may in turn affect the search for victims' remains.

The rotation and alignment effects are two more systematic errors in judgements of spatial relations (Tversky, 1981). The rotation effect refers to errors in judgements of figures within a frame. That is a figure will be adjusted to fit the perceived axis of the background it is displayed against (Tversky, 1981). The best example of this would be to imagine a picture of a boat within a picture frame. Individuals reproducing the picture from memory will have a tendency to draw the hull of the boat parallel with the horizontal axis of the picture frame when in reality the hull may not be parallel with this axis. This would be the same for the mast of the boat. The mast would be reproduced in line with the vertical axis on the frame. Essentially the perceived axis of the background will impact on the retrieval of the angle of the figure. As such, individuals who produce sketch plans will tend to draw objects in line with the perceived axis of a frame (Tversky, 1981) which in a real-world setting could be a depiction of a pathway through a field or a clearing being represented as parallel with the boundary of the field when in reality it crosses the field at an angle that is non-parallel. The alignment effect is similar in the fact that the axes of two figures are reproduced in alignment when in reality they are skewed (Tversky, 1981). Considering again the example above, ignoring the background, if two sail boats were represented in a picture the mast being the vertical axis and the hull being the horizontal axis, a representation reproduced from memory

would align these axes to be parallel in each boat whereas in reality one boat's axes may be slightly out of alignment with the other. In the case of retrieving spatial information from an interviewee, this is important to investigators as a judgement in angle can be affected by the stimuli around it. This means that any information presented in an interview setting where an interviewee is presented with a map to identify the location of a victim's missing remains will be prone to error based on the features of the map. The rotation effect, alignment effect and right-angle bias are all examples of systematic errors in judgements of angle, however there are also several heuristics that affect estimations of distance (Allen & Kirasic, 1985; Jansen-Osman & Berendt, 2007; Sadella & Magel, 1980).

Estimations of distance. This section will briefly outline several of the heuristics that affect estimations of distance. First, the 'Angularity effect' is a tendency for individuals to misjudge the length of a route based on how many changes of direction the route contains (Sadella & Magel, 1980). In essence the more changes of direction that are contained in a route the more likely an individual is to overestimate the distance that has been travelled (Greenberg, Natapov & Fisher-Gewirtzman, 2020; Sadella & Magel, 1980). Second is the 'Feature Accumulation effect'. This effect is similar to the Angularity effect but refers to any salient features in the environment that may be present along the route. The more salient features that are present along a route the longer the estimation of distance (Jansen-Osman & Berendt, 2007). Last is the 'Route Structuring effect'. This is an example of the hierarchical nature of memory. A route will be subjectively broken up into segments by the individual who perceives it (Allen & Kirasic, 1985). Essentially these segments may be delineated by a cluster of landmarks that are similar, a stretch of pathway between two turns or any other perceived separations between one leg of a route and another. The distance between objects within a leg will be perceived to be less than the distance between objects in different legs

even though this may not be the case (Allen & Kirasic, 1985; Jansen-Osman & Berendt, 2007).

These heuristics demonstrate that the accuracy of information provided verbally and in sketch plans drawn from suspects will not be accurate and prone to systematic error. Tversky (2003) noted that the errors created when cognitively reproducing a representation of a spatial environment are due to the unrestricted boundaries of spatial memory. Individuals traversing through an environment are restricted by the spatial environment and therefore guided by the environment to make more accurate judgements (Tversky, 2003). Research conducted by Devlin and Bernstein (1995) demonstrated that individuals exposed to a basic map (not a sketch plan) that contains landmarks and route knowledge were more likely to make navigation errors than an individual who was exposed to a map coupled with visually rich information (pictures of landmarks). This is an important insight into the spatial memory of suspects and the factors that need to be considered in an investigative interview as the level of detail generated in a map will directly affect the searcher's accuracy in locating an object.. Particularly, it is important to understand the errors in information given by a suspect in an interview and how they should be interpreted. For example, a suspect may deem that they have travelled much further or not as far as they had due to the complexity of the route they chose when hiding a victim's remains. This discrepancy may be deemed by an investigator as the suspect being deceptive when it is could be a genuine and common error in judgment due to how the spatial environment is perceived. Having the knowledge of these processes may allow investigators to alter their decisions based on their description of the environment, to expand search areas and in turn increase the probability of locating the victim's remains, in the least it will equip investigators with a greater understanding of the errors generated through spatial memory retrieval which will promote a critical eye when interpreting this type of information.

1.4.5 Body based movement, Orientation and Scale of Space

The encoding and retrieval of spatial memory has some distinct factors that separate it from simply remembering a sequence of events such as body based movement, orientation and scale of space. Body based movement in the environment can be separated into two types, translational movement which refers to physical movement through an environment (reference if a different reference from the next one), and rotational movement which refers to a subject's stationary physical rotation within an environment . Both types of body-based movement are as important, if not more important than a 'visual stream' when encoding spatial memory (Ruddle & Lessels, 2006). Outlined in this section is literature emphasising the importance of physical interaction with the environment when encoding and retrieving spatial details that reinforces the importance of the specific research required in the investigative interviewing field when looking for the most effective way to interview a perpetrator in a missing body homicide case.

The quality of a visual stream is less important than body-based movement information when dealing with spatial memory retrieval. A study conducted by Ruddle and Lessels (2006) found that participants who were required to locate objects in a VR laboratory were much more accurate if they had explored the environment by physically moving through it compared to a visual only, or rotation condition. The visual only group perfectly located their object 43% of the time, the rotation group 45% of the time and the physical movement group 90% of the time. This was consistent with previous research conducted by Loomis et al. (1995) who had participants navigate an environment by walking, being pushed in a wheelchair or remain stationary, with participants in the walking condition being more accurate at indicating the location of objects than the wheelchair and stationary conditions. This increased level of accuracy when comparing visual only, rotation and translational movement demonstrates the importance of the relationship between physical movement in

the environment and the encoding and retrieval of spatial memory. Further, this highlights the importance for investigators to return the suspect to the environment in which the memory was encoded, to improve the accuracy of retrieving the spatial memory as opposed to mental reinstatement of the environment conducted off-site in an interview room.

Another important factor in the retrieval of spatial memory is the orientation of an individual when attempting to retrieve an object's location (Kelly, et al., 2007; Presson & Montello, 1994; Reiser, 1989). Essentially there are discrepancies in the accuracy of an individual in identifying an object's location when their physical alignment within an environment is incongruent with the alignment with which they encoded the spatial memory. This is known as the 'sensorimotor alignment effect'. Research by Kelly et al. (2007) found that participants were faster and more accurate in identifying an object location when they were physically aligned rather than misaligned with the environment in which the memory was encoded. The process of having to imagine an object from an altered perspective, requires the participant to perform a rotation task (Shepard & Metzler, 1971). Essentially, requiring an individual to imagine a large-scale environment from a misaligned perspective would reflect a similar task. The increased level of strain on an individual's cognitive resources involved in mental rotation and recalling the location of an object would reduce the speed and accuracy of the retrieval task. This is an important consideration when conducting an investigative interview, particularly when taking a suspect to site, and emphasises the need to maintain a pathway congruent with the initial encoding undertaken by the suspect. Essentially, making sure that the suspect enters the environment from a point consistent with when they encoded the memory will avoid unnecessary cognitive strain that might impede the already taxing memory retrieval process. However, this effect may be reduced depending on the familiarity that the suspect has with the site, and the ability to form a cognitive map and navigate novel pathways through an environment.

A final element that is important to this topic is the scale of space in which a memory is encoded. Hegarty et al. (2002) proposed a distinction between three scales of space that are interpreted and used through different cognitive processes. These are figural or small-scale space (typically objects that are pictorial in nature or small objects relative to the subject and able to be manipulated), Vista space (a scene that can be observed in a singular view but is equal to or larger than the person viewing it) and Environmental space (a large-scale space which contains the subject and requires movement within it to capture all aspects) (Hegarty, et al., 2002). When navigating through Environmental space, subjects would see landmarks and other spatial detail appear in front of them and disappear behind them as they navigate through the environment. This is an important distinction within the field of spatial memory research as outlined above. In terms of the topic of this thesis it is particularly salient as the majority of the investigative interviewing literature tests participants with an event on a computer monitor or television screen (Khönken, et al., 1999; Memon et al., 2010). In a situation where an investigator is taking a suspect to site to retrieve the location of a victim's remains, the variables involved become quite different to those commonly found in the literature. The scale of space in missing body homicide cases means that the spatial memory of a perpetrator or suspect has been encoded in an environmental scale space. This incorporates translational movement through the environment and brings the body movement based spatial memory retrieval factors into play. As outlined above, environmental scale space is encoded and retrieved differently to other scales of space emphasising the need to conduct research relevant to investigative interviews conducted in missing body homicide cases.

1.5 Where to hide a victim's remains

As mentioned in section 1.3.1 the nature of the task an individual is undertaking will affect the types of environmental features that become prominent. As such, an examination of the

literature around the hiding behaviour of individuals is relevant to this topic. Understanding where a suspect might hide an object may assist in the interview process by guiding the interviewer's focus on information that is relevant or avoid information that is not. Further, and understanding of where individuals hide objects could assist in search efforts when coupled with the information provided in an interview. The research in this area tends to focus on either field research that uses retrospective data on cases where remains have been found or laboratory-based research that uses VR and desktop computers to conduct experimental studies that do not particularly relate to homicide cases. The major flaw in the field research is that it only examines cases where a victim's remains have been found and this does not specifically relate to remains found by a perpetrator. The issue with this is that there logically cannot be any information gathered on the remains of victims that have not been found, therefore we can only claim that these particular patterns of hiding behaviours relate to those perpetrators that did not adequately hide their victim's remains. The perpetrators whose victim's remains are never found may use an entirely different pattern of hiding behaviour, meaning that using this information to guide search attempts will only uncover those remains that are hidden in a particular way. The laboratory studies while methodologically strong, lack the ecological validity required to generalise to missing body homicide cases. There are many environmental and situational factors at play when someone has murdered a person and needs to dispose of their remains, such as the weight of the victim, the physical strength of the perpetrator, the distance required to move the victim, the access to vehicles and suitable locations to hide a victim, the soil type, i.e.. can you physically excavate the site you have chosen or does another site need to be selected where it can reasonably be excavated? Or is there features in the environment that lend themselves to hiding a victim's remains that require minimal or no excavation? And many other considerations that have not been covered in these types of studies. As such the research in

this area will be discussed in terms of how it applies to this thesis and how it may be applied in a missing body homicide investigation.

1.5.1 Field Research

Much of the research examining how perpetrators hide victims' remains is based around the goal of developing profiles from geographic information (Geographic profiling) to locate a perpetrator after the deposition site has been established. This research has provided some detailed information about the distance from the perpetrators home to the depositions site (Nethery, 2004; Ressler et al., 1988; Lundrigan & Canter, 2001), distances travelled from a transportation route (roadways etc.) and the kinds of environments and methods of hiding used by perpetrators (Rossmo, 2000; Sea & Beauregard, 2018). Essentially, the choices of distance from residence or murder site to deposition site or choices of where to hide within the chosen site can be associated with different situational factors. For example, access to a vehicle will impact on how far a victim's remains can be transported and will therefore open more options to the perpetrator. Further, knowledge of suitable deposition sites, such as forests, must be acquired by the perpetrator. This knowledge is often gained through unrelated activities at these sites prior to the murder, like transportation routes commonly used by the perpetrator, such as driving to and from work, or areas used by the perpetrator for recreational activities (Canter, 1994). Research by Nethery (2004) examined the types of environments victims remains were hidden, such as forests, open fields, carparks, and dumps. Most victims were found to be disposed of in forests (Nethery, 2004). This research was further supported by studies that found most victims remains were located in agricultural or forested areas (Hääkänen et al. 2007; Sea & Beauregard, 2018). In addition to these broader choices, research has examined more specific choices such as the distance travelled within the deposition site.

Most victims' remains that have been hidden are located within 15 to 70 meters from a roadside depending on whether they are a child or an adult (Burton, 1998). Specific to child victims, 98% of victims were found between 46-91.4 meters from a footpath (Rossmo, 2000). In general, it was found that a victim's remains would rarely be transported further than 60.9 meters for a child victim and 46 meters for an adult victim from a transportation route, with some variation between distances depending on the mode of transport taken to the deposition site e.g. whether a vehicle was used to move the remains from the murder site to the deposition site (Rossmo, 2000). This variation between child and adult victims can be explained with the practical implication of moving a body. For example, it is reasonable to assume that the weight of a body would be a factor in how far an individual can manually transport a body from a vehicle to the victim's final resting place. Further, this distance may also be impacted by the perpetrator's fitness, with some research suggesting that serial killers tend to move their victims less distance as they age (Nethery, 2004).

In addition to the distances that victims are transported, there has been research conducted on the types of hiding behaviours and locations that are chosen. Research conducted by Ressler, Burgess, & Douglas (1988) found that 58% of victims were either buried or covered, while 42% were left exposed, with no attempt to conceal the body. While this research has examined deposition sites in more detail than previous research, there are several issues that cannot be addressed with secondary data. This research relies on information gathered from known deposition sites and linking to known offenders, and so is unsuitable for examining information about remains that are never found. Therefore, part of the picture is missing. Further, while the research has examined broadly the types of environments that perpetrators choose to dispose of their victims, no research to date has looked at, specific choices around individual features within the environment, such as hiding

remains in hollow logs, etc. or examined the decision-making process of someone hiding an object

Finally, due to the over representation of males as perpetrators of homicide, there is a lack of research in this space that examines any differences in the hiding behavior between males and females, with research showing that the spatial behavior may differ with sex (Ishikawa & Montello, 2006; Gagnon et al., 2016, 2018; Montello, Lovelace, Golledge & Self, 1999; Munion, Stefanucci, Rovira, Squire & Hendricks, 2019). Global statistics show that 80% of homicides are perpetrated by males (UNODC, 2011). This over representation of males as perpetrators is reflected in the research with most studies focusing on the behavior of males. This in turn results in a lack of evidence to inform investigators when dealing with the rarer cases where females are perpetrators of homicide and choose to hide a victim's remains. Further, due to this imbalance, there is a lack of empirical evidence that can directly compare the behaviours of male and female hiding behaviours when disposing of a victim's remains.

1.5.2 Laboratory studies

Laboratory studies, in general, have examined the difference in individual's hiding behaviours compared to their searching behaviours. However, these studies do not directly relate to a homicide scenario. Typically, these studies are conducted on a computer where participants are required to indicate where they would hide an object or series of objects on a grid or within a virtual reality (VR) representation of a real-world space (typically a room) (Anderson, Foulsham, Nasiopoulos, Chapman & Kingstone, 2014; Legge et al., 2012; Street, Bischof & Kingstone, 2018). Following this, participants are then required to search for another participant's object in the same space. This research gives insight into the cognitive processes involved in 'hide and seek' tasks. However, several issues exist with this kind of research when trying to apply it to a homicide scenario. First is the use of VR as a substitute

for a real-world environment. There are many somatosensory aspects to moving through an environment that may alter the decision making. For example, in the case of the disposal of a victim's remains, the terrain (steepness or ruggedness) of the landscape will have real impacts on how a perpetrator can traverse any given area. This may impact the distance travelled, the choice to move around large objects, or to follow low lying areas, rather than walk up an incline. Further, issues like the 'digability' of the soil may also change the initial choice of a deposition site with the practical problems associated with excavation (rocks, tree roots etc.). These issues have in part been addressed by research that compares hiding behaviour in a real-world environment and compares it with a VR representation of that same environment and has found that there are similarities, such as participants hiding and searching for objects in similar ways in both a real room and a VR representation of the room (Legge et al., 2012). However, this does not adequately address the variables that must be considered by a perpetrator hiding a victim's remains, particularly in a naturalistic setting like a forest.

Second, these studies largely do not address scales of space commonly found in real homicide scenarios. The scale of space represented in these laboratory study ranges from small scale space, such as that on a desktop to a representation of a room (vista scale space) without addressing larger scales of space. In an actual case of hiding a body, the scale of space is likely to be environmental scale space, where the entire space in question cannot be viewed from one vantage point (Hegarty et al., 2002). As an individual maneuvers through the environment, new scenes will open up in front of them as others disappear from view behind them. This opens new layers of complexity in decision making as all hiding options are not present at any given time. Individuals may walk past locations that may seem suitable in a bid to find something more suitable, then must remember and return to a location once they have assessed a number of options and selected one that they deem most suitable.

There is a large evidence base that examines differences between males and females with spatial abilities such as wayfinding, with numerous studies indicating that males tend to have an advantage over females (Ishikawa & Montello, 2006; Montello et al., 1999; Munion, Stefanucci, Rovira, Squire & Hendricks, 2019). Many of these studies were conducted in a VR space and those that were conducted in a real-world environment allowed participants to use navigational aids such as maps and compasses (Malinowski & Gillespie, 2001; Munion et al., 2019) which may not be consistent with the typical conditions faced by a perpetrator when hiding a victim's remains. A study conducted by Gagnon et al. (2016) offers a navigational task more consistent with this scenario. Participants were required to search for an object by navigating through an environmental scale VR space without navigational aids (maps etc.). They were then required to find their way back to the point at which they started (Gagnon et al., 2016). The results indicated that females tended to be more cautious when searching for the object, resulting in more time taken moving through the space as well as a reduced likelihood of relocating previous locations (landmarks or waypoints) when navigating back to the starting position. This was determined to be a function of risk perception. Females tended to be more anxious about navigating through the environment than males resulting in the higher level of caution (Gagnon et al., 2016). This research was further supported more recently with a study indicating that males and females differed in the way they explored the environment (Gagnon, et al., 2018). Females tended to revisit locations more frequently than males. This again was deemed to be a function of navigational cautiousness (Gagnon et al., 2018). While this research demonstrates gender differences in navigating behaviours, and is more closely aligned to a missing body homicide scenario, it does not address the practical constraints of hiding an object in a real-world environment, such as gradients, and digability (how conducive the terrain is to excavation) etc. Further, there may be cognitive differences between searching for an object within an environment

that has been selected by an experimenter and participants making their own decision about where to hide an object. It is unknown whether gender will play a role in this process and impact the choice of where to hide an object.

Finally, the decision-making process represented in laboratory studies often do not reflect those that may be in use in a homicide scenario, such as the goal of hiding an object from the police. While, some studies have examined the difference in hiding behaviour of individuals who are hiding from a foe or those hiding for a friend (Street et al. 2018; Anderson et al. 2014), these are not conducted in real world environments or in an environmental scale of space. Essentially the distinction between friend and foe could be extrapolated to a forensic setting such as hiding an object that the individual does not want found (ie. a victim's remains and hiding an object that would require locating in the future such as a cache of drugs or weapons). One study required participants to indicate where they would hide an object within a series of squares with either homogenous squares (a grid all containing the same symbol) or a 'pop out' condition (where some squares in the grid contained novel symbols) and examined differences between hiding from a foe, someone who they did not want to find the object, and hiding for a friend, someone they did want to find the object (Street et al., 2018). It was found that participants avoided squares that had novel symbols when hiding from a foe and tended to hide objects near grids with novel features when hiding with the intention of a friend locating the object (Street et al., 2018). In a naturalistic setting this would equate to hiding an object near or within a landmark or hiding it away from landmarks as a way of making discovery of the object more or less difficult. Again, this study falls short of addressing the practical constraints and complex environmental factors that may impact on the decision making of individuals in the concealment of a victim's remains.

In summary, each branch of research in this field on its own does not adequately address the issue of how individuals hide a victims' remains. There remains a need to add an experimental approach that applies the context of a homicide scenario to add a level of ecological validity to the existing experimental studies and also adds some value to the research that examines the patterns of hiding behaviours in homicide cases. Through this type of research a possibility of uncovering another pattern of hiding behaviour may be found.

1.6 Chapter Summary.

This chapter presented the current literature on investigative interviewing, spatial memory and human hiding behaviour. Through this literature review it has been identified that there is a gap in the investigative interviewing research regarding the particular circumstances found in missing body homicide cases where a perpetrator is willing to assist in locating a victim's remains. In particular, a clear distinction was identified around spatial memory retrieval and the factors involved that separate it from the current investigative interviewing research conducted which focuses on smaller scale space rather than the environmental scale space that could be expected when a victim's remains have been hidden. Further, entwined in this topic is the nature with which individuals hide object in an environment similar to those chosen by actual perpetrators. Therefore, a need exists to conduct research using a methodology that takes into account the practical constraints that face investigators, in a context that is relevant to missing body homicide investigations and that can inform investigators on the best way to conduct these kinds of interviews.

1.7 References

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Chapter 2: Where is the body? Investigative interview strategies in missing body homicide cases

This chapter includes a co-authored published research paper: **Ryan, N. C.**, Westera, N. J., Kebbell, M. R., Milne, R., Harrison, M. (2019). Where is the body? Investigative interviewing strategies in missing body homicide cases. Investigative Interviewing Research and Practice, 10(1), 62-77.

My contribution to the paper involved:

As the first Author on this manuscript my contribution involved developing the design of the research project with minor consultation from the co-authors. Participant recruitment was done in collaboration with myself and Prof. Rebecca Milne. All data collection and transcription of interviews was completed by myself, with the majority of the data analysis also being completed by myself. I wrote the majority of this paper, with suggestions for improvement and some sections written supplied by Prof. Mark Kebbell and Prof. Rebecca Milne. Revisions for publication were conducted by myself under the supervision of Prof. Kebbell and Prof. Milne

(Signed) _____ (Date)____14/01/2020_
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Chapter 2: Where is the body? Investigative interview strategies in missing body homicide cases

Chapter 2 presents a qualitative study examining the current practices in missing body homicide cases, the challenges that are faced by investigators and some strategies that could be or are used to solve these challenges as identified by experienced homicide investigators from the United Kingdom, Australia, Canada, and Iceland. The motivation for this study was to establish and validate the claims of an experienced investigative interviewer who, through years of experience as an advisor in missing body homicide investigations, had noticed that homicide investigators lacked an adequate level of experience in dealing with these cases and generally did not know how to conduct interviews when attempting to locate a victim's remains and the lack of research that had tested any of the current techniques in a spatial memory retrieval task that was applicable to these types of cases. Further, it was suggested that the current evidence-based memory mnemonics, such as those found in the CI/ECI were not being applied when taking the suspect/ perpetrator to the deposition site. The following study shows that the initial assertions of the instigating investigator were correct. However, this study presents many informed and reasonable justifications for the choices that these investigators have made, indicating that while the current practices may not be consistent, there is an evidence-based logic behind their decisions. Further, there is a willingness and need to develop an evidence base, such as that commenced in this thesis, to assist investigators in making informed choices.

2.1 Abstract

In some murder cases the location of the victim's body is unknown. In these circumstances, the information provided by the murderer can be the key to locating the victim's body. In this paper we report the findings of 11 semi-structured interviews with homicide investigators who have worked on missing body homicide cases. Investigators were asked about their critical decision points, and how interviews in these cases should be conducted. Four main themes were identified from the interviews. These were (a) establishing rapport; (b) strategies for gaining information about the site location; (c) strategies for checking suspect veracity; and, (d) impediments to the interview process. This study provides a research base to inform how homicide interviews are conducted in these cases and suggests a lack of a direct evidence-base for interviewing in these cases.

Where is the body? Investigative interview strategies in missing body homicide cases

2.2 Introduction

In some murder cases the location of the victim's body is unknown, but there is evidence to establish the crime has taken place and charge a suspect. Police may have information about the general location of the body deposition site but have been unsuccessful in locating this site. In these circumstances, the information provided by the suspect is essential to locating the victim's body and it may be in the best interest of the suspect to reveal the location of the deposition site. However, due to the length of time between the offence and the task of recalling the location or impediments to the encoding of spatial information at the time of the event, such as drug use, some suspects struggle to remember the location of the deposition site. Although there are procedures in place in some police organisations to deal with these specific cases (ACPO, 2006), these are general in nature and relate to the management of the interview process rather than the retrieval of a suspect's spatial memory that is required remember a location. There has been much research conducted on investigative interview techniques that improve the amount and quality of information regarding other criminal events, for example assaults (Khönken, Milne, Memon & Bull, 1999; Memon, Meissner & Fraser, 2010), there has, to our knowledge, been no research on ways to improve the task of retrieving a murder victim's missing body.

There are many circumstances where a suspect may be motivated to disclose the location of a victim's remains such as, a reduced sentence, or in some cases immunity from further prosecution in exchange for disclosing the whereabouts of the victim's remains (Hodge, 2017; Layt, 2017). One example where a suspected murderer was offered immunity for disclosing the location of the victim's body was the Australian case of Michael Atkins. Atkins was charged with the murder of his boyfriend Matthew Levenson in 2009 however, he was found not guilty (State Coroner's Court of New South Wales, 2017). While Atkins has

never admitted to the murder, he did admit to hiding the victim's body during a coronial inquest after he was offered immunity from further prosecution which was conditional on disclosing the location of the victim's body (State Coroner's Court of New South Wales, 2017). In total, three separate search attempts were conducted spanning six months, each of which included Atkins being interviewed on-site. Each site visit used a different interview technique to assist in Atkin's recall. The first interview was conducted in the early hours of the morning in a broad area of bushland identified by Atkins. During this interview three possible deposition sites were identified. The second was conducted with the aid of a psychologist using relaxation techniques, where one of the previous possibilities was eliminated. The final site visit, Atkins was required to engage in a complete re-enactment, driving from the murder site to the deposition site and moving a weighted manikin to where he believed the body to be buried. None of these methods resulted in an accurate indication by Atkins of the deposition site (State Coroner's Court of New South Wales, 2017). Although the Atkin's case is an example where the suspect struggled to remember, there are cases where the suspect can locate the victim's remains accurately. One example is the case of Christopher Halliwell, a serial killer in the UK, who led investigators to the remains of two victims (Fulcher, 2017). The interview described by the lead investigator, involved an information gathering approach, establishing rapport, limiting interruption, allowing the suspect to take control of the interview and give directions to the deposition site (Fulcher, 2017). Cases like these raise issues fundamental to retrieving spatial memory information from suspects that are crucial in missing body homicide cases. Primary is the need for police to use and have access to evidence based interview techniques that will improve a suspect's memory of where the body was disposed.

Recent missing body homicide cases, like the Atkins case, have gained public interest worldwide and has motivated a push for legislation changes around the sentencing practices

of convicted murderers (Hodge, 2017: Layt, 2017). In England and Wales 'Helen's law', or the *Unlawful killing (recovery of remains) Act (2017)* is currently before parliament. A key part of this legislation, if passed, is that homicide perpetrators who do not disclose the location of their victims will be ineligible for parole. Similarly, in Australia the Queensland Parole System Review (2016) has recommended that convicted murders who do not disclose the location of their victims will not be eligible for parole. These changes are designed to motivate offenders and to ease the ongoing suffering of victims' families (Layt, 2017). It is hoped that these legislative changes and recommendations may increase the number of perpetrators that come forward to disclose the location of their victims' remains. With these possible changes it is important that investigators have access to robust evidence-based interview techniques relating to locating missing remains.

The investigative interview is a key component of any police investigation (Milne & Bull, 1999). Information retrieved from suspects and witnesses can feed the investigative process and add to a pool of evidence that can lead to the conviction of a perpetrator, or in the case of a missing body, the location of the victim's remains. The importance of evidence-based practice is clear. Evidence-based interview techniques such as the cognitive interview (CI) have been shown to increase the quality and quantity of information provided to investigators with 41% more detail correctly recalled when compared to a standard interview (Khönken, et al., 1999; Memon et al., 2010). In cases where a body is missing it is crucial to gain as much accurate information regarding the location of the victim's remains as possible.

The most current evidence-based interview technique that is available to investigators as a way of improving memory is the Enhanced Cognitive Interview (ECI), which is an extension of the CI and consists of the following eight phases (Fisher & Geiselman, 1992) (1) Establish Rapport, building the initial relationship with the interviewee (2) Focused retrieval, encouraging the participant to concentrate when attempting to recall information (3) Report

everything, instructing the interviewee to give fine detail no matter the perceived relevance (4) Transfer of control, handing the interview over to the interviewee (5) Mental reinstatement, encouraging the interviewee to focus on the details of the scene such as smells, feelings, sounds etc (6) Interviewee compatible questioning (7) Varied retrieval, which includes: Reverse order, instructing the participant to recall events in a different order and Change perspective, instructing the participant to imagine the events from another position (8) a summary, closure and evaluation phase (Fisher & Geiselman, 1992). The CI fits well within the 'PEACE' method devised in England in 1992, which is being implemented in a growing number of countries and recommended by the United Nations (see https://digitallibrary.un .org/record/839995/files/A_71_298-EN.pdf)

Most interviewing research that has been conducted with the CI has focused on the retrieval of episodic memory, that is the memory for events (Tulving, 2002; Memon et al., 2010). In these cases, investigators are interested in who, what, when, why and how, with a limited focus on where, as the location is obvious in most cases – that is to say, it is known *where* the crime occurred. Meanwhile, experimental studies are usually laboratory based, and display a video of a crime event, and the accuracy of interview techniques are measured by the amount of correct information, incorrect information, and confabulations across various interview strategies (Odinot, Memon, LaRooy & Millne, 2013; Vinet & Verkampt, 2007). Research examines the impact of the CI on the quality and quantity of reports across detail types (i.e.; descriptions of people, objects, actions and, but not specifically around locating objects in large scale environments, such as a forest).

Requiring a suspect to locate a deposition site is primarily a spatial memory task. Spatial memory is the memory of positions and relationships between objects in an environment (Hegarty et al., 2002; Tversky, 2003). There is a distinction between the scale of space being encoded and retrieved, and the cognitive processes used for navigating through a

large-scale space that is unable to be perceived from a singular vantage point, to that of small-scale space, such as viewing a picture or video. Individuals encode these large-scale spatial memories in the form of landmarks and routes/roads (Thorndyke, 1981; Thorndyke & Hayes-Roth, 1982; Tversky, 2003). This is distinctly different from how people encode episodic memories. Furthermore, the retrieval of spatial memory is prone to biases, with errors displayed in estimations of distance, angle and order of landmarks along a route (Tversky, 2003). There is limited research examining the best ways to enhance the accurate location of missing objects, and therefore, there is a lack of evidence to inform investigative interviewing practice.

The use of sketch plans and visual aids such as photographs within an interview are commonly used tools amongst investigators, with research showing 44% opting to use a sketch plan in an interview to facilitate recall of an event (Dando, Wilcock & Milne, 2009). Research has shown that the use of sketch plans and other visual aids, such as photographs, in an interview result in more correct and accurate information regarding events (Jack, Martyn & Zajac, 2015). Logically, in the case of a missing body the use of sketch plans or other visual aids such as information rich maps like Google maps should be a valuable tool for investigators. However, it is unknown how investigators use these tools in a missing body case and if there are issues associated with their use.

In addition, there are constraints around the use of some interviewing techniques. Memory is not the only issue with regards to recalling where a body is located. Many practical aspects of the interview process need to be considered by investigators. Not included in the CI is how to deal with the veracity of a suspect's statement. Although ways of testing the veracity of a statement vary in their effectiveness, there are strategies such as the strategic use of evidence (SUE) that, in addition to potentially detecting deception, prevent the contamination of a interviewee's statement as well as minimising the ability of the

interviewee to mislead the interviewer with evidence that may be presented too early in the interview (Hartwig, Granhag, Strömwall, & Kronkvist, 2006). The SUE model restricts the evidence known to investigators from a suspect and works by allowing the suspect to believe that the investigators have very little, or no evidence to prove their guilt, therefore allowing the suspect to potentially make claims that contradict the evidence police have gathered (Hartwig et al., 2006). Investigators will not disclose any evidence until they have gained a full statement from the suspect that has been explored through strategic questioning to eliminate alternative explanations. Once this statement has been acquired the investigators will reveal the contradictory evidence and confront the suspect (Hartwig et al., 2006). The SUE may be particularly relevant in missing body cases as some memory retrieval aids – such as maps - provide a level of information that could contaminate a suspect's statement. Further, gradual disclosure of information across the course of an interview has been shown to increase the accuracy and strength of observers' judgements of deceit, as opposed to early or late disclosure (Dando & Bull, 2011; Dando, Bull, Ormerod, & Sandham, 2015).

Although the current interview techniques are successful in an experimental setting (Memon et al., 2010), practitioners have been reluctant to apply all aspects of these techniques (Kebbell, Milne & Wagstaff, 1999). The reason for this is largely due to the time constraints or external pressures faced by investigators, and the belief that some aspects of the CI cause confusion amongst witnesses (Kebbell et al.,1999). Practitioners claim that the CI in its full form is cumbersome and cannot be practically applied in many cases. Often the 'reverse order' and 'change perspective' mnemonics are not used due to these time constraints and witness confusion. Outside these issues with witnesses, and time, it is unknown what other restrictions are faced by investigators when interviewing suspects in missing body homicide cases. But some practical aspects may include the length of time

between the suspect hiding the body and being required to remember the location, as well as, physical changes that may occur to the environment within this time.

The current study

To our knowledge, there is no research exploring how police apply investigative interviewing techniques in suspect interviews when specifically trying to locate a victim's body. For this reason, we sought to discover what challenges are faced by investigators when conducting these interviews and what solutions they may have used to overcome these challenges. To achieve this aim, we used qualitative interviews of homicide investigators with direct experience in missing body homicide cases. These interviews allow us to gain an understanding of the context within which the investigative interview must take place (Berg & Lune, 2014). Due to the relative rarity of these types of cases, investigators from around the world who had direct experience with interviewing suspects in missing body homicide cases were recruited and supplemented with two homicide investigators that interviewed offenders to help with the retrieval of a missing object of interest to the investigation.

2.3 Method

Participants

Snowball sampling was used to recruit a purposive sample of 11 police investigators who had experience in conducting interviews in homicide cases that required a suspect to assist in the retrieval of a missing body, or weapon that was central to the investigation. The two investigators who did not have direct experience in a missing body homicide case were included due to the central focus of the murder investigation being on the retrieval of the weapon. Seven investigators were from the United Kingdom (UK), two from Australia, one from Canada, and one from Iceland. Nine investigators had direct experience in a missing body homicide case and two had experience in homicide cases requiring the location of a

murder weapon. All participants were experienced interviewers with a mean of 15.3 years in an investigative interviewing role. These roles varied in their description from each country, with six of the seven investigators from the UK being 'specialist investigative interviewing advisors', and one investigator from Australia being a 'tier five tactical interviewer'. The remaining five investigators included in the sample were experienced detectives. All investigators had experience in homicide cases.

Procedure

After ethical clearance was gained, participants were contacted and supplied with a brief overview of the research objectives. Each interview lasted approximately one hour and was conducted by phone or Skype. A semi-structured interview plan was used to guide the topics while also allowing the interviewee to elaborate on any issue they deemed relevant. Interviews were based on the critical incident technique which uses expert knowledge to identify critical components of a task and solutions or improvements to any task or issue that may arise from a task (Flannagan, 1954; Butterfield, Borgen, Amundson & Maglio, 2005). This interview technique is largely used in an organisational setting to gain expert knowledge to improve processes (Butterfield et al., 2005) and has been used in the analysis of high impact events such as suicide (Redpath, Stacey, Pugh & Holmes, 1997). The participants were requested to verbally give brief details of a missing body homicide case in which they interviewed a suspect. They were then asked to reflect on the interview process and identify any critical incidents in this process. Participants were asked questions like, *'what went well?', 'what went wrong?',* and '*what they would improve on next time?'* to garner information during the interview. In addition, they were asked, '*what advice they would give to another investigator who found themselves dealing with a similar case'*. All interviews were audio recorded and transcribed.

Analysis

An inductive approach, using grounded theory, was used to identify the themes in the transcribed interviews (Strauss & Corbin, 1990). A thematic analysis was conducted on the data using five steps. First the researchers familiarised themselves with the transcribed interviews. Second preliminary codes were assigned to the data to describe the content. Third, three researchers independently identified the main themes. The researchers then met to discuss the themes, and an agreement was reached regarding the final main themes. Fourth, a review of the main themes was conducted with the participants' coded statements allocated to the relevant theme. Fifth, subthemes were identified from these coded statements and all themes were labelled.

2.4 Results and Discussion

The analysis of the interviews revealed four main challenges regarding investigative interviewing. These were; (a) establishing rapport; (b) strategies for gaining information about the site location; (c) strategies for checking suspect veracity; and (d) impediments to the interview process. A summary of the main themes and subthemes are displayed in Figure 1.

All investigators demonstrated a knowledge of evidence-based interview techniques. Although, there was no consensus on strategies used for assisting suspects in recalling where they had hidden an object, most investigators applied a combination of evidence-based techniques, and practical experience to address the challenges faced in a homicide investigation. It was also identified that there is no training, or interview technique, that specifically relates to the problem of locating missing bodies or objects.

When interviewing at the police station, not at the deposition site, the investigators stated that they applied only some aspects of the CI to assist in object location, (reasons for this will be discussed in detail below). When interviewing on-site, most had no specific

questioning strategy. The general practice, as reported by investigators, was to ask the suspect to guide them to the site. However, suggestions were provided by the investigators of how to test the veracity of the suspect's statements while on site and facilitate the retrieval of the suspect's memory of the deposition site.

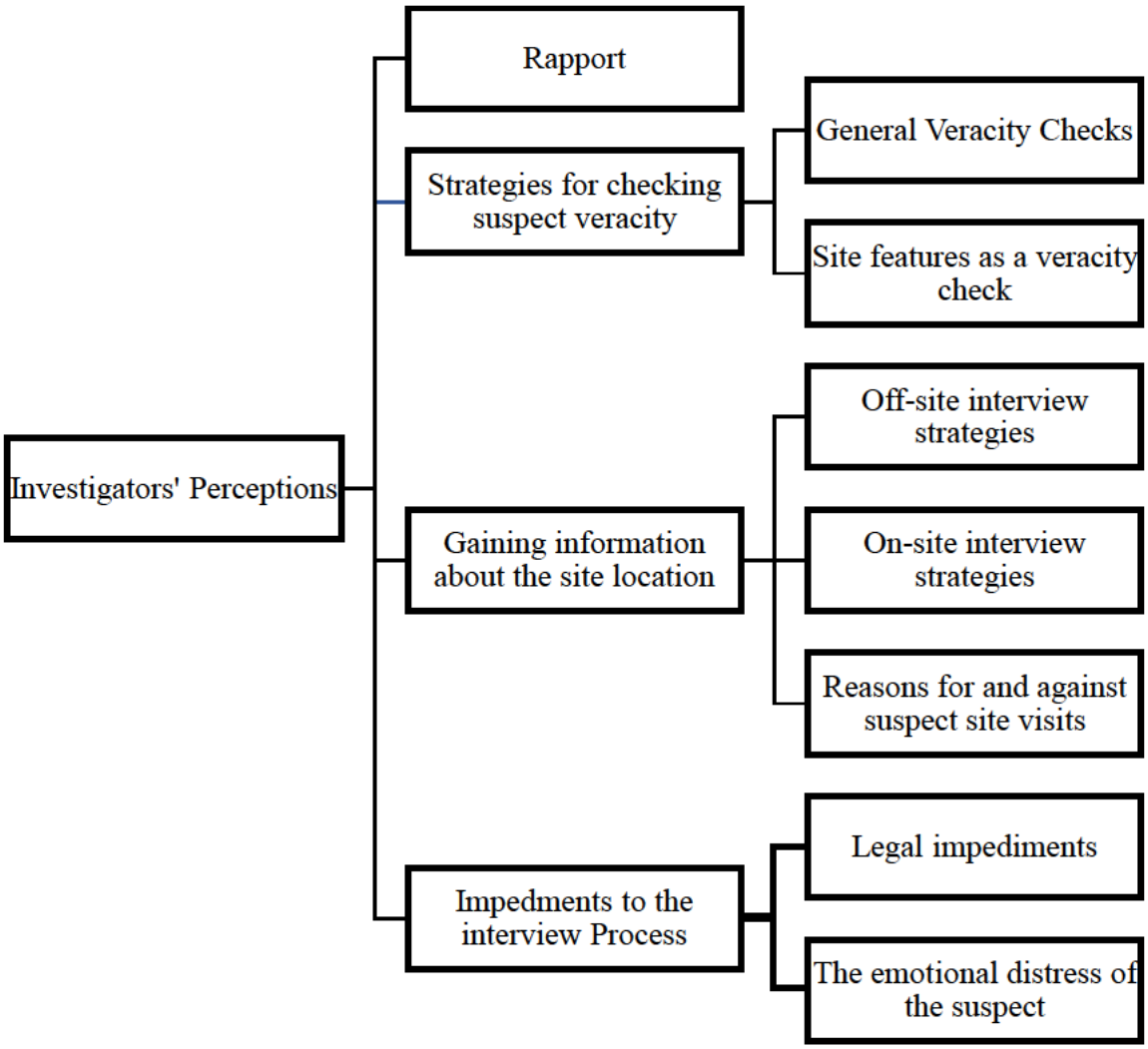

Figure 1. Main Themes and Subthemes

Establishing Rapport

The first challenge identified by participants was establishing rapport. Consistent with the literature on rapport building (Walsh, & Bull, 2012) establishing a bond with the suspect early in the interview was deemed essential to assisting the quantity and quality of the

suspect's statement regardless of the interview purpose. This includes finding common ground with the suspect and generally trying to make them at ease with the interview process, as described by Investigator 8 "… it's about a human interaction, it's about creating an environment, that if they so desire to tell their story, or so desire to tell the story as they know it, then you've got to create that environment".

Investigators stated that ultimately the decision to give information was up to the suspect, and that rapport building was only a way of facilitating an account from a suspect. Participants stated that it is not possible to make an unwilling suspect give information, but it is possible, through a dominant approach, to make a willing suspect unwilling to give information. Rapport-based information gathering interview style has been shown to reduce the chances of false confession while maintaining the ability to elicit confessions and true information when compared to accusatorial approaches (Meissner et al., 2014). While not mentioned specifically by the investigators, it is important to continue rapport building throughout the interview to maintain its benefits (Walsh & Bull, 2012). The consistency between practitioners regarding rapport is encouraging as it suggests that practitioners have accepted and engaged in some aspects of evidence-based practice. Further, it should be noted that some PEACE method skills are relevant to assisting an 'unwilling' suspect to become 'willing' to provide information (Bull & Soukara, 2010).

Strategies for checking suspect veracity

The second challenge investigators identified was gauging veracity. Possible deception was a common consideration for investigators, and as such, they each had strategies to deal with this. Two subthemes were identified in managing deception. These were general veracity checks and using site features as a veracity check. Some of the strategies mentioned were dependent on whether the investigator chose to take a suspect to the site.

General veracity checks. General veracity checks are those that are not specific to an interview focused on an object's location. The veracity of a suspect's statement is integral to investigators and approaches to determining veracity overlapped with decisions of whether to take the suspect to the scene. The main strategy used by investigators was the SUE, minimising or eliminating interviewer presentation of information that may be used to deceive an investigator (Hartwig et al., 2006). This is a sound approach in the interviewing process. The following quote demonstrates how investigators allowed specific details around the dismemberment of a victim's body to be disclosed by the suspect in the hope that the suspect would disclose information known only to the investigators and the perpetrator, thus, demonstrating the veracity of the suspect's statement.

> …what you do is you tactically miss out stuff, that only the murderer would know, …so we made no mention at all that the heart was missing....so if he turns round and we said to him "which bits did you remove?" and he says "I did this, I did that, I did the heart, I did this" and then later on he says "I only admitted it because I was frightened of the police , we would have it all recorded, written and saved that we never ever said anything about heart. (Investigator 5)

Site features as a veracity check. Investigators used features of the site to test the veracity of the suspect's responses. This could be used in both on-site and off-site interviews. The strategy when interviewing the suspect on-site was to ask them to describe various features of the environment (i.e. landmarks) prior to moving to that location. This can be seen in the strategy used by one investigator in a case that involved the retrieval of a baby's remains five years after it was buried in a forest.

> ...step by step exactly recreating it as it was and how she had done all those years ago, and she was rediscovering these locations and she was describing that to me and verbalising what her next discovery point was, and I found that critical because the

> aim for me in the interviews is not just to locate what we're looking for, but it's as much as the veracity and methodology of it....I would've been very confident this lady had undertaken that journey at some stage because of the of the challenge checks along the way, she wouldn't have been able to make that up…so that was part of my planning… it wasn't just 'could we find a small baby in a large forest five years down the track?' It was 'is this lady telling the truth? (Investigator 2)

By getting the suspect to describe the next landmark in the journey, the investigator can discover whether the suspect has been to that site before, and in doing so determine that the suspect is being co-operative. If the suspect is correctly identifying the landmarks ahead of time, then the investigator can be sure that the suspect has been to this site before. However, this must not be misconstrued as confirmation that this is the deposition site, only that the suspect is being truthful about knowledge of that site.

When interviewing off-site, investigators can question the suspect about physical details about the site. This may include landmarks, but also more specific details such as, what sort of plant life is at the site, whether the terrain is rugged or smooth. This information as described by investigators become checkable facts that investigators can use to determine if the suspect has previously visited that site. This strategy is like that created by Nahari, Vrij and Fisher (2014) with the verifiability approach. In this approach, information that can be verified is encouraged so that the veracity of an interviewee's statement can be gauged.

Strategies for gaining information about the site location

The third challenge for investigators was how to get a reliable account from the suspect regarding the location of the deposition site. Two subthemes emerged as methods of attaining this information: off-site interviews and on-site interviews. However, whilst all investigators would conduct an off-site interview, three said they would not conduct on-site interviews.

Off-site interviews. Off-site interview strategies generally followed the format of the CI. Investigators use focused retrieval, mental reinstatement, free recall and to a lesser extent reverse order. The interview process involved the use of a material timeline which is the process of building a timeline of events based on evidence gained from multiple sources, including interviews. The investigators can use this to identify where key information is lacking, which then enables them to focus resources in specific areas of need. The material timeline can also identify where the focus is required in an interview. When interviewing to locate a deposition site, three investigators mentioned the use of the material timeframe to divide an event into episodes, and link each of those episodes to a location narrowing down a search area as explained by Investigator 4:

> What we're doing effectively is saying here's the timeline we divide that into ten chunks, you think he got rid of the knife somewhere between chunks seven and 10 so let's start at six again, then take you up to seven, right ok 'has he still got the knife? Yes' right so let's go from seven to eight, 'has he still got the knife? Yeah', eight to nine, 'Oh hang on a minute no he's not got the knife'. Right ok let's go back to seven and let's work through seven in more detail. (Investigator 4)

In addition to the use of the CI and material timelines, investigators used memory aids such as Sketch plans and maps such as Google maps. The use of sketch plans and maps were a key component of the off-site interview in most cases. Many investigators had a specific preference for sketch plans while some were open to using either sketch plans or information rich maps. Investigators who preferred the sketch plan did so because a sketch plan contains no information that could contaminate the suspect's account as explained by one investigator. "If I gave you a map and said 'you went form a to b how'd you get there?' and you couldn't remember, you'd just look at the map and do the utmost most logical route" (Investigator 4). Investigators who had no preference were equally concerned about the possibility of

contaminating the suspect's account, and would only introduce a map, or photographic memory aids after a topic had been fully explored during the interview process. However, it is not known whether the information presented on maps provides any tangible assistance to search teams. In the spatial memory literature, the generation of sketch plans is prone to inaccuracy, with consistent errors in judgements of angle and distance among other things (Thorndyke, 1981; Thorndyke & Hayes-Roth, 1982; Tversky, 2003). It is also possible that an information rich map may not generate any helpful information from a suspect especially in situations where the victim has been hidden in a remote tract of bushland where there may be no significant landmarks and of course the usefulness of a map will be dependent on the amount and quality of information displayed in the map.

On-site interview strategies. When on-site interviews were used by investigators they were always used after the application of an off-site interview had been performed first. Essentially the on-site interview is a separate interview, as the suspect must have admitted to the crime or some knowledge of the crime in a prior interview before this would be considered. There is no point in taking a person who denies knowledge of the location to seek it out. Therefore, the details of the crime would have already been addressed. The use of on-site interview strategies by the investigators was limited. Investigators used a free recall strategy with limited questioning. The suspect was generally taken to a starting point specific to the case. Some investigators took the suspect to the site of the murder, whereas, others started from the police station. Generally, there was no formal questioning strategy involved when conducting on-site interviews. The practice was to ask the suspect to direct the investigator to the deposition site while maintaining rapport. When conducting the interviews on-site, the use of the techniques such as the CI was generally not seen. This again indicates a need for research in this area. It is not clear what procedure for conducting an on-site interview is best for

improving a suspect's memory retrieval when trying to locate a missing body. Although the strategy for on-site interviewing was limited, one investigator offered a technique to deal with a suspect who had become lost or had forgotten the next step in the route.

> … So I said, 'ok let's stop' and said 'what I'd like you to do is I'd like you to walk, return to a location where you knew you were, so where you actually understand exactly where you are'. So she returned to a location and I said 'Right. So what I'd like you to do now in this location, cause you actually know where you are now, I'd like you' and I was using the four points of the compass and so I said…'walk in that direction' which was north 'until or unless you either say to me, I'm now back on the track I know where I'm going or no this is the wrong way. If it's the wrong way [we] return back to this location we are currently standing in. (Investigator 2)

This strategy used by the investigator in this instance is trying to activate a memory trace by systematically allowing the suspect to explore the environment. The goal of this strategy is to facilitate recognition of the next landmark along the route and hopefully continue to the deposition site.

Reasons for and against suspect site visits

Suspect site visits were a point of contention across investigators. Three investigators stated they would never take a suspect to site, whereas six said they would always take a suspect to site if it was practical to do so. This difference of opinion revolved around practical constraints. Investigators who stated they would never take a suspect to the site believed the practical constraints, such as site contamination, could reduce the chance of a successful conviction. While most investigators believed that taking a suspect to site would be best for helping with memory retrieval, it was also believed that the perceived risk was not worth the potential benefit of improved memory retrieval had the interview been conducted on site

Reasons for a suspect site visit. The justification given by investigators for a suspect site visit was the complexity of the deposition site. This refers to the size of the site, and the lack of easily identifiable landmarks. In most cases, the deposition site was in non-descript bushland or a rural environment. The difficulty for investigators in this situation is the inability of the suspect to verbalise any distinguishing features that would easily guide an investigator to the deposition site. It was stated by investigators in favour of suspect site visits that the deposition site would never have been located without taking the suspect to the site as explained by Investigator 8:

> Now once we got to the front gate he was able to direct us. We spent probably five hours there the first day, didn't do any good. We spent all day the next day, I put him in a chopper with me, we still couldn't find it. And the morning of the third day we found it, we found this massive rock.... Now from that, once we had that he was able to walk with me and point to this massive crevice, this crevice that went down about 12, 13 feet, and then showed me where the body was which had been covered up with sticks. Now, without his help we would have never, ever, found the body, impossible. (Investigator 8)

The practice of conducting an on-site interview in addition to an off-site interview is consistent with spatial memory research. The choice to take a suspect to the deposition site should be of more benefit to the suspect as the spatial cues would assist in the retrieval of spatial memory (Tversky, 2003).

Reasons against a suspect site visit. As previously mentioned, the reasons for not taking a suspect to site were dictated by practical constraints. Primarily these constraints fell into three categories which were, site contamination, community impact and an increased risk to staff and suspect.

Site contamination was a major concern for investigators deciding not to take a suspect to site. It was stated that the defence for the suspect could use this as a way of discrediting any DNA evidence presented at trial. If the suspect's DNA was found on site, it may be attributed to the police taking the suspect to the site, rather than relating to the crime itself.

The community impact of taking the suspect to the site was seen to be another major factor. Typically, missing body homicide cases are high profile, and attract large amounts of media and community involvement. Often the community and the victim's family may be involved in searching for the victim or holding vigils in areas that may be necessary for the suspect to visit. Investigators stated that they believed that by taking the suspect back to the site, the risk of encountering members of the community who may realise that he/she is the suspect would be too great, and it would probably cause distress within the community and the victim's family.

The decision to not take a suspect to a site can also be justified by the risk to the suspect and police officers. There is an increased risk of harm to both the suspect and police officers when taking suspects to site that may come from disgruntled members of the community looking for retribution or associates of the suspect who may attempt to free them. This would result in an increased risk to police who have a duty to protect the suspect.

Although many missing body homicide cases are high profile and remain so for many years, it is possible that the community impact may lessen over time and in some prominent recent cases the time between the crime being committed and the interview to locate the victim's body may be years rather than weeks and days. In this situation it may well be that investigators no longer see this as a restriction to an on-site interview.

Impediments to the interview process

Legal Impediments. Another consistent theme that was found was the legal impediments investigators had to deal with regarding timing and application of suspect interviews. Investigators believed the CI would not be accepted by the suspect's legal representative. Although legal representation was recognised as necessary and legally required, it was suggested that the legal representative would be unlikely to allow an un-interrupted CI and would interrupt periodically to provide advice to their client. Any interruptions in a CI can warrant the process ineffective as it may disrupt the suspect's ability to focus, and therefore, disrupts the memory retrieval process. It was usually the case that investigators used the instructions around focused retrieval followed by free recall, and then some follow up questions, omitting the other less practical techniques of the CI such as reverse order. In addition to the legal representation, investigators were concerned about the acceptability of the evidence produced by a full CI.

Four investigators stated that the various mnemonics contained in the CI are unpalatable to jurors, lawyers, and judges. They believed jurors would not understand the science behind the interview strategy and would find the information confusing or doubt the evidence because of its presentation. Therefore, many investigators rarely chose to use reverse order, and none chose to use change perspective. This negates the effect of the multiple retrieval principle. With less attempts and less variation in the attempts at retrieving information, there is less chance of activating the various memory traces. An alternative to the change perspective mnemonic is 'category clustering recall' which has been found to increase the amount of information generated and may be a more 'palatable' option (Paulo, Albuquerque, & Bull, 2016). The investigators' goal is to obtain a conviction and an interview method, although effective in theory, must be suitable for practical application and must not jeopardise the focus of the investigation. It must also be noted that in the

circumstances of a search interview this may not be applicable. At the point where a suspect has agreed to assist in locating the victim's body, they may have already admitted to the crime. Therefore, it is probable that the search interview could be conducted separately in addition to an interview that focuses on a conviction.

Investigators stressed the importance of the interview in gathering information. However, it was made clear that the interview can be only one aspect of the investigation and that the needs of the investigation influence the focus of the interview, rather than the interview operating in isolation. This means interviews will initially only focus on locating a missing body or object if the investigation requires it. Many investigators stated that locating the body was not always necessary for a conviction, and if so, the interview may initially focus on other aspects of the case. This is due to the time constraints placed on investigators during the investigation.

Interviews must be conducted within a limited time frame and the search for the deposition site may consume too much time without yielding a result. The focus of locating the victim's remains could resume after the initial investigation yielded a conviction. However, it was also stated that locating the victim's body was preferable within the initial stages as it made a conviction more likely and allowed return of the body to the victim's family promptly. The understanding of the impact on families and friends of the victims was clear among the investigators. "…you know people tend to forget, the victims that are left, there's the tragedy of someone being killed, buried and not found, but it's also the families, the friends, the knock-on effect of all that" (Investigator 7).

Time was the final constraint identified by investigators. In the period that the suspect can be detained, much more than just interviewing must take place, as explained by one investigator.

> So a lot of it is enforced, so you know the police and criminal evidence acts in the UK says you must be interviewed at in the normal working day, so in daylight hours, they've got to take regular breaks for meals and refreshments, they've got to have 8 hours sleep, they've got to be allowed to consult with a solicitor, now sometimes these consultations can take 5-6 hours. And then you've got to, so I'm almost sat there with this sliding rule trying to work out when the best time is to take them to court. (Investigator 4)

Furthermore, forensic evidence may need to be collected, the suspect may have medical needs that have to be attended to, and there may be court appearances for the suspect. These time constraints make it difficult for an investigator to schedule large amounts of time to the interview process, and it is most likely that the interview will take place over multiple stages.

The emotional distress of the suspect. Although not a dominant theme, two investigators stated the suspect was in a heightened level of distress. Essentially, they are affected emotionally by their own actions. This placed some restrictions on the interviewer in asking the suspect to recall details of the crime as these increased levels of distress as explained by Investigator 8.

> So what you've got to remember with suspects is…they are going to be suffering from shock and trauma…the problem is if I took him through the offence and just really compounding the trauma he was displaying in the interview…that can appear oppressive, he's basically saying 'I don't want this to happen'. (Investigator 8)

The investigator in this circumstance is referring to the wellbeing of the suspect and the consequences of repeatedly reviewing the traumatic aspects of the crime. It was further noted

by this investigator, that the legal representative present in the interview would be reluctant to allow the interviewer to continue if the suspect was becoming too distressed. As such, the emotional distress of the suspect, and focusing on the traumatic events of the crime, would impede the amount of information the investigator was able to retrieve from the interview process.

Furthermore, it was suggested that when interviewing to retrieve the location of the deposition site the interviewer should not focus on the details of the murder as this may increase the reluctance of the suspect to give information. Investigators avoided this by focusing on the suspect and avoiding the more detailed aspects of the murder. Through this it was hoped that the suspect would continue to disclose information regarding the whereabouts of the deposition site.

Limitations

The size of the sample in this study, and the large proportion of UK based investigators, may be a limitation. However, the rarity of cases where a suspect hides a victim and is perceived as willing to assist in the location of the victim limits the amount of investigators with relevant experience, but this is precisely the reason for the research – so others can be informed about what to do in these infrequently occurring – but high impact – cases. Countering this limitation is the substantial experience of the participants in this sample, some participants having been involved in several of these types of cases over their careers.

2.5 Conclusion

While there is an extensive literature to support the use of the CI (Khönken et al., 1999; Memon et al., 2010) this has focussed on memory of events rather than the spatial task that is finding a body. To date no one has researched how homicide investigators use investigative interviewing strategies for this task. Four main themes were identified from the interviews. These were; (a) establishing rapport; (b) strategies for gaining information about the site

location; (c) strategies for checking suspect veracity; and, (d) impediments to the interview process. This study provides a research base to inform how homicide interviews are conducted in these cases and suggests a lack of a direct evidence-base for interviewing in these cases. Whilst missing body homicide cases are rare, the impact on the victim's families and loved ones means they have tremendous consequences. The strategies we have identified here may help in these investigations and provide template for future research that may help find more murder victims' bodies and allow their families and loved ones to find closure.

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2.7 Chapter summary

Chapter 2 presented the findings of study 1 ‘Where is the body? Investigative interviewing strategies in missing body homicide cases.’ In this study we interviewed experienced homicide detectives from various countries around the world. It was the aim of this study to determine what issues are faced by investigators in these rare cases, how experienced investigators address these issues and what recommendations they would give to address them. It was found that there is no consistent application of interview strategies when a suspect is taken to the deposition site. However, many of the investigators had some informed ideas on how to conduct these interviews. It was determined that the lack of research evidence when it comes to gathering spatial information may have been the reason investigators varied on the best way to conduct these types of interviews. Further, factors relating to these types of investigations, such as the time a suspect can be held, the number of additional tasks that need to be conducted within this time, the presence of legal representation and the community impact of returning a suspect/ perpetrator to the crime scene all impacted on the ability to conduct an interview optimally. These practical limitations were considered in the following study (Chapter 3) when testing an abbreviated version of the Enhanced Cognitive Interview on-site in a mock homicide hiding task. A detailed rationale is provided in the next chapter.

Chapter 3: To know where the bodies are buried: The use of the cognitive interview in an environmental scale spatial memory retrieval task.

This chapter includes a co-authored paper: **Ryan, N. C.,** Kebbell, M. R., Westera, N. J., Milne, R., & Harrison, M. (2019). To know where the bodies are buried: The use of the cognitive interview in an environmental scale spatial memory retrieval task. *Applied Cognitive Psychology, 34,* 565-576.

My contribution to the paper involved:

As the first Author on this manuscript my contribution involved investigating and identifying the theoretical foundation for the experiment. Further I developed the experimental design of the study in collaboration with the co-authors. I conducted the data analyses under the supervision of Prof. Mark Kebbell and Prof. Rebecca Milne. In addition, I wrote the majority of the final manuscript with some sections written and suggestions for improvement given by Prof. Kebbell and Prof. Milne.

(Signed) _____ (Date)___14/01/2020__
Mr. Nathan Ryan

(Countersigned) _____ (Date)_____14/01/2020__
Supervisor: Prof. Mark Kebbell

Chapter 3: To know where the bodies are buried: the use of the cognitive interview in an environmental scale spatial memory retrieval task.

The following chapter presents an experimental study examining the effect of an abbreviated ECI on the retrieval of spatial memory in a real world, naturalistic, spatial memory retrieval task. Participants were required to hide an object in bushland and return approximately one month later to retrieve the object after being allocated to either an abbreviated ECI or free recall condition. Interviews were conducted on-site. The results from the study presented in chapter 2 were used to place some practical parameters around this study. Firstly, the decision to conduct the interviews at the deposition site was based on the lack of strategy presented by homicide investigators and the lack of applicable research in this area. Therefore, this form of interview was deemed to be the most important area to develop. Second, the decision to use an abbreviated version of the ECI was based on the information in the first study that demonstrated that many of the mnemonics in the ECI were simply not practical in these types of cases. Finally, provide an ecologically valid environment for participants, there was a need to conduct this study in a real-world environment and introduce all of the practical factors at play when hiding an object in a tract of bushland.

While there are many possible variations that could have been applied to this research design, such as using the reverse order or change perspective mnemonics it was determined that it would be best to start with the current practice of experienced investigative interviewers which did not include these mnemonics. This was decided for a few reasons. First it was determined that a base level should be tested with a form of the ECI that we know will be used. Second when examining the reverse order aspect of the interview another level of complexity must be incorporated into the design; the return trip. Finally, when examining the change perspective mnemonic, this now incorporates egocentric and allocentric aspects of spatial memory. Again, this would be another excellent study to conduct, however, it also

adds a layer of complexity to the design; the need to account for the participants' familiarity with the site. From a research design perspective, it would be best to control this variable by exposing each participant to a different level of familiarity, however, this is beyond the scope of this study and would be best suited to a separate investigation.

3.1 Abstract

Missing body homicide cases have gained public interest globally due to some high-profile cases. In many of these cases, the task of locating the victim's remains relies on the information investigators can gain through the interviewing of willing suspects. To date investigative interviewing research has largely focussed on the retrieval of episodic memory (events) without focussing on spatial memory; a prominent cognitive task required in locating a victim's remains. The current experiment tests the enhanced cognitive interview (ECI) against a free recall strategy in a mock homicide scenario where participants are required to hide and retrieve an object in a natural bushland setting. The results showed that those in the ECI condition produced more coarse- and fine-grained details of landmarks and their actions at, and journeying to the deposition site. This demonstrates the value of using the ECI in generating more valuable information to assist in successive search attempts.

To know where the bodies are buried: The use of the cognitive interview in an environmental scale spatial memory retrieval task.

3.2 Introduction

Matthew Levenson died in 2007. His suspected killer, Michael Atkins, was acquitted of murder but later admitted to disposing of his body in a tract of bushland after being compelled to give evidence in a Coroner's inquiry into the death. Nine years had passed from the time of Matthew's death to the admission from Atkins. Police investigators took Atkins to the proposed deposition site on three separate occasions to identify possible locations (State Coroner's Court of New South Wales, 2017) and excavated and sieved 7500 square meters of bushland. It was not until the last hour, of the last day, of the final search attempt, that Matthew's body was found approximately 30m from one of the potential deposition sites identified by Atkins (State Coroner's Court of New South Wales, 2017).

In some cases, the victim's body is hidden from investigators and the perpetrator is willing to co-operate by providing information about the location of the body. However, the perpetrator may be unable to accurately recollect the location of the victim's body because of problems with memory. In these cases, it is often only the suspect that holds the information that will lead to the successful retrieval of the victim's remains and the investigative interview strategy chosen by the investigator becomes particularly important (Ryan, Westera, Kebbell, Milne & Harrison, 2016).

The Levenson case demonstrates the importance of obtaining accurate accounts about where bodies are disposed. This is reflected in legislation such as the 'No body, no parole' Law, that at the time of writing is currently before parliament in the United Kingdom ("Helen's Law") and propose that perpetrators who have hidden a victim's remains will not be eligible for parole unless they successfully disclose the location of the deposition site (Unlawful killing (recovery of remains) Act (2017). This is similar to legislation in other

countries, for instance in Australia the Queensland Government in Services (No Body, No Parole) Amendment Act (2017), that prevents a killer from being released without a body being recovered.

Whilst trying to get offenders to find the bodies of their victims is rare, there are many other situations in which police need to find the locations that only a suspect or witness might know. For instance, the police may want to find out where an offender has hidden drugs or a weapon. In one case, the police returned a convicted arsonist to a tract of bushland to identify the location at which a lethal bushfire was started. Finding this location helped to identify the extent to which the arsonist was responsible for the deaths of people killed in the fire (McDermott & Hassall, 2018). Further, in many cases crime victims, such as rape victims, are asked to provide information about where an offence occurred so that forensic evidence can be collected, and accounts corroborated. Therefore, in many instances, it is important for the police to be able to help people remember locations.

Eyewitness memory and interviewing, broadly defined, has had a great deal of attention (Loftus & Palmer, 1974; Loftus, Loftus & Messo, 1987; Fisher, Milne & Bull, 2011). Commonly, research conducted into the area of investigative interviewing focuses on the retrieval of episodic memory (the memory for events) or descriptions of actors in the environment, such as the appearance of a suspect, or descriptions of objects in an environment (such as colour and size etc.) (Köhnken, Milne, Memon & Bull, 1999; Memon, Meissner & Fraser, 2010). Typically, the research paradigm for investigative interviewing is to show a participant a video of a crime or a staged event and then conduct variations of interview techniques and use measures such as correct responses, incorrect responses and confabulations to assess relative effectiveness (see for example, Paulo, Albuquerque, Saraiva, & Bull, 2015; Prescott, Milne & Clarke, 2011). This is relevant to many witnessing scenarios

and police interviews, however, the memory for the location of objects (such as a body) may be different in some salient ways.

First, there are somatosensory aspects of placing and locating objects – the individual is moving around to achieve this task (Jones & Martin, 2009; Ruddle, Volkova, Mohler, & Bülthoff, 2011; Tversky, 2003). Second, the individual is not a passive witness to an event, they are an active decision-maker – deciding where to go and what to do. This more active involvement may encourage deeper processing thus a stronger memory trace (Jacoby, & Craik, 1979; Fu, Maes, Varma Kessels & Daselaar, 2017). For example, it has been shown that when retrieving spatial memories participants are more likely to recognise those landmarks that were located at 'decision points' (points where the participant made a choice about which direction to go) (Janzen, 2006). Although it is not known whether similar processes exist in episodic memory, it is an important aspect to consider when delineating between passive witnesses and active agents in a spatial memory task.

Locating a missing body engages the use of spatial memory. This is a distinct form of memory related to relationships between objects in space (Hegarty, Richardson, Montello, Lovelace & Subbiah, 2002; Tversky, 2003). Objects and relationships between them within space are often separated into landmarks, (notable features in the environment) and routes, (the pathways between landmarks) (Thorndyke, 1981; Thorndyke & Hayes-Roth, 1982). Individuals use this spatial information to find their way back to locations. The retrieval of spatial memory engages somatosensory systems that engage with the environment in a specific way when encoding spatial information (Jones & Martin, 2009; Ruddle et al., 2011; Tversky, 2003). When retrieving spatial memories, the engagement of these somatosensory networks improves the ability of participants to retrieve the spatial memory; that is by reinstating the physical interaction with the environment the retrieval of these relationships becomes more accurate (Jones & Martin, 2009; Ruddle et al., 2011; Tversky, 2003).

Logically when the task of locating a missing body is required, a return to the environment that engaged with the somatosensory system of the subject should activate this memory trace. Returning the subject to the deposition site should then act as another variation of memory retrieval that should assist in the specific task of finding the deposition site.

Nevertheless, spatial memory is prone to its own set of errors. Features of the environment can affect individuals' memory of spatial features, such as the Feature Accumulation effect, which is that the complexity of a route, can change participants' estimations of distance where the more features in a route, the greater the estimated length of the route (Jansen-Osman & Berendt, 2005). This is just one example of many errors or heuristics that can affect the retrieval of spatial memory. Although there is a substantial body of research into these errors, no research has examined investigative interviewing techniques specifically on the retrieval of spatial memory. Thus, little is known about how people who are trying to find objects can be interviewed most effectively.

A commonly used interview technique, with willing interviewees, that has been well documented concerning episodic, non-spatial memory, is the Cognitive Interview (CI). The underlying principles of the CI is that memory can be encoded in many ways and therefore varied retrieval attempts may unlock different memory traces, it follows that the more attempts at the retrieval of a memory, the more likely it is that the memory will be retrieved, and that memory retrieval is a cognitively demanding task therefore the interviewee must be free from distraction (Fisher & Geiselman, 1992). These principles formed the basis of the mnemonics in the CI and were expanded with the development of the ECI including the psychology of communication and more cognitive techniques. The ECI consists of: (1) Establish Rapport, building the initial relationship with the interviewee; (2) Focused retrieval, encouraging the participant to concentrate hard when attempting to recall information; (3) Report everything, instructing the interviewee to give fine detail no matter the perceived

relevance; (4) Transfer of control, handing the control of the flow of recall over to the interviewee; (5) Mental reinstatement of context, encouraging the interviewee to focus mentally on the details of the scene such as smells, feelings, sounds, etc; (6) Interviewee compatible questioning; (7) Varied retrieval, which includes - Reverse order, instructing the participant to recall events in a different order and Change perspective, instructing the participant to picture the events from another person's perspective; and, (8) a summary, closure and evaluation phase (Fisher & Geiselman, 1992; Milne, 2017). Research has shown that the CI is successful at increasing the quantity and quality of information from interviewees with 41% more correct detail recalled when compared to a control interview (Khönken et al., 1999; Memon et al., 2010). A possible increase in correct details in the context of spatial information such as landmarks, should assist individuals in navigating back to a previous location. If this is the case, this increased accuracy would be valuable to investigators when interviewing perpetrators in missing body homicide cases. While this is encouraging for the possibility of use in a large-scale environment, such as a journey to a deposition site, to date no research has tested the use of the CI in this manner.

These mnemonics came with recommendations that the interview must take place in an environment free from distraction as taking an interviewee back to the site of the event may contaminate their memory (Fisher & Geiselman, 1992). This was justified by the environment not being the same as the time the event took place. Sound, smells, light and other aspects would change and therefore contaminate the witness's account (Fisher & Geiselman, 1992). Of course, the event cannot be recreated but only reconstructed by the witness. So, in the case of retrieving the memory of an event this would be crucial. However, in the case of missing body homicides and specifically the goal of locating the deposition site this may not be as important as the site as it was at the time of deposition, may still exist. The landmarks and routes taken by the subject may still be intact. Therefore, taking a subject to

the deposition site, after an off-site interview has been conducted to retrieve an uncontaminated memory of the event, could be an effective way of assisting them to locate the victim's remains.

While previous research has touched upon spatial memory, indirectly, as part of the CI, i.e.; asking participants to remember the general positions of objects and people within a room, this may not be congruent with the task of locating an object in a large scale space, such as the task of locating a deposition site in a naturalistic setting, such as a tract of bushland or forest. Hegarty et al. (2002) proposed a distinction between three scales of space that are interpreted and used through different cognitive processes. These are figural or small scale space (typically objects that are pictorial in nature or small objects relative to the subject and able to be manipulated), Vista space (a scene that can be observed in a singular view but is equal to or larger than the person viewing it) and Environmental space (a large scale space which contains the subject and requires movement within it to capture all aspects) (Hegarty, et al., 2002). Essentially when navigating through Environmental space, subjects would see landmarks and other spatial detail appear in front of them and disappear behind them as they navigate through the environment. This distinction instigated the development of the Santa Barbara Sense of Direction Scale (SBSODS) which is used to determine an individual's level of ability to navigate through environmental scale space (Hegarty, et al., 2002). The task of locating a missing body would typically take place in this scale of space. This would require the suspect to move through an environment, such as a forest. It could be argued that at best the current body of research examining the CI tests some aspects of participant's retrieval of Vista space, as viewing an event on a screen or staged in a lecture theatre can be perceived from one particular vantage point. The variation in ability of individuals to navigate through the environment is an important factor to capture in any study that investigates the retrieval of environmental scale memory. Using the SBSODS to measure

these differences may account for variation in the accuracy of participants and avoid confounds. Essentially the retrieval of Environmental spatial memory using the ECI mnemonics has yet to be tested.

In a study conducted by Ryan et al. (2016) investigators discussed the importance of gaining environmental detail in missing body homicide cases. Essentially, it was suggested that finding specific detail about the environment could be used to assist search teams in their efforts to locate the victim's remains. The goal of this information being too narrow down the search area. Detailed information about the journey undertaken by the perpetrator or how the perpetrator buried or hid the body may give important information about soil types, the types and amounts of foliage in the area, and key landmarks to guide search attempts (Harrison & Donnelly, 2008; Ryan et al. 2016). In the case of an on-site interview, this would become particularly relevant if the perpetrator was unable to locate the deposition site directly and further search attempts were required.

The current study

The current paper is the first study, to our knowledge, investigating how interviewing might be improved to help aid the finding of objects that a person has hidden. Participants were required to hide an object whilst being filmed and tracked via GPS in a tract of natural bushland and retrieve it after a 30-day period. It is hypothesised that consistent with the CI research into the retrieval of episodic memory that the stages of the ECI that are applied by practitioners will generate more environmental space detail. Further, due to the success of the CI in increasing the quantity and quality of information from interviewees with 41% more correct detail recalled when compared to a control interview (Khönken et al., 1999; Memon et al., 2010), increasing the ability of participants correctly identifying landmarks, which are used for navigation, will lead to an improved ability to find the deposition site, resulting in a greater level of accuracy compared to participants in a FR condition.

Furthermore, it is hypothesised that this technique will increase the spatial accuracy of participants when it comes to identifying the location of a hidden object as the increased environmental space detail will assist participants in navigating back to the deposition site

3.3 Method

Participants

A sample of 40 (Male =18, Female= 22) undergraduate students from Griffith University were recruited from the School of Psychology subject pool, with a mean age of 27.6 years (*SD*=11.25). Participants received a partial course credit for participating in the study. A chance at winning a Samsung tablet (value of $150 AUD) was also used as an incentive to encourage participants to return for the second phase of this study.

Design

A between subjects experimental design was employed. The independent variable was interview type with two levels: (1) abbreviated cognitive interview (*n* = 20), and (2) free recall (*n* = 20). The dependant variable was the accuracy of participants' ability to locate an object measured by distance between the actual deposition site and the indicated deposition site in meters. Further, the effect of interview type was examined on the fine and coarse grain detail of the spatial information provided; Landmarks and route/road, and behaviours and decisions making; Actions, Elimination tactic, Environmental changes, Decision making (self), Decision making (others) and Decision making (speculative) (dependant variables). Participants were randomly assigned to one of the two interview conditions CI or FR.

Interview Conditions

An abbreviated version of the Enhanced Cognitive interview was compared to a Free recall condition due to the absence of any consistent interview strategy among investigators when taking a perpetrator to a deposition site in missing body homicide cases as identified in Ryan et al. (2019). Therefore, it was deemed that a free recall condition was most consistent with

what was described by these investigators. Both interview conditions consisted of a rapport building phase where the interviewers engaged the participants in general conversation prior to commencing the information gathering aspects and a clear description of the purpose of the interview, to locate the hidden object. Due to comparing the CI with a free recall condition, only the initial stages of the CI were used to avoid excessive repeated retrieval attempts confounding the results.

The Abbreviated Cognitive Interview. The abbreviated CI consisted of mental reinstatement, focused retrieval and report everything phases. The mental reinstatement phase consisted of instructions such as 'I want you to think about the route you took', 'Think about the features in the landscape that you noticed along the way', Think about how it felt to walk along that path', 'Think about the choices you made when hiding the object' and 'Think about why you made those choices'. Focused retrieval was achieved by stating 'I want you to take a moment to think back to when you were here to hide the object. I want you to concentrate hard when thinking about this' and finally for the report everything phase participants were told 'As you lead me towards that location I want you to tell me what you are thinking as you go in as much detail as you can. Tell me everything even if you think it is trivial unimportant. For example, 'from the start point I walked a short way down this path and remember seeing a sign, this sign was about at eye level, was brown and had some writing on it'.

A further aspect to this interview was added in the form of a prompt to be used during the journey to the deposition site if the participant became disoriented. This prompt instructed participants to take their time and focus on the last landmark they were certain they remembered. This was used as a way of activating the participant's spatial memory around landmarks with a view to improving accuracy of retrieval.

Free Recall. The free recall condition consisted of several instructions and a general prompt. Participants were instructed ‘I want you to try really hard to remember where you hid the object and in a moment lead me to that location.’, ‘as you lead me towards that location I want you to tell me what you are thinking as you go’ and ‘you can say anything you like but the more detail you can provide about what you are thinking the better.’ In addition to these instructions, participants were also prompted during the journey if they became disoriented which consisted of the being told to ‘take their time’.

Materials

A Trimble R1 GNSS receiver linked to an Apple 5c mobile phone was used in conjunction with Trimble Terraflex GIS workflow software to collect and store the GPS data. A real time differential adjustment was used to improve accuracy of the receiver to allow for sub meter accuracy via the Trimble RTX correction service. Both phases of the study were video recorded via a Hero 4 Go Pro camera and both camera and GNSS receiver were attached to a hard hat that was worn by participants in the first phase. A 50x80cm white polypropylene sack, half filled with empty plastic bottles was used as the object to be hidden.

Standardised interview scripts were used for each interview condition containing information for interviewers on what to tell the participants (See appendix A & B). Participants were also given the Santa Barbara Sense of Direction Scale (SBSODS) which is a paper survey used to measure sense of direction in large scale environments (Hegarty et al., 2002). A further paper survey was used to collect demographic information.

Procedure

Ethics was obtained from the University Ethics Board. The experiment contained two phases. The first phase was a hiding phase, where participants were led to an area of bushland near the University and asked to hide a sack. The second phase required the participant to retrieve the sack.

Phase 1. Participants were led to a starting point where a vignette was read about a homicide that they had committed and the need to hide an incriminating object. They were also advised that they had 1 hour to scout out a location for the object, then return to the starting point to collect the object and hide it before another participant would commence searching for the object. They were also advised that this was a two-part study requiring them to participate in a survey after approximately one month.

There were two aspects of this information that were misleading. First was the use of a second participant. This was a deception as there was no second participant trying to find the sack. The fake participant was used for the purposes of ecological validity in two ways. First, to create a situation where participants would begin thinking about where other people might look for their object consistent with the task faced by a perpetrator hiding an object from the police. Second, to create a sense of increased urgency around the 1-hour timeframe by introducing the risk of being caught in the act. In addition, the purpose of the second phase of the experiment was masked. The reason for this was to prevent the participants from ruminating over the location of the object and therefore possibly making it easier to locate in the second phase and to prevent the participants from deliberately hiding the object in an easy to remember location.

Participants were then asked to walk through the tract of bushland and scout out possible locations to hide the object and to return to the start point after finding a suitable location. Upon returning to the start point participants were given a hard hat fitted with the GNSS receiver and video camera. They were also given the sack and the mobile phone that contained the tracking software. After receiving some instruction on how to use the software, they were asked to take the bag back to the location they had chosen and mark this location with the tracking software. Then once again return to the starting point. Following this the participants were dismissed, and the experimenter then entered the bushland to retrieve the

sack and take a more accurate measure of the deposition site with the GNSS receiver and a differential correction.

Phase two. After one-month participants were led back to the starting point and were allocated to either the free recall or abbreviated ECI condition. Upon returning to the site the interviewer advised the participant that their task was to retrieve the sack that they had hidden previously and that the participant who was the closest to identifying the location of their sack would win a Samsung tablet. Again, this incentive was used to provide some form of ecological validity as in many cases a perpetrator is given some incentive for accurately identifying the deposition site. Participants were unaware that the sack had been removed. The interview protocol was then conducted, with the interviewer applying either the ECI or FR instructions, depending on the allocation of the participant, at the end of which the participant was told to lead the interviewer back to the deposition site. During the journey back to the deposition site the interviewer would use the prompts if the participants became disoriented. The interview was video recorded, and participants were again tracked using the GNSS receiver. Once the participant had identified the 'remembered' deposition site it was marked with the GIS software and the participant was led back to the starting point to complete the surveys. Upon completing the surveys, the participants were debriefed.

Interviewer Training

Three interviewers participated in a two-hour training session on the aspects of interviewing relevant to the needs of the experiment. All interviews were supervised and evaluated by the experimenter reviewing the visual recordings of the interviews. Verbal feedback was provided to interviewers after each interview regarding how accurately they applied the interview protocols.

Coding

All recordings of the interviews were transcribed. A coding protocol was developed and a sample of 10 interviews were then coded by two independent coders to measure inter-rater reliability. Once an acceptable level of agreement was reached, the remaining interviews were coded.

Analysis

Coding Protocol. A coding protocol was developed based on themes discovered in the transcribed interviews, the literature on spatial memory (Thorndyke, 1981; Thorndyke & Hayes-Roth, 1982) and previous investigative interviewing studies (Koriat & Goldsmith, 1994; Koriat & Goldsmith, 1996; Sauer & Hope, 2016). The interviews were divided into information about the journey and information about the deposition site. Furthermore, this information was also separated into 'coarse' and 'fine grain' details. This distinction is important when conducting research in a naturalistic setting as a focus on quality as well as quantity gives a more comprehensive measure of memory retrieval (Koriat & Goldsmith, 1994; Koriat & Goldsmith, 1996; Sauer & Hope, 2016). Coarse details refer to general details such as an object existing for example: "I hid it under the tree", the indication of the tree being a coarse detail. Fine grained details are those that give additional information about an object or route such as: "I hid it under a large tree that had been hollowed out by a fire". The coding protocol consisted of eight variables related to the details given by participants: (i) Landmarks – details about notable features of the environment; e.g. "There was like a burnt out like stump up in the distance", (ii) Route/Road knowledge – environmental details about the paths between landmarks; e.g. "it's an old track, still fairly used and all that stuff, but it's not in great condition", (iii) Actions – what participants did while hiding the object e.g. buried the bag with sticks and grass; e.g. "I covered it with like sticks and stuff from around here as well as some leaves from around the corner", (iv) Elimination tactics – a process

where participants explored the environment to eliminate areas they were certain they had not hidden the object; e.g. “So we’ll just go up a little bit further and If it doesn’t look like it up there, I’m pretty sure this is the spot…There was no track. I didn’t cross a track”, (v) Environmental changes – participants’ claims that the environment had changed; e.g. “The whole scene looks the same but I’m pretty sure that was a log, but it looks like it’s been split up”, (vi) Decision Making (self) – decisions based on the participant’s own assessment of the environment; e.g. “this area is not dense enough to hide the bag”, (vii) Decision Making (others) – decisions based on participants’ beliefs about where another person might search for the bag; e.g. “I was thinking about hiding it around the bridge but again it would be too easy and too obvious to find. I’m sure that someone would search there”, (viii) Decision making speculative – disoriented participants’ beliefs about where they think they would or would not have hidden their object; e.g. “I think in the end I may have just thrown the object, I wouldn’t have thrown it there I don’t think because that’s quite open”. As an example of the way units were coded in the statement ‘I hid it under a large tree that had been hollowed out by a fire’, this would be scored as one point for ‘action deposition site’ (hid it under), one point for ‘landmark deposition site (coarse)’ (tree), and two points for ‘landmark depositions site (fine)’ (large, hollowed out by fire).

Inter-rater Reliability. Inter-rater reliability was calculated using an intra-class correlation (ICC) analysis (Shrout & Fleiss, 1979). The results indicated a high level of consistency between raters with an average ICC of .862 and a 95% confidence interval from .488 to .965 ($F(9,9) = 7.768$, $p < .01$).

Interviewer demeanour. To ensure that no bias was introduced by the interviewers an independent rater observed two randomly selected recorded interviews of each interviewer (one ECI and one FR) and scored them for rapport, encouragement, body language and disposition. The goal of this analysis was to determine if there were differences in the way

the interviewers treated the participants which may have biased the outcomes of the interviews. A 2x3 ANOVA with the independent variables, interview type (ECI, FR) x interviewer (Interviewer 1, interviewer 2, interviewer 3) was conducted to test for significant differences between interviewers across conditions. The dependant variable was interviewer demeanour, which included ratings of rapport, encouragement, body language and general disposition. The independent rater scored each dependant variable on a 5-point Likert scale rating ranging from '1 strongly disagree to 5 strongly agree'. Statements included 'In this interview the interviewer: Was friendly; Had welcoming body language; Seemed grumpy or unhappy'. The results for each response were totalled and a mean score for interviewer demeanour was created. No significant interaction or main effects were found, suggesting that there was no significant difference in the way interviewers behaved.

3.4 Results

Random allocation to groups

To assess whether randomisation was effective in countering any systematic error between groups, a series of independent samples t-tests were conducted. The independent variable has two levels (ECI versus FR) and the dependant variables were age, gender and sense of direction (measured with the SBSODS). No significant differences were found between the conditions on any of the dependant measures.

Retrieval of site details.

A one way MANOVA was conducted to assess the total effect of interview (ECI versus FR) on the twelve dependant variables; Landmarks journey (coarse), landmarks journey (fine), landmarks deposition site (coarse), landmarks deposition site (fine), route/road, actions journey, actions deposition site, elimination tactic, environmental changes, decision making (self), decision making (others) and decision making (reflective). Breaches of univariate and multivariate normality were detected. Tranformations were deemed unnecessary due to there

being no reason to expect that the DVs would not be normally distributed in the population (Tabachnic & Fidell, 1996). A series of bivariate correlations was performed to assess for multicollinearity. As seen in Table 1 most variables were within an acceptable range indicating a meaningful relationship between variables. A Box's M of 191.05 was found to be significant (p=.001) based on a cutoff of .005 as suggested by Huberty and Petosky (2000) indicating unequal covariance of matrices. To account for this breach in assumption a Hotelling's T was used which is regarded as robust to breaches of covariance of matrices when comparing two groups with equal sample size (Hakistan, Roed, & Lind, 1979). The results of the MANOVA were found to be non-significant; Hotelling's T = .79, F(12, 1.78) = .11. Due to the small sample size and the conservative nature of the MANOVA when accounting for type 1 error a series of post hoc analyses were conducted to detect if any effect of interview condition on each individual independent variable.

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Table 1. Bi-variate correlations of dependant variables to assess for multicollinearity

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Landmarks journey (coarse)	-											
1. landmarks deposition (coarse)	.325*	-										
2. Landmarks Journey (fine)	.762*	.358*	-									
3. Landmarks deposition (fine)	.481*	.709*	.506*	-								
4. actions journey	.535*	.362*	0.240*	0.286*	-							
5. actions deposition	.316*	.493*	.375*	0.290*	.407*	-						
6. Route/road	.508*	0.296*	.474*	0.270*	.537*	.444*	-					
7. Elimination tactics	.652*	.493*	.620*	.801*	0.272*	0.225*	.368*	-				
8. Environmental change	.369*	.500*	.355*	0.174	.334*	.493*	.497*	0.213*	-			
10. Decisions other	0.143	0.119	0.105	0.025	.459*	.320*	.345*	-0.107	0.227*	-		
11. Decisions (self)	0.013	-0.023	0.003	0.034	0.018	-0.095	0.010	0.091	-0.055	0.076	-	
12. Decisions (reflective)	0.099	-0.141	0.272	-0.146	-0.098	0.118	0.116	-0.078	0.055	-0.100	0.076	-

**correlations within range of .2-.8*

A series of independent samples *t*-tests were conducted to analyse the effect of interview condition on each of the twelve dependant variables as listed above. An alpha level of .05 was adopted for all analyses. Normality was breached for all variables with the exception of 'Actions journey'. Normality of distributions were gauged using a standardised cut-off of $z = 3.29$, as recommended by Tabachnick and Fidell (2007). A series of transformations were applied to adjust for skew and the analyses were again conducted. No changes to significance levels were found. Therefore, the untransformed data has been presented. A lavene's test for equality of variances was conducted and found to be significant for 'Landmarks journey (fine)', 'Landmarks deposition site (fine)', 'Actions journey' and 'Elimination tactics'. To address this issue degrees of freedom were adjusted to a more conservative level.

The results for these analyses are presented in Table 2. The results indicated that the CI generated more coarse and fine grain details regarding Landmarks along the journey. This difference represented a large effect size, indicating that the ECI is effective at eliciting more information about landmarks on the journey to the deposition site than the FR conditions. Further, significantly more coarse and fine grain details about landmarks were also given by participants in the ECI condition when referring to the depositions site. This difference represented a medium effect size, indicating that the ECI is more effective at eliciting more information about landmarks at the depositions site. Further, significantly more detail regarding actions of the participants was generated in the ECI condition. This difference represented a medium effect size, indicating that the ECI is more effective at generating information regarding the participant's actions on the journey to, and at the deposition site than the FR condition. Regarding the remaining dependant variables, no significant difference was found between conditions. This finding is consistent with previous research demonstrating that the CI tends to generate more coarse- and fine-grained details than other

interview methods (Köhnken, Milne, Memon & Bull, 1999; Memon, Meissner & Fraser, 2010).

Accuracy of Object Location.

Accuracy was gauged as the distance between the DGPS point where the bag was initially hidden and the DGPS point where the participant indicated they had hidden the bag when they returned to the site. A Lavene's test of variance was conducted and found to be not significant, $F = 2.53$, $p = .12$. A breach of normality was found. One outlier was detected; however, removal of this person did not adequately correct the skew. The outlier was replaced and a Log10 transformation was conducted to achieve normality. Normality of distributions and outliers were gauged using a standardised cut-off of $z = 3.29$, as recommended by Tabachnick and Fidell (2007). No difference in significance levels were found, therefore the untransformed data has been reported. An independent samples *t*-test indicated there was no difference between participants in the free recall condition ($M = 8.78$, $SE = 2.63$) compared with the ECI ($M = 20.50$, $SE = 11.27$, 95% CI [-35.15, 11.73], $t(38) = 1.012$, $p = .159$, $d = 0.24$). A Bayesian factor independent samples test was also conducted to assess the fit of the data under the null hypothesis and the alternative hypothesis. Due to the lack of previous research in this field a non-informative prior distribution was chosen. The results of this analysis showed an anecdotal level of support for the hypothesis $BF = 2.75$, 95% CI [-12.50, 35.93] as suggested by Jeffreys (1961), indicating that the data is 2.75 times more likely under the hypothesis than the null hypothesis. This finding is consistent with the independent samples *t*-test demonstrating that there is no effect of interview condition on accuracy of object location.

Table 2. Independent samples t-tests comparing effect of interview conditions on detail recalled

	Free Recall (*n*=20)		Cognitive Interview (*n*=20)						
	M	*SD*	*M*	*SD*	*CI (95%)*	*t*	*df*	*p*	*d*
Landmarks journey (coarse)	3.40	3.33	7.80	6.24	[-7.60, -1.19]	2.78	38	<.01**	0.88
Landmarks journey (fine)	0.55	0.94	3.05	2.99	[-3.96, -1.04]	3.56	22.73[a]	<.01**	1.13
Landmarks Deposition site (coarse)	0.90	1.17	1.80	1.67	[-1.82, 0.02]	1.97	38	.028*	0.62
Landmarks deposition site (fine)	0.25	0.55	1.10	1.59	[-1.63, -0.07]	2.26	23.51[a]	.017*	0.71
Route/ Road	1.80	2.38	3.05	2.63	[-2.85, 0.350	1.58	38	.061	0.50
Actions journey	4.300	4.21	7.25	4.59	[-5.77, -0.13]	2.12	38	.021*	0.67
Actions deposition site	1.30	.92	2.40	2.23	[-2.21, -0.01]	2.04	25.31[a]	.026*	0.64
Elimination tactic	0.45	1.36	1.95	3.87	[-3.40, 0.40]	1.64	23.59[a]	.057	0.52
Environmental changes	0.35	.081	0.85	1.79	[-1.39, 0.39]	1.14	38	.131	0.36
Decision making (self)	3.90	2.90	4.10	3.23	[-2.16, 1.76]	0.21	38	.419	0.07
Decision making (others)	1.55	1.76	1.90	2.25	[-1.64, 0.94]	0.54	38	.293	0.17
Decision making (reflective)	0.10	0.31	0.15	0.37	[-0.167, 0.27]	0.47	38	.322	0.15

**p<.05. **p<.01. [a] denotes an adjusted degrees of freedom to address unequal variances.*

Finally, most participants were accurate to within a 10-metre radius when identifying the location of their hidden object. It is important to note the impact of this error rate on the size of a potential search area for investigators (see Table 3). Although it is unknown at what level of error a search becomes unworkable, a reasonable estimation of the increase in difficulty for investigators can be deduced from this information.

Table 3. Participants' Error Range (distance between deposition site and indicated deposition site) in meters and potential Search Area

	Error Range(m)								
	0-5	6-10	11-15	16-20	21-25	26-30	41-45	46-50	225+
Search Area (upper limit m^2)	78.54	314.16	706.86	1256.64	1963.50	2827.44	6361.74	7854	159043.5
Participants (%)	50	25	2.5	5	7.5	2.5	2.5	2.5	2.5

3.5 Discussion

This study is the first to examine the CI in an on-site, naturalistic setting with the task of locating an object. Previous research has focused on the retrieval of episodic memory. Typically, these studies present a visual recording of a crime event and ask participants to recall details in various interview conditions that are conducted in an interview room setting (Khönken et al., 1999; Memon et al., 2010; Paulo et al., 2015). The current study has focused on interviews that are conducted on-site with a view to locating missing objects or the retrieval of spatial memory. The results of this study found that the CI is an effective tool for generating more information and more detailed information than a free recall strategy. Previous research has shown that the CI can generate up to 41% more information than other interview strategies (Köhnken et al., 1999; Memon et al., 2010). The current study shows that it is much more effective in generating spatial details, such as coarse and fine grain details about landmarks, and details regarding the interviewee's own actions. Although no

significant change in participants' accuracy of locating the deposition site were found between conditions, the CI does not impede the primary goal of the task, locating the missing object, and generates significantly more information which may be of use for successive search attempts.

The non-significant results when it comes to the accuracy of the participants locating the missing object may be a function of the site itself. Context re-instatement is used to activate the interviewee's memory through cognitively recreating the environment in which the memory was encoded (Fisher & Geiselman, 1992). This may not be as effective in an on-site interview, as returning the interviewee to the site should automatically re-instate much of the environmental detail that will facilitate memory retrieval (Godden & Baddeley, 1975). This is particularly relevant in the Australian bushland as, compared to other environments, and particularly over a 30-day interval, it is largely static. It is possible that the physical rather than the mental re-instatement of the environment was the cause for most participants being accurate to within 10 metres and this may have masked the effect of the CI on participants that were less accurate. In environments that change drastically over time, context re-instatement may be more effective, such as seasonal changes between winter and summer in environments containing largely deciduous trees and seasonal snow.

The increased level of information generated by the CI, although not assisting with increasing the participant's chances of locating the object, may assist in successive search attempts. This may be particularly important in cases where only one site visit is possible, for legal or practical reasons. The increased amount of coarse and fine grain detail about landmarks, may be able to assist search teams in narrowing down a search area, or expand it to encompass areas that also fit the description given by an interviewee. For instance, if an interviewee was to state that they buried an object under the root bowl of a fallen tree (a root bowl being the void left under the root system of a tree after it has been uprooted) and gave

enough fine grain detail about this tree, investigators may be able to broaden their search area to locate large fallen trees, and then focus their search around these environmental features. The relevance of this would obviously be dictated by the nature of the information given and the surrounding environment. A large fallen pine tree in a pine forest would be a very common object and therefore may render this information useless. However, whether this information would be useful to investigators would be dependent on the level of detail given by the interviewee. In addition to this, the increased level of information regarding the actions of the participant at the deposition site may also assist investigators.

An increase in the details of what participants did at the deposition site might allow investigators to gain important detail about the deposition site itself and the likelihood of being able to retrieve the victim's remains. Participants who have buried a body may give detail about their actions which could indicate the nature of the soil and give investigators additional information to assist search efforts. The 'digability' of the soil is an important factor that could determine where a body is hidden (Harrison & Donnelly, 2008). Investigators may be able to rule out certain sections of a search area because the soil would be unable to be excavated based on the actions taken by the participant e.g. if they were using their hands to bury an object, they would not have been able to bury a body in a location where the soil would not allow it. Therefore, investigators may be able to narrow down search areas with this information. In addition, the details of how the perpetrator covered the body, whether it was buried or not, will give some indication of whether there are any remains. If a participant indicates that they placed the victim in a root bowl and covered them with sticks and leaves, the body will decay faster than a body that has been buried at a substantial depth (Mann, Bass & Meadows, 1990). This of course is time dependant; it is possible that if a time period has passed, such as in the Levenson case, and the body was left

on the surface rather than being buried there would be no remains to locate, for example, because of interference by animals.

The interviews yielded some interesting findings on the thought processes and strategies that participants used to find their objects. Participants tended to make decisions based on a combination of what they thought was a good place to hide the object and where they thought other people would look for the object. Although some research has been conducted into 'hide and seek' behaviours, to the knowledge of the researchers, no research has investigated the decision-making process of individuals' choices in hiding missing bodies or other types of evidence that may be of interest in an investigation.

Many participants appeared to be using an 'elimination strategy'. Participants would search the area if unsure of the location of the deposition site and eliminate locations that they were sure they had not been to previously. This strategy was not something that was encouraged but was independently adopted by these participants. It is consistent with one technique identified in a previous study by Ryan et al. (2016) where an investigator recommended that participants who became disoriented should explore the environment in a systematic way to eliminate areas that were not familiar and hopefully discover a familiar landmark to progress a search. With this suggested strategy the interviewee would be asked to walk along a logical trajectory into the environment until they either eliminated that trajectory by way of seeing things they knew they had not seen before or recognised aspects of the environment that would allow them to continue the journey. If a trajectory was 'eliminated' the interviewee would return to the point where they had commenced the process and then choose another trajectory (Ryan et al, 2016). It may be that this method is tapping into a natural search instinct of the interviewee, however, it is not known whether this is an effective strategy in improving recall and requires further research.

A question generated from this research is how accurate is accurate enough? While most participants were accurate to within ten metres, it is unknown to the researchers, how accurate an interviewee must be to adequately assist search efforts. A relatively small decrease in a participant's accuracy will result is a substantially larger search area. The difference between a five-metre radius and a twenty-metre radius dramatically increases the excavation required from 79m² to 1257m². This of course is only considering surface area as a two-dimensional space without considering the undulations in the surface of the environment which will also increase the search area.

Another finding in this study, which warrants mentioning, is that there were errors among participants. It is important to note that this study verifies that it is reasonable to believe that an interviewee may be genuinely unable to find where they have hidden a victim's remains. One participant identified a location 219 meters away from their deposition site. Considering the interval between hiding and attempting to retrieve the object is only 30 days, this is particularly salient as many cases, such as the Levenson case, have time frames of years between the disposal of the victim and the retrieval attempt of the perpetrator. This gives weight to the claims by investigators that there are perpetrators that they believe are trying to find the victim, but simply cannot, rather than it being a function of deceit (Ryan et al., 2016) and could be relevant to the fairness of 'no body, no parole' decisions.

The length of time between encoding and retrieval is a limitation of this study. The example case provided in the introduction contains an interval of nine years. While one month is a substantial amount of time between phases from a long-term memory perspective, it does not represent many of these cases which have much larger intervals between encoding and retrieval. It may be that with a larger interval (years) that the error rate among participants would have been much larger and provided a more ecologically valid result. Considering this, as previously stated it is also possible that the effect of the CI on the

accuracy of participants was lost through the number of participants who were within a reasonable search range. An increase in time between phases may have generated a larger error rate and exposed the effect of the CI, however this cannot be resolved in the current study.

Not addressed in this study was the emotional arousal of the participant. It could be that perpetrators would have a high level of emotional arousal while conducting the task of hiding a victim's remains. This is an assumption as no research has been conducted to investigate how perpetrators were feeling while doing this. Without this research it was decided not to introduce a level of arousal to the study. However, previous research shows that highly aroused participants tend to focus on specific aspects of the environment that are of most importance, such as the 'weapons focus effect' (Loftus, Loftus, & Messo, 1987; Saunders, 2009). It is possible that participants may focus on different aspects of the environment and ignore peripheral details in the same way. This also may have an impact on accuracy. Further, the emotional arousal of the perpetrator may cause them to ruminate on the location of the victim's remains. This was not addressed in this experiment due to the need to hide the second phase of the study to increase the difficulty of the retrieval task and avoid participants deliberately hiding the object in an easy to remember location.

The CI can enhance the amount of detail reported by people trying to retrieve a hidden object. This detail has the potential to assist future, forensic, search attempts and is an important finding that can assist investigators to make evidence-based choices when conducting on-site interviews. It is important to remember that in missing body homicide cases there is an emotional toll on those who remain. The importance of finding a way to improve the outcomes for search attempts has the potential for the families and friends of the victims to gain closure gained by being able to farewell their loved one.

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Section 3.7 Addendum for Study two (additional statistical analyses)

The following addendum provides the null results for 'Interviewer Demeanour', the random allocation checks provided in the results section and skew statistics.

Interviewer demeanour

A 2x3 ANOVA with the independent variables, interview type (ECI, FR) x interviewer (Interviewer 1, interviewer 2, interviewer 3) was conducted to test for significant differences between interviewers across conditions. The dependant variable was interviewer demeanour, which included ratings of rapport, encouragement, body language and general disposition. A Levene's test of equality of error variances was found to be non-significant, indicating there was no breach in the assumption of homogeneity of variance. There was no significant main effect on interview type, $F(1, 7) = 0.305$, $p = 0.6$ or on interviewer, $F(2, 7) = 0.143$, $p = 0.87$. Further no significant interaction between interview type and interviewer was found, $F(1, 7) = 0.319$, $p = 0.59$.

Random allocation to groups.

To assess whether randomisation was effective in countering any systematic error between groups, a series of independent samples t-tests were conducted. The independent variable has two levels (ECI versus FR) and the dependant variables were age, gender and sense of direction (measured with the SBSODS). When examining age, a breach of Levene's test for equality of variances was found therefore a more conservative level of degrees of freedom was applied. The independent samples *t*-test indicated there was no difference between participants in the free recall condition ($M = 24.6$, $SE = 1.93$) compared with the ECI ($M = 30.6$, $SE = 2.88$, 95% CI [-13.06, 1.06], $t(33.17) = 1.729$, $p = .093$).

When examining sense of direction, an independent samples *t*-test found no significant difference between participants in the free recall condition ($M=3.61$, $SE=0.2$) compared to the ECI ($M=3.95$, $SE=0.27$, 95%, CI[-1.03, 0.34], $t(38) = 1.01$, $p = .319$. When

examining gender, no significant difference was found as equal numbers of male and female participants were found in each condition.

A further note must be made in relation to the *t*-tests conducted following the MANOVA in the main results section. These analyses were intended as planned comparisons and it must be acknowledged that this has not been clearly expressed in this publication.

Skew statistics

Table 4. Skewness and Kurtosis statistics

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Landmarks journey (coarse)	1.118	.687	.192	1.334
Landmarks journey (fine)	1.516	.687	1.802	1.334
Landmarks coarse (deposition)	-.389	.687	.370	1.334
Landmarks fine (deposition)	1.959	.687	4.187	1.334
Route/road	1.067	.374	.575	.733
Actions journey	.643	.687	-.982	1.334
Actions deposition	.876	.687	1.132	1.334
Elimination tactic	3.156	.374	9.890	.733
Environmental changes	3.173	.374	11.559	.733
Decision making (self)	1.539	.374	2.544	.733
Decision making (others)	1.129	.374	.300	.733
Decision making (reflective)	1.352	.374	1.964	.733

3.8 Chapter summary

Chapter 3 presented the results of the experimental study ‘To know where the bodies are buried: The use of the cognitive interview in an environmental scale spatial memory retrieval task.’ In this study participants were required to hide an object in a tract of bushland during a mock homicide scenario. After approximately 30 days they returned and were randomly allocated to either a free recall or abbreviated ECI condition. Interviews were conducted on-site. The results demonstrated that although there was no difference in the ability of participants to locate their object, there was a significantly increased level of key details that may assist investigators in search attempts such as, fine- and coarse-grained details about landmarks. This study provides an evidence base for investigators when conducting interviews on-site which improves the amount of information provided by participants. Further, this study addresses a gap in the literature regarding the application of the ECI when retrieving spatial memory relevant to locating a missing object. The final study in this thesis (chapter 4) examines the patterns of hiding behaviours comparing male and female participants in a mock homicide scenario.

CHAPTER 4: Hiding behaviours in a mock homicide body disposal task

This chapter includes a co-authored paper: Ryan, N. C., Kebbell, M., Milne, R., & Westera, N. J. (2020). Hiding behaviours in a mock homicide body disposal task. *Behavioral Sciences and the Law.* (submitted)

My contribution to the paper involved:

As the first Author on this manuscript my contribution involved investigating and identifying the theoretical foundation for the experiment. Further I developed the experimental design of the study in collaboration with the co-authors. I conducted the data analyses under the supervision of Prof. Mark Kebbell and Prof. Rebecca Milne. In addition, I wrote the majority of the final manuscript with some sections written and suggestions for improvement given by Prof. Kebbell and Prof. Milne.

(Signed) _____ (Date)___14/01/2020__
Mr. Nathan Ryan

(Countersigned) _____ (Date)_____14/01/2020_
Supervisor: Prof. Mark Kebbell

Chapter 4: Hiding behaviours in a mock homicide body disposal task

The following paper examines the hiding behaviours of participants in a mock homicide disposal task. This paper follows the 'Model for real world enquiry' as a 'spin off' project. The data used in this paper was collected in the 'hiding' phase of the previous study. Participants hiding behaviours were examined to identify patterns and differences in behaviours between participants when hiding objects in a 'real world' environment. Distinct patterns and differences were identified and are discussed. The paper contributes valuable information to the field of missing body homicide investigations, as it approaches these cases from the unique perspective of the perpetrator. In particular, it adds to the field by examining the largely unresearched female population when examining environmental scale hiding tasks. Further, the results of this study when compared to research conducted on actual missing body homicide cases shows that participants in this experiment hide objects in similar ways to actual perpetrators, thus adding a level of ecological validity to study 2.

There were several methodological decisions made in study two that also relate to this paper as the data collected in the first phase of study two was used in this paper. Most notable is the decision to use a bag with no significant weight, or a weight that would replicate that of disposing of human body or parts of a human body. While this is a limitation to the ecological validity of this research, the negligible weight of the bag must also be considered in the context of the effort a volunteer could be reasonably expected to apply to this task. It could be assumed that the motivation to hide a victim's remains would be much higher in an actual perpetrator than a participant in an experiment. Therefore, using a weighted object to replicate that of human remains may result in a less ecologically valid result than the bag used in this research. I believe that the similarity in hiding behaviours, when compared to the field research examining actual homicides and hidden remains, demonstrates that this decision resulted in the correct balance between motivation and effort expended.

4.1 Abstract

Missing body homicide cases are rare but often high-profile cases. Often police investigators have general information about possible deposition sites and due to the effort required to locate a victim's remains, require as much information as possible to narrow down possible search areas. Previous research has focused on analysis of real cases using secondary data, which can only examine cases where a body has been found, or artificial laboratory studies that do not address many of the practical challenges of hiding a body (gradient of terrain and density of bushland) that may impact on the choice of deposition site. When examining real-world cases, factors such as gender of the perpetrator or the hiding behaviours of those whose victims are never found are not addressed adequately. The current study aimed to address these factors by having participants hide objects in a real-world bushland setting using a mock homicide scenario. The results found distinct patterns of hiding behaviours that differed between gender, such as the distance travelled to hide the object, with males travelling significantly further than females before exiting the pathway, and their choice of where to exit pathways, with the majority of females exiting the pathway at two distinct points. This study provides a bridge between the field and laboratory research and adds to an evidence base for investigators when conducting search efforts in missing body homicide investigations.

Hiding behaviours in a mock homicide body disposal task

4.2 Introduction

Cases of missing body homicides have become the focus of the media, the public and governments around the world due to several high-profile cases. Due to this, current research has focused on ways of improving outcomes for missing body homicide investigations such as improved ways for police to gather information for missing body homicde investigations (Ryan, Westera, Kebbell, Milne & Harrisson, 2018; Ryan, Westera, Kebbell, Milne & Harrisson, 2019). To date research that has focused on the way perpetrators hide victims' remains have either been focused on an analysis of historical homicide cases that draw conclusions retrospectively about the nature of the locations where remains are hidden (Burton, 1998; Hääkänen, Hurme & Liukkonen, 2007; Nethery, 2004; Ressler et al., 1988; Rossmo, 2000) and those that use more theoretical, laboratory based methods that examine general human hiding behaviours that are not specific to a homicide scenario. The study improves on previous research by examining how and where participants hide objects in a naturalistic setting during a mock homicide scenario, thus being able to account for factors that are not possible to account for in retrospective or laboratory-based experiments.

For the purposes of this literature review a naturalistic environment is defined as one that is not man made or contains very minimal man-made structures, for example a forest that may have some tracks created by humans for the purpose of navigation. A 'real world' environment is defined as any environment that is not represented digitally e.g. a digital recreation of a 'real world' environment in a virtual reality space or the small-scale representation of space such as hiding objects within a grid on a computer. This distinction is important due to the rich environmental cues that occur in the 'real world' that cannot be reliably substituted in a virtual environment, such as practical difficulties in choosing where to hide an object (e.g., ruggedness of terrain)(Harrison & Donnelly, 2008).

Field Research

Much of the research examining how perpetrators hide victims' remains is based around the goal of developing profiles from geographic information (Geographic profiling) to locate a perpetrator after the deposition site has been established. This research has provided some detailed information about the distance from the perpetrators home to the depositions site (Nethery, 2004; Ressler et al., 1988; Lundrigan & Canter, 2001), distances travelled from a transportation route (roadways etc.) and the kinds of environments and methods of hiding used by perpetrators (Rossmo, 2000; Sea & Beauregard, 2018). Essentially, the choices of distance from residence or murder site to deposition site or choices of where to hide within the chosen site can be associated with different situational factors. For example, access to a vehicle will impact on how far a victim's remains can be transported and will therefore open more options to the perpetrator. Further, knowledge of suitable deposition sites, such as forests, must be acquired by the perpetrator. This knowledge is often gained through unrelated activities at these sites prior to the murder, like transportation routes commonly used by the perpetrator, such as driving to and from work, or areas used by the perpetrator for recreational activities (Canter, 1994). Research by Nethery (2004) examined the types of environments victims remains were hidden, such as forests, open fields, carparks and dumps. Most victims were found to be disposed of in forests (Nethery, 2004). This research was further supported by studies that found most victims remains were located in agricultural or forested areas (Hääkänen et al. 2007; Sea & Beauregard, 2018). In addition to these broader choices, research has examined more specific choices such as the distance travelled within the deposition site.

Most victims are located within 15 to 70 meters from a roadside depending on whether they are a child or an adult (Burton, 1998). Specific to child victims, 98% of victims were found between 46-91.4 meters from a footpath (Rossmo, 2000). In general, it was found

that a victim's remains would rarely be transported further than 60.9 meters for a child victim and 46 meters for an adult victim from a transportation route, with some variation between distances depending on the mode of transport taken to the deposition site e.g. whether a vehicle was used to move the remains from the murder site to the deposition site (Rossmo, 2000). This variation between child and adult victims can be explained with the practical implication of moving a body. For example, it is reasonable to assume that the weight of a body would be a factor in how far an individual can manually transport a body from a vehicle to the victim's final resting place. Further, this distance may also be impacted by the perpetrator's fitness, with some research suggesting that serial killers tend to move their victims less distance as they age (Nethery, 2004).

In addition to the distances that victims are transported, there has been research conducted on the types of hiding behaviours and locations that are chosen. Research conducted by Ressler, Burgress, & Douglas (1988) found that 58% of victims were either buried or covered, while 42% were left exposed, with no attempt to conceal the body. While this research has examined deposition sites in more detail than previous research, there are several issues that cannot be addressed with secondary data. This research relies on information gathered from known deposition sites and linking to known offenders, and so is unsuitable for examining information about remains that are never found. Therefore, part of the picture is missing. Further, while the research has examined broadly the types of environments that perpetrators choose to dispose of their victims, no research to date has looked at, specific choices around individual features within the environment, such as hiding remains in hollow logs, etc. or examined the decision making process of someone hiding an object

Finally, due to the over representation of males as perpetrators of homicide, there is a lack of research in this space that examines any differences in the hiding behavior between

males and females, with research showing that the spatial behavior may differ with sex (Ishikawa & Montello, 2006; Gagnon et al., 2016, 2018; Montello, Lovelace, Golledge & Self, 1999; Munion, Stefanucci, Rovira, Squire & Hendricks, 2019). Global statistics show that 80% of homicides are perpetrated by males (UNODC, 2011). This over representation of males as perpetrators is reflected in the research with most studies focusing on the behavior of males. This in turn results in a lack of evidence to inform investigators when dealing with the rarer cases where females are perpetrators of homicide. Further, due to this imbalance, there is a laclk of empirical evidence that can directly compare the behaviours of male and female hiding behaviours when disposing of a victim's remains.

Laboratory studies.

Laboratory studies, in general, have examined the difference in individual's hiding behaviours compared to their searching behaviours. However, these studies do not directly relate to a homicide scenario. Typically these studies are conducted on a computer where participants are required to indicate where they would hide an object or series of objects on a grid or within a virtual reality (VR) representation of a real world space (typically a room) (Anderson, Foulsham, Nasiopoulos, Chapman & Kingstone, 2014; Legge et al., 2012; Street, Bischof & Kingstone, 2018). Following this, participants are then required to search for another participant's object in the same space. This research gives insight into the cognitive processes involved in 'hide and seek' tasks. However, several issues exist with this kind of research when trying to apply it to a homicide scenario. First is the use of VR as a substitute for a real-world environment. There are many somatosensory aspects to moving through an environment that may alter the decision making. For example, in the case of the disposal of a victim's remains, the terrain (steepness or ruggedness) of the landscape will have real impacts on how a perpetrator can traverse any given area. This may impact the distance travelled, the choice to move around large objects, or to follow low lying areas, rather than walk up an

incline. Further, issues like the ‘digability’ of the soil may also change the initial choice of a deposition site with the practical problems associated with excavation (rocks, tree roots etc.). These issues have in part been addressed by research that compares hiding behaviour in a real-world environment and compares it with a VR representation of that same environment and has found that there are similarities, such as participants hiding and searching for objects in similar ways in both a real room and a VR representation of the room (Legge et al., 2012). However, this does not adequately address the aforementioned variables that must be considered by a perpetrator hiding a victim’s remains.

Second, these studies largely do not address scales of space commonly found in real homicide scenarios. The scale of space represented in these laboratory study ranges from small scale space, such as that on a desktop to a representation of a room (vista scale space) without addressing larger scales of space. In an actual case of hiding a body, the scale of space is likely to be environmental scale space, where the entire space in question cannot be viewed from one vantage point (Hegarty, Richardson, Montello, Lovelace & Subbiah, 2002). As an individual maneuvers through the environment, new scenes will open up in front of them as others disappear from view behind them. This opens new layers of complexity in decision making as all hiding options are not present at any given time. Individuals may walk past locations that may seem suitable in a bid to find something more suitable, then must remember and return to a location once they have assessed a number of options and selected one that they deem most suitable.

There is a large evidence base that examines differences between males and females with spatial abilities such as wayfinding, with numerous studies indicating that males tend to have an advantage over females (Ishikawa & Montello, 2006; Montello, Lovelace, Golledge & Self, 1999; Munion, Stefanucci, Rovira, Squire & Hendricks, 2019). Many of these studies were conducted in a VR space and those that were conducted in a real-world environment

allowed participants to use navigational aids such as maps and compasses (Malinowski & Gillespie, 2001; Munion et al., 2019) which may not be consistent with the typical conditions faced by a perpetrator when hiding a victim's remains. A study conducted by Gagnon et al. (2016) offers a navigational task more consistent with this scenario. Participants were required to search for an object by navigating through an environmental scale VR space without navigational aids. They were then required to find their way back to the point at which they started (Gagnon et al., 2016). The results indicated that females tended to be more cautious when searching for the object, resulting in more time taken moving through the space as well as a reduced likelihood of relocating previous locations (landmarks or waypoints) when navigating back to the starting position. This was determined to be a function of risk perception. Females tended to be more anxious about navigating through the environment than males resulting in the higher level of caution (Gagnon et al., 2016). This research was further supported more recently with a study indicating that males and females differed in the way they explored the environment (Gagnon, et al., 2018). Females tended to revisit locations more frequently than males. This again was deemed to be a function of navigational cautiousness (Gagnon et al., 2018). While this research demonstrates gender differences in navigating behaviours, and is more closely aligned to a missing body homicide scenario, it does not address the practical constraints of hiding an object in a real-world environment, such as gradients, and digability (how conducive the terrain is to excavation) etc. Further, there may be cognitive differences between searching for an object within an environment that has been selected by an experimenter and participants making their own decision about where to hide an object. It is unknown whether gender will play a role in this process and impact the choice of where to hide an object.

Finally, the decision-making process represented in laboratory studies often do not reflect those that may be in use in a homicide scenario, such as the goal of hiding an object

from the police. While, some studies have examined the difference in hiding behaviour of individuals who are hiding from a foe or those hiding for a friend (Street et al. 2018; Anderson et al. 2014), these are not conducted in real world environments or in an environmental scale of space. Essentially the distinction between friend and foe could be extrapolated to a forensic setting such as hiding an object that the individual does not want found (ie. a victim's remains and hiding an object that would require locating in the future such as a cache of drugs or weapons). One study required participants to indicate where they would hide an object within a series of squares with either homogenous squares (a grid all containing the same symbol) or a 'pop out' condition (where some squares in the grid contained novel symbols) and examined differences between hiding from a foe, someone who they did not want to find the object, and hiding for a friend, someone they did want to find the object (Street et al., 2018). It was found that participants avoided squares that had novel symbols when hiding from a foe and tended to hide objects near grids with novel features when hiding with the intention of a friend locating the object (Street et al., 2018). In a naturalistic setting this would equate to hiding an object near or within a landmark or hiding it away from landmarks as a way of making discovery of the object more or less difficult. Again, this study falls short of addressing the practical constraints and complex environmental factors that may impact on the decision making of individuals in the concealment of a victim's remains.

The intention of this study is to establish a foundation of research that bridges the gap between the secondary data used in field studies and the laboratory studies, and to expand the knowledge in this area to assist police investigators in making operational decisions during search efforts to locate victims' remains. The current study uses a mock homicide scenario to examine the way participants hide an object in a naturalistic, real world environment and explores possible patterns in hiding behavior. Consistent with the research conducted by

(Gagnon et al., 2018) it is hypothesised that there will be a difference in the way the female participants hide their objects compared to male participants. This is due to the differing search behaviours that may be employed when looking for a suitable location to hide their object. Finally, it is hypothesised that fitness of the participant will impact on the distance travelled to hide the object. As fitness decreases, the distance that participants travel will also decrease. This study provides general descriptive data on the nature of locations that participants choose to hide their objects and the pathways taken to choose a deposition site.

4.3 Method

Participants

A sample of 40 (Male =18, Female= 22) undergraduate students from Griffith University were recruited from the School of Psychology subject pool, with a mean age of 27.6 years (*SD*=11.25). Participants received a partial course credit for participating in the study.

Design

A Quasi-experimental non-equivalent groups design was used to test the effect of gender on distance (total and distance from pathway), choice of deposition site (general and specific) and choice of action at the deposition site. Further, an exploratory approach was taken to analyse the spatial patterns of participants in relation to the pathways taken to reach their deposition site.

Materials

A Trimble R1 GNSS receiver linked to an Apple 5c mobile phone was used in conjunction with Trimble Terraflex GIS workflow software to collect and store the GPS data. A real time differential adjustment was used to improve accuracy of the receiver to allow for sub meter accuracy via the Trimble RTX correction service. The study was video recorded via a Hero 4 Go Pro camera and both camera and GNSS receiver were attached to a hard hat that was worn by participants. A 50x80cm white polypropylene sack, half filled with empty plastic

bottles was used as the object to be hidden. A printed copy of the International Fitness Scale (IFIS) (Ortega et al., 2011) and a questionnaire for general demographic information were used (Appendix C).

Procedure

Ethics was obtained from the University Ethics Board. Participants were led to a starting point where a vignette was read about a homicide that they had committed and the need to hide an incriminating object. Further, they were advised they had 1 hour to find a suitable location for the object, then return to the starting point to collect the object and hide it before another participant would commence searching for the object. This was a deception as there was no second participant trying to find the sack. The fake participant was used for the purposes of ecological validity in two ways. First, to create a situation where participants would begin thinking about where other people might look for their object consistent with the task faced by a perpetrator hiding an object from the police and second, to create a sense of increased urgency around the 1-hour timeframe by introducing the risk of being caught in the act.

Participants were then asked to walk through the tract of bushland and scout out possible locations to hide the object and to return to the start point after finding a suitable location. Upon returning to the start point participants were given the hard hat fitted with the GNSS receiver and video camera. They were also given the sack and the mobile phone that contained the tracking software. After receiving some instruction on how to use the software, they were asked to take the bag back to the location they had chosen and mark this location with the tracking software. Then once again return to the starting point. Following this the participants were dismissed, and the experimenter then entered the bushland to retrieve the sack and take a more accurate measure of the deposition site using the GNSS receiver with a

differential correction. Participants were contacted at a later date to complete the questionnaire, containing the IFIS.

4.4 Results

Spatial patterns of pathways and depositions sites

The initial analysis of the pathways taken by participants to reach their deposition site was conducted with Esri Arc Map 10.4.1. Measurements of distance were calculated using the measure tool which provides geodesic measurements of linear distance. Patterns of pathways taken were evident in the DGPS line data as seen in Figure 1. Although not directed by the experimenter, from the start point, participants generally walked to the first intersection and took one of two pathways. The first pathway labelled 'inter-campus link' was a sealed bitumen pathway, and the second pathway labelled 'Baileyana track' was an unsealed gravel pathway. Approximately half of the participants chose the 'intercampus link' (n = 20) and half the 'Baileyana track' (n = 19), with one participant taking an alternative route that avoided either pathway. The average distance travelled by participants from the start point to their deposition site and from the point they exited the path to their deposition site can be seen in table 1.

Table 1. *Distance travelled in metres by participants when hiding object*

	n	Minimum	Maximum	*M*	*SD*
Total distance travelled	40	85.93	684.59	336.91	157.59
Distance from path exit point to deposition site	40	1.61	165.11	63.37	46.61

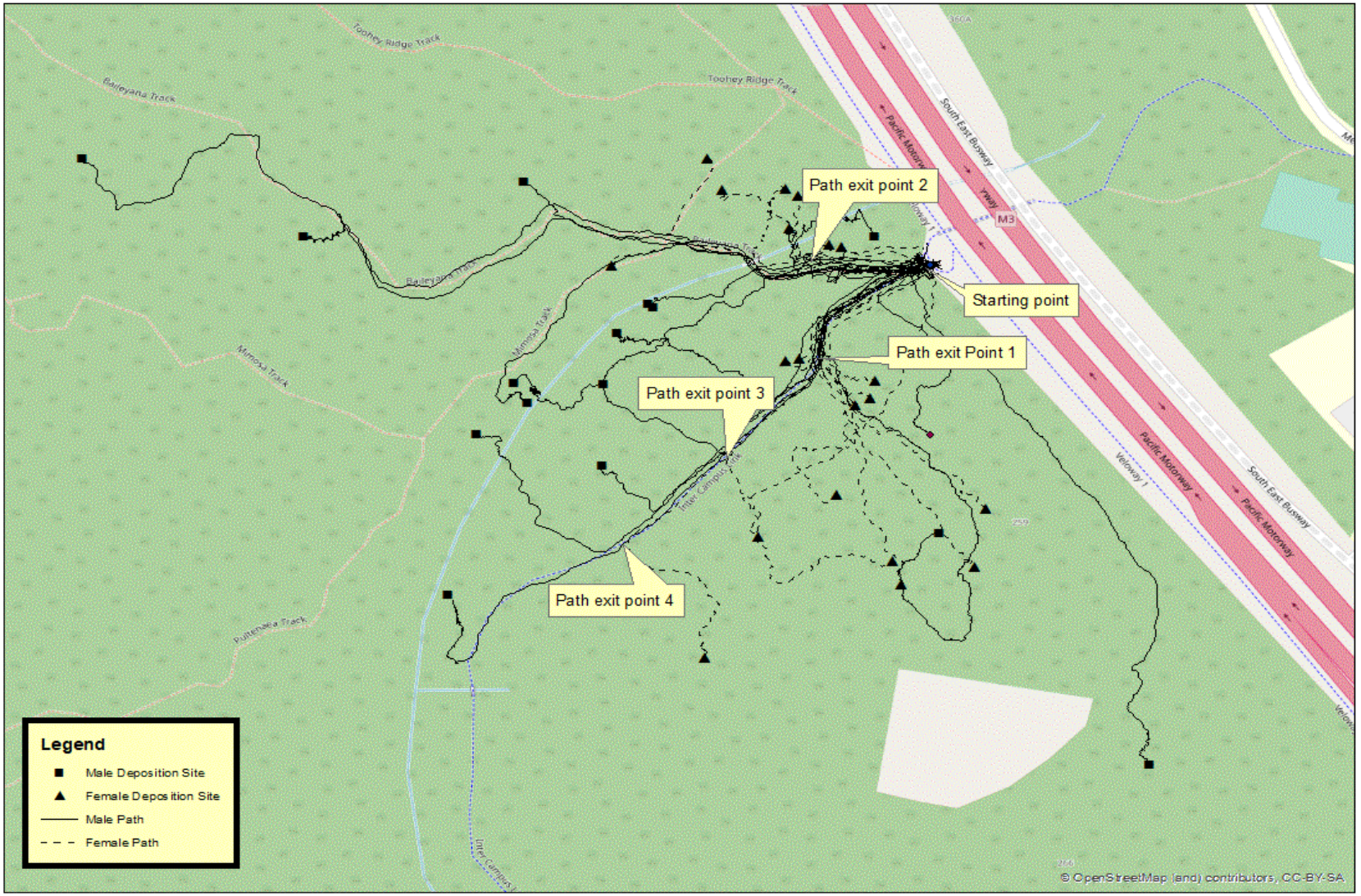

Figure 1. Overall map of path exit points and deposition sites

Examining the ‘Intercampus link more closely (see figure 2), there are some distinct clustering points that participants chose to exit the pathway. At ‘Path exit point 1’ a total of ten (10) participants chose to exit the path within eight (8) meters of each other, with eight (8) participants choosing to exit to the South of the path, and two (2) participants exiting to the North. Further, all but one participant who exited at this point were female. Once participants had exited at this point, their choice of hiding location disperses. However, there is a linear nature to the distribution of hiding places heading in a southern direction, which is consistent with the topography of the area as either side of this section is bounded by two gentle gradients. This suggests that participants were guided by the gradient of the land and tended to hide the object in the lower areas of this section. Again at ‘Path exit point 3’ two participants have exited the path within a close range (2 meters). One participant exiting to the North (male) and one to the South (female). This is also the case at ‘Path exit point 4’ where two participants have exited the path within a close range (7 meters) and again one participant exited North (male) and one South (female). The total length of this path from the start point to the furthest participant’s path exit point is 373 meters. Indicating that these exit points are not random.

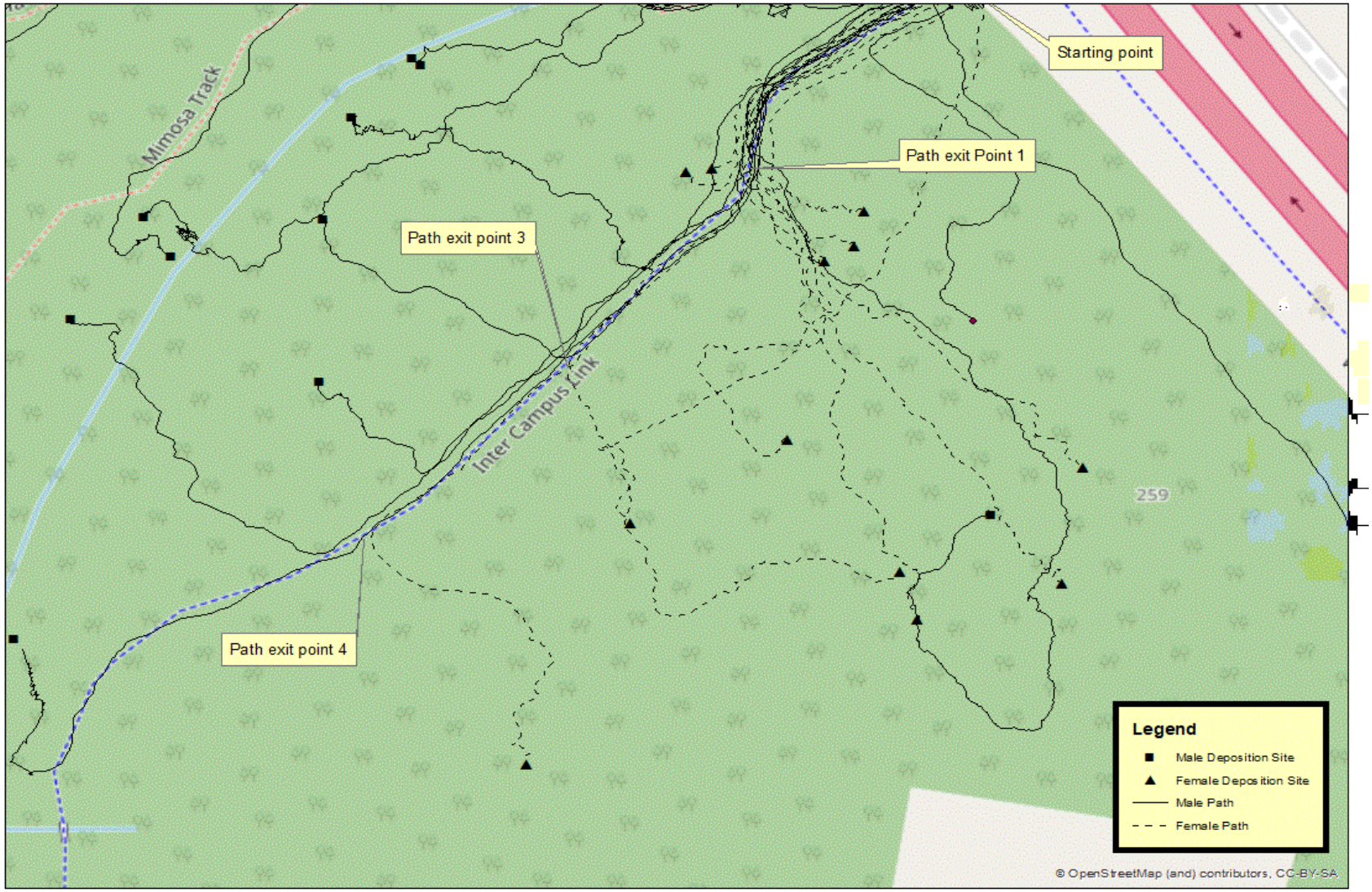

Figure 2. Path exit points 1, 3, and 4 'intercampus link

Examining the ‘Baileyana track’ more closely (see figure 3), again there is a clustering of participants exiting the path at a particular point. While on this pathway the clustering is not as distinct as the ‘intercampus link’ (see figure 1), six (6) participants chose to exit the path within 30 meters of each other and seven (7) within 50 meters. Again, all but one of these participants were female. The total distance on this path from the start point to the furthest participant path exit point was 384 meters, again suggesting that this cluster of participants exiting the pathway was not random. However, no pattern was observed for the remainder of participants that chose this pathway.

A chi squared goodness of fit analysis was conducted to test if participants’ choice of exit points were merely random. To conduct this analysis the total lengths of the pathways chosen by participants were calculated by measuring from the start point to the furthest participant pathway exit point and adding these distances together. This total distance was then divided by the number of participants (n=40) to calculate an increment. These increments were then overlaid onto the map using Esri Arc Map 10.4.1 and the number of participants exiting within each increment was calculated. The analysis was then conducted by comparing the frequency that participants exited within the increments, to the expected frequency (one participant per increment). The low number of expected observations for each cell was not considered a problem due to the robustness of this analysis when there is a uniform expected cell frequency of one or higher (Roscoe & Byars, 1971). The analysis found that there was a significant difference between the expected frequency that participants would exit the path within the increments to the observed frequency, x^2 (39) =168, p<.01. This indicates that participants were exiting the pathway in a nonrandom way.

The clustering of these exit points suggests that the environment is prompting participants to make a decision about where to exit the path. However, the reason participants exited at these points can only be speculated as an examination of each exit point yielded no

observable difference in the features of the environment to make a definitive claim about what is guiding participants to exit at these points.

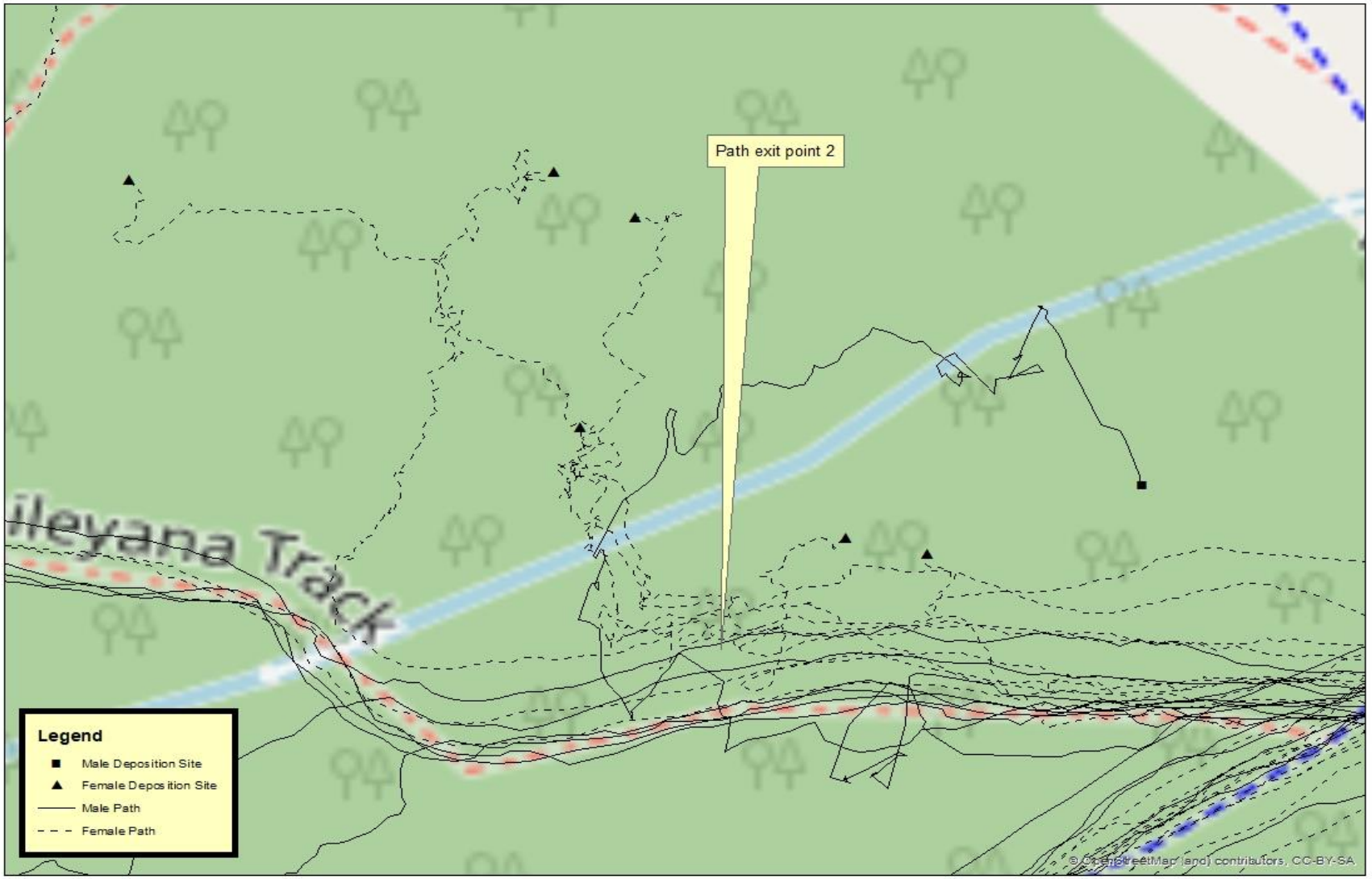

Figure 3. Path exit point 3 'Baileyana track'

Gender and distance travelled

An independent samples *t*-test was conducted to assess the effect of gender on distance in metres from the starting point to the final placement of the object. On average males travelled further (*M*= 397.73, *SE*= 39.53), than females (*M*=295.85, *SE*=32.57) when hiding the object. This difference was significant $t(34) = 2.01$ $p<.05$. Further analysis was conducted on the distance travelled from the point where participants exited the path and the final placement of the object. There was no significant difference, $t(37)=-.391$, $p>.05$, between females (*M*=66.11, *SE*=11.21) or males (*M*=60.18, *SE*=9.81).

To assess whether there were group differences on ratings of fitness and whether this impacted on distance travelled, an independent samples *t*-test was conducted to assess the effect of gender on ratings of fitness. It was found that males rated their fitness levels higher (*M*=3.57, *SE*= 0.15) than females (*M*=2.95, *SE*=0.12) and this was significant $t(38)=3.31$, $p<.01$. However, a simple linear regression analysis of fitness by distance travelled revealed no relationship between these variables (β=44.51, *SE*= 38.43, $p=.126$). Meaning that fitness was not a predictor of distance travelled.

Choice of location.

A visual inspection of the distribution of deposition sites by gender as seen in figure 1 shows that males and females tended to hide their objects again in patterns. Participants depositing their object south of the Inter-campus link pathway are mainly female ($n=10$) with only three males depositing in this area. Similar, but less obvious patterns can be seen after exit point two. However, this pattern was deemed as a logical function of the clustering of exit points. Rather than patterns of choosing a deposition site. It is logical that if participants are exiting the path at the same point then their hiding options will also appear in a misleading pattern due to the consistency of distance travelled once exiting the path and the number of options

available to hie the object. However, an analysis of the types of locations chosen by male and female participants was conducted as outlined below.

Categories were created to define participants' choices around their deposition site. These were general description of the deposition site, specific description if the deposition site and action taken at the deposition site. To generate these categories, a coding protocol was created by a visual inspection of the video recordings of the participants when hiding the objects. The first is a general description of the density of bushland. Four categories were created: Dense bushland, where participants had difficulty passing between trees and shrubs, and required some clearing or pushing of branches to pass through. Medium bushland, where participants could pass through with little difficulty, there is no requirement to clear or push branches, but movement is somewhat impeded. Light bushland, where some trees and shrubs are present, but the participant has no restriction in movement. A clearing, an open space, grassland with few to no trees.

Second, is the categorisation of the specific location that participants chose to deposit their object. Seven categories were created: Hidden under, in or around a log or stump. Hidden in or near a creek or water. Hidden in a washout, this is not a creek but an area where the soil has been scoured by rain. Hidden in a depression that is not a washout or a root bowl. Hidden in shrubbery or dense undergrowth such as ferns etc. Hidden in twigs, branches or any accumulation of leaf litter etc. Hidden in dense grass.

Finally, is the choice of action that the participant took to conceal the object. Four categories were created: Covered with leaves, bark, grass, twigs or branches. Buried, some excavation of soil and covered with soil. Thrown, the object was thrown into its final position. Placed, no attempt at covering.

A series of Chi squares analyses were conducted to test participants' hiding choices. An alpha level of .05 was set and a Bonferroni correction was used to account for familywise

error. First, A Chi squared analysis was conducted to assess the difference of general hiding location by gender see table 2. Males were more likely than females to hide their objects in dense bushland. However, the most favoured choice of site for both genders were in medium density bushland.

Table 2. Gender and choice of general deposition site

	Total	Male	Female	
Deposition site	*n*(%)	*n*(%)	*n*(%)	x^2
Dense Bushland	5(13)	5(29)	0(0)[b]	7.42**
Medium bushland	20(51)	9(53)	11(50)	0.03
Light Bushland	13(33)	3(18)[b]	10(45)	3.34
Open space/clearing	0(0)	0(0)	0(0)	0

% is in relation to the percent of participants within gender to have hidden the object in this location. An alpha level of .016 was used to adjust for familywise error and test significance** indicates p<.01. [a] indicates approaching significance. [b] Indicates a breach of assumption for minimum number of count per cell.

Next a Chi squared analysis was conducted to assess specific hiding location by gender see table 3. There were no significant differences between genders in the choice of specific deposition site. However, the most favoured location for both genders was in or around a log or stump.

Table 3. Gender and choice of specific deposition site

Deposition site	Total *n*(%)	Male *n*(%)	Female *n*(%)	x^2
Hidden in or around a log or stump	22(56)	10(59)	12(55)	2.46
Hidden in or near a creek or water	5(13)	2(12)[b]	3(14)[b]	0.03
Hidden in a washout	5(13)	2(12)[b]	3(14)[b]	0.03
Hidden in a depression	2(5)	0(0)[b]	2(9)[b]	1.63
Hidden in shrubbery or dense undergrowth	8(21)	5(29)	3(14)[b]	1.46
Hidden in twigs, branches or leaf litter	12(31)	7(41)	5(22)	1.53
Hidden in dense grass	7(18)	3(18)[b]	4(18)[b]	0.002

[b] Indicates a breach of assumption for minimum number of count per cell. An alpha level of .016 was used to adjust for familywise error and test significance

Finally, a Chi squared was used to analyse the actions taken at the deposition site by gender see table 4. Again, no clear significant difference was found between the genders regarding the actions taken at the deposition site. However, participants in general chose largely to cover the object with existing leaves, bark, twigs and branches. Very few participants chose to bury or throw an object as a way of hiding the object.

Table 4. Gender and actions at deposition site

Deposition site	Total *n*(%)	Male *n*(%)	Female *n*(%)	x^2
Covered with leaves, bark, twigs	27(69)	9(53)	18(82)	3.75[a]
Buried, covered in soil	1(3)	1(6)[b]	0(0)[b]	3.34
Thrown	1(3)	1(6)[b]	0(0)[b]	3.34
Bag placed, no covering	10(26)	6(35)	4(18)[b]	3.75[a]

An alpha level of .016 was used to adjust for familywise error and test significance ** indicates p<.01. [a] indicates approaching significance (2 sided). [b] Indicates a breach of assumption for minimum number of count per cell.

4.5 Discussion

This study examined the hiding behaviours of participants in a tract of natural bushland during a mock homicide scenario. The first analysis examining the pathways that participants took to reach their chosen deposition site found distinct clustering of pathway exit points, with the majority of participants exiting the pathway at four distinct points. Further, with the narrow margin that these participants exited the path, when considering the vast number of possible exit points, it is clear that participants are exiting the pathways in a nonrandom way and this was demonstrated by the analyses. Further, these patterns tended to be much more distinct for female participants than male participants. There are two plausible explanations for this. The first is that female participants tend to have similar spatial decision-making patterns when hiding an object and therefore chose to exit the pathway after observing a suitable location to hide their object. The second explanation is that this clustering of exit points is a function of distance. Females tend to travel less distance when hiding their object and are therefore exposed to less suitable options to exit the path. This would account for male participants being more distributed. The clustering may be a function of simply having less options. While this is not able to be determined through these results, it is our opinion that the clustering of exit points is too dense to be simply a function of distance. Further, the probability of the male and female participants exiting within such a narrow margin at the other two pathway exit points, albeit a small number of participants, supports this position. It is more likely that this was a function of the spatial choices of females and males. Females simply tend to choose similar locations to exit the pathway. Therefore, this pattern can be attributed to spatial features of the environment and gender affecting the choices of the participants. Although it could not be definitively determined what aspects of the environment contribute to participants choosing these points, this is an important finding, as it indicates that participants choose exit points in a systematic and possibly predictable way

and this tends to be more the case for females than males. If in future studies it can be determined what these aspects of the environment are, this could drastically reduce the possible search areas that police investigators should focus search efforts.

The difference in total distance travelled by males compared to females is an important finding that can assist investigators when dealing with less common cases that involve female perpetrators. This difference is an indication of how far participants are willing to travel down a transport route (the pathway). It is clear that women will not travel as far along a transport route before exiting the path to hide an object, but there is no difference in the distance travelled once participants exit the path and enter into bushland. The difference in distance was not found to be a function of fitness. Therefore, the reason that women did not travel as far along the pathway before exiting as men, could be explained as a function of navigational caution as found in Gagnon et al. (2016, 2018), where it was suggested that females travel more cautiously through unfamiliar environments due to anxiety of becoming disoriented. However, considering the ease of navigating back down the pathway to the starting point, it seems that this is unlikely. If navigational caution was the reason behind the distance travelled, it would be more likely that differences in distance between males and females would occur after exiting the pathway and moving away from manmade wayfinding landmarks, such as the pathway itself and signage along the path, where risk of becoming disoriented would increase. Therefore, the choice of distance when travelling down the pathway to their chosen exit point is most likely a function of spatial decisions that differ between males and females.

The analysis of the general distance travelled form the path showed that participants were closely aligned to previous research demonstrating that perpetrators will transport a victim's remains between 46 and 60.9 meters depending on whether an adult or child victim was involved (Burton, 1998; Nethery, 2004; Ressler et al., 1988; Rossmo, 2000). Participants

in the current study travelled similar distances with males and females travelling an average of 60.18 and 66.11 meters respectively. This is consistent with moving a child's remains and could be interpreted as a function of weight. It is logical to assume that if substantial weight was added to the object, then this distance would be reduced. However, it must also be noted that the level of motivation to move a weighted object would be less with participants volunteering for an experiment than actual perpetrators. Regardless of these differences this finding is important for demonstrating the potential ecological validity that this paradigm holds.

Once participants had exited the path, the choice of where to hide the object tended not to differ, with the exception of the general environment of the deposition site. Significantly more males hid their object in dense bushland. No females chose this type of environment as an option. It is quite possible that this is a function of the distance travelled by females as the males that chose to walk significantly further were exposed to dense bushland that the females were not and opted for a more hidden location.

Regarding the specific choice of deposition site, there were no significant differences between the genders. However, participants favoured hollow logs and stumps as places to hide their objects. This could be interpreted in two ways in the context of the laboratory research. First, this could be seen in contradiction to the research demonstrating that when participants hide objects, they will choose a 'distractor' as a suitable location i.e. an object that does not stand out from the rest of the environment (Street et al., 2018). A hollow log, or stump could be perceived as an object that stands out in the environment. It may seem like an obvious place to hide an object. This decision could be explained by the practical implications of hiding an object such as a bag in a naturalistic environment. The participants, in a time limited situation had to find a place to hide the object with minimal effort, no tools were available for excavation and these features offer a hollow in which to hide the object

easily. Therefore, they may have chosen this feature due to practical constraints rather than what may have been optimal, such as some distance away from a landmark. Second, participants may have deemed that there were many hollow logs and stumps in the environment and therefore this object was a distractor. This would then mean that the findings of the laboratory research were consistent with our findings. However, it is the position of the researchers that that primary explanation is the most logical, the practical limitations of the physical environment and the scenario led to participants choosing a deposition site that was convenient and met the conditions of the task (hiding the object from view).

Finally, the actions taken at the deposition site by participants found no difference between the genders. However, the majority of participants chose to cover their objects with some form of leaf litter, twigs or bark that was sourced from the surrounding area. Although no significant difference was found between males and females, females were more likely to cover the object in this fashion. Alternatively, males were more likely to place their object without any covering at all. Again, this finding is encouraging when looking at the way that perpetrators choose to hide their objects in real homicide cases, with the majority choosing to cover the victim's remains (Ressler et al., 1988).

The findings of this research provide a base for future studies conducted in this way. Identifying the probable exit points from a pathway or roadway, coupled with the information regarding distance that perpetrators travel from these pathways, and the knowledge also gained from this research regarding the finite choices of participants make when hiding their objects (in hollow logs etc.), investigators may be able to use this information, to create targeted search areas to increase the probability of locating a victims' remains, and/or reducing the time and resources required in these search efforts. Further, there is a need to find ecologically valid experimental paradigms to assist in researching the decision making of

‘perpetrators’ in missing body homicide cases. The design of this study can be used in future research and be considered a somewhat valid representation of how actual perpetrators hide a victim’s remains as the participants in this study showed very similar hiding behaviours to those found in actual homicide cases. Further, this study and future studies using a similar design can provide empirical evidence that may inform investigators when searching for victims’ remains that have previously not been examined with an experimental methodology, specifically in cases where the perpetrator is female. Conducting research in this way can give insight into the practical limitations faced by perpetrators when hiding a victim’s remains and also insight into hiding behaviours that cannot be discovered by examining secondary data that only contains information on those victims that have been found.

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4.6 Chapter summary

Chapter 4 presented the results of study 3 which examined the hiding behaviours of male and female participants in a mock homicide scenario. Participants were required to hide an object from another participant in a tract of natural bushland. The results of this study found that there are distinct patterns of hiding behaviours among participants with key points where participants chose to exit the pathway in a nonrandom way. Further, differences were found between males and females, with females travelling significantly less distance when choosing to hide their object. This study provides valuable information to investigators when assessing possible body deposition sites in search efforts. Chapter 5 synthesises the results of the preceding studies, discusses some limitations and provides directions for future research.

Chapter 5: Developing a psychological research base for Criminal Investigations:

Academics and Practitioners working together

This chapter includes a co-authored paper: **Ryan, N. C.,** & Kebbell, M. R. (2019). Developing a psychological research base for Criminal Investigations: Academics and Practitioners working together. In P. Marques (Eds.), *Police Psychology* (In press).

My contribution to the paper involved:

As the first Author on this manuscript my contribution involved developing the initial outline of the paper collaboratively with the co-author. I wrote the majority of this paper, with suggestions for improvement and minor sections written supplied by Prof. Mark Kebbell.

(Signed) _____ (Date)__14/01/2020___
Mr. Nathan Ryan

(Countersigned) _____ (Date)__14/01/2020___
Supervisor: Prof. Mark Kebbell

5.0 Developing a psychological research base for Criminal Investigations: Academics and Practitioners working together

The following chapter provides a general reflection on the research conducted in this thesis through a book chapter (in press). The book chapter focuses on the 'Model for real world enquiry' and provides the research in this thesis as an example of its application. This chapter provides a candid presentation of how a line of research may commence and proceed into a line of published research. Further, it reveals some of the more honest aspects of how research is conducted which can be sometimes lost when teaching students about the research process. In general, it has been my experience that students who choose to move into a career in research have a very idealised understanding of how it is conducted when in reality the process is much more practical and sometimes 'messy' than it is taught in many research methods courses. Due to the research in this thesis being used as an example, this chapter contains some generalities that may not directly relate to the thesis.

Developing a psychological research base for Criminal Investigations: Academics and Practitioners working together

5.1 Introduction

With the rate of technological advancement, the readily available access to information and the ever-changing nature of crime, there is a need for police to achieve and maintain the most current evidence-based strategies. The complex nature of this environment and the task that is required of police investigators means that the need to collaborate with academics to develop empirically sound research that can inform practice and have real world applications is extremely valuable. A failure to keep up with the changing environment would mean that criminals would gain an advantage over authorities and increase their chances of avoiding capture. Further, ineffective practices may lead to wrongful convictions (Gross, Jacoby, Matheson, Montgomery, & Patil, 2005) and in turn a reduction in the public's confidence in the police reducing their legitimacy as law enforcers (Innes, 2010; Jang, Joo & Zhao, 2010). This is particularly relevant in the case of violent crimes such as homicide which the reduction of and ability to solve these cases can be seen as directly affecting the public's perception of the effectiveness of police and in turn the public's perception of legitimacy (Jang, Joo & Zhao, 2010; Dawson, 2018).

There have been many areas of policing where academics and practitioners have come together to advance knowledge and improve outcomes. One example is Research conducted by Westera, Kebbell, Milne and Green (2014a) into the various roles of detectives. In this study the researchers interviewed detectives to identify the various traits and skills that combine to make an effective detective. Ultimately there are benefits for both researcher and practitioner in this style of research. Academics gain valuable insight into a previously unseen aspect of policing and can progress research into other areas or use this information to guide future research that can have a more applied focus. For the police there is the benefit of

gaining an evidence base to assist with recruiting suitable individuals for the role and identifying areas that detectives need to develop to optimize their performance (Westera, Kebbell, Milne, & Green, 2014b). Further, the implementation of new technology by police can open new streams of data for academics and also provide research opportunities.

The implementation of visual recording equipment by police departments has allowed detailed analysis of areas such as the application of the investigative interviewing process, the quality of information generated by witnesses and suspects and how this impacts perceptions of evidence (Westera, Kebbell & Milne, 2011), and in the case of body worn cameras, interactions with the public and the decision making of police in the field (Richards, Roberts, Britton & Roberts, 2017). Essentially the introduction of the video recorded interview has allowed researchers to assess and improve the practice and policy of police to improve outcomes by viewing these recorded interviews and developing a model to address any shortcomings (Baldwin, 1992; Clark & Milne, 2001). Further, the recorded interview has been shown to provide more complete and reliable accounts from witnesses (Westera, Kebbell & Milne, 2013) and in the case of rape victims, removed the stress of having to provide testimony in court (Kebbell, O'Kelly & Kingi, 2009). This research demonstrates the benefits that academics and practitioners can achieve when working together to improve outcomes. In this book chapter we discuss the process of conducting practical, police research using a real example of an investigative interviewing research project. In this example a problem was brought to our attention by an experienced, senior police-investigator. The problem was how best to conduct suspect interviews in missing body homicide cases. The issue raised was one of a lack of evidence to inform practice in these cases. This example of research demonstrates how a practitioner-inspired problem can be investigated by bringing together the theoretical knowledge of researchers with the practical experience of police to develop a research project that is useful and can be applied.

5.2 A Model for 'Real World' enquiry

The examples provided in the previous section demonstrate some of the benefits for collaborations between academics and practitioners. 'Real world research' differs to the traditional model of scientific enquiry which is theory driven and is conducted in controlled environments. The scope for real world research is much broader and is based in applied fields such as criminology and psychology (Robson & McCartan, 2016). This style of research is more likely to use problems inductively through the experience of practitioners. Figure 1 displays a model of a 'real world' enquiry process that starts with the identification of an area of enquiry and integrates the experience of practitioners at various stages (Robson, 1995).

The first step is to identify a 'problem of concern'. This line of enquiry could come from anywhere but is generally started from an issue identified in the 'real world, rather than a gap in the academic literature. This may seem an obvious starting point. However, there are examples where there has been little collaboration between police and academics. For instance, very little empirical work has been done with detectives concerning how they solve crime (there are some notable exceptions see Fahsing & Ask, 2013). This is not because academics are not interested in detectives, as there is an extensive literature on the fictional detective Sherlock Holmes. Indeed, this academic literature on Sherlock Holmes is much more extensive than on real detectives. The gap seems to be because of a failure of researchers and police to develop research projects together.

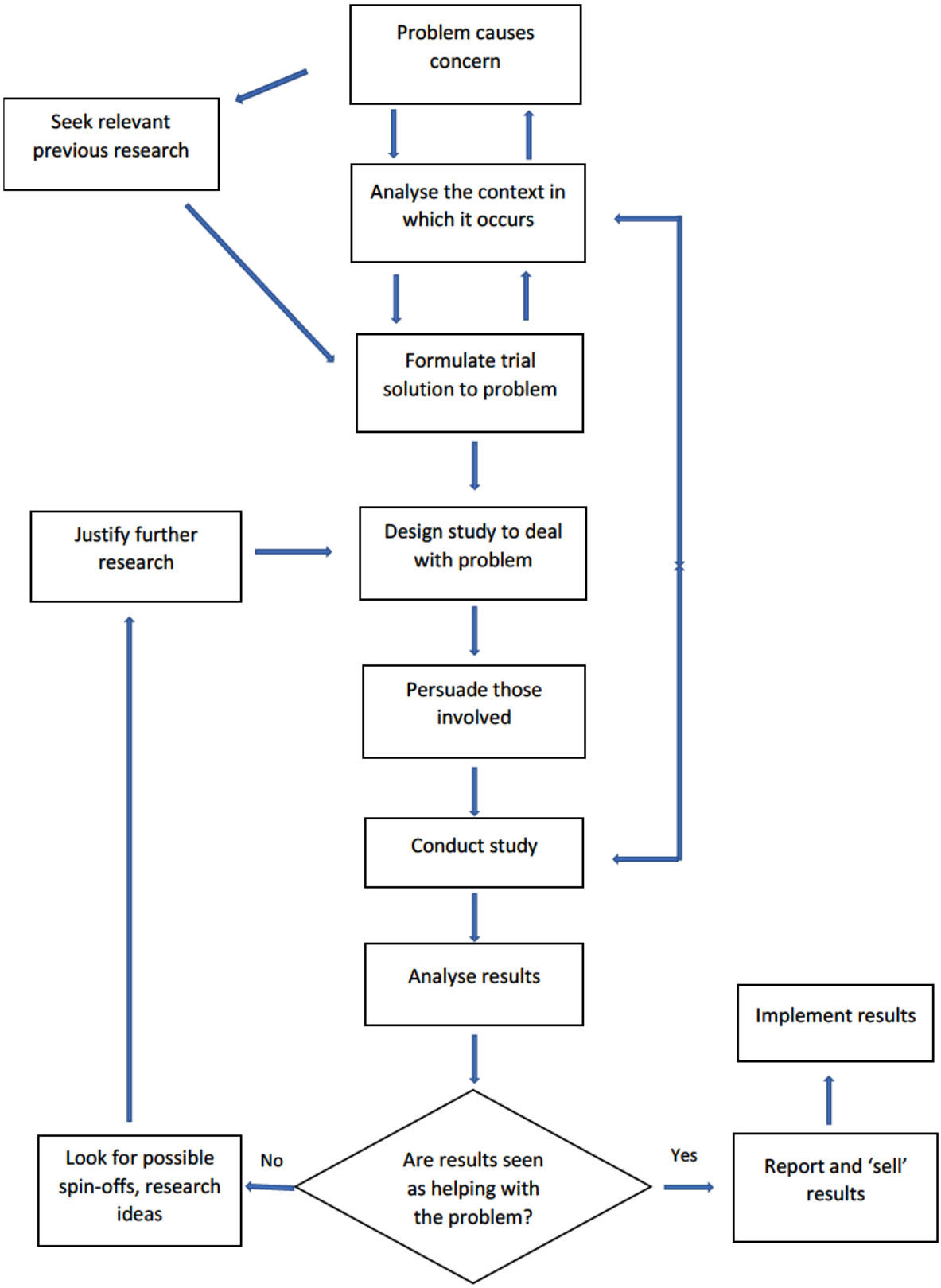

Figure 1. A Model for Real World Enquiry. Reprinted from *Real World Research: A Resource for Social Scientists and Practitioner- Researchers* (p.451), by C. Robson (1995). Oxford: Blackwell Publishers Ltd.

The involvement of police at the outset is essential as police have a unique understanding of the issues they face. Police get to see parts of the community that academics do not: crime tends to be hidden from view. For example, domestic violence and sexual violence occur behind closed doors and are not apparent to the public and academics. Similarly, offending patterns are dynamic and can change rapidly. An example of this is thefts of cars. As cars have become harder to steal because of immobilizers, criminals have taken to breaking into houses to steal the keys to vehicles. Police were aware of this change more quickly than academics.

There have certainly been some successes. Shortly, we will outline an example of a positive research program concerning investigations in missing-body homicide cases from conception of the problem to solutions. Of course, this is not the only example. For instance, Fox and Farrington (2015) report a study where they worked with police to develop offender profiles that were used to improve detection rates for burglary. In this study, they collaborated with police to identify statistical patterns in offending behaviours. An example of this were offenders they labeled as “Opportunistic”. These offenders could be identified at burglaries because they made their way into a property because it had been left open, stole low value items, and showed no preparation or use of tools. Offenders in this category tended to be young, male, with prior theft and shoplifting offences, and without a car. In contrast, an “Organised” group of offenders were identified. These could be identified at the scene because they left a clean, but forced entry, had brought tools to the scene, did not leave evidence behind, and took high value items that would often need a ‘fence’ to dispose of. These offenders tended to be older, specialize in burglary, cohabit or have a partner, and have a car. Using the typology, police crime analysts were able to draw up lists of potential suspects. This strategy increased the arrest rate to three times that of a control site. A

substantial improvement in this difficult-to-solve crime. This example illustrates how researchers and police can work together to solve problems causing concern (see chapter 18).

5.3 Formulation

5.3.1 Identifying a problem

The research in the case-example presented in this chapter was identified as being in need of research by an experienced investigative interviewer who was also an interview advisor. Over the course of his career, the interviewer had worked on cases where a perpetrator had admitted, or had been found guilty of, a murder and had hidden the victim's remains. However, whilst the murderer was willing to disclose the location of these remains, investigators had been unsuccessful in gaining the information required to identify where the body could be found. From these experiences, the practitioner identified a need to develop an evidence-based interview protocol that was specific to these circumstances. The experience of the practitioner was that once a perpetrator admitted to the murder and that they knew where the victim's remains could be found, investigators did not know how to proceed other than getting the perpetrator to direct them to the scene or use various untested methods of gaining information about the location of the deposition site. Not having an evidence-based guideline for an investigative interview created a whole host of issues, such as the contamination of memory potentially, exposure to possibly previously unknown information that could be used to deceive the investigators and lacking a systematic approach that could facilitate accurate recall. Nevertheless, the original problem was not sufficiently clear to conduct a program of research. The next step in the process, therefore, was to define the problem.

The practitioner was an active participant throughout the research process including the design phase. This maintained a practical perspective and prevented drift into the purely theoretical (even though it could be argued that if a theory is true it should be able to be

applied in practical situations). For this phase the research team discussed what was practical, what can be achieved within certain timeframes and budgets. Initially, the desire was to investigate the entire interview process in missing body homicide cases, however, that was too broad in terms of resources and time. For instance, deception, is a field of research where there are already existing evidence-based procedures (Vrij & Fisher, 2016) that could be overlaid in a missing body homicide case. Therefore, the decision was made to include only cases that involved 'willing' interviewees. Once deception was no longer on the research agenda, this narrowed the objective down to memory retrieval techniques. The question became, how do we improve the memory retrieval of perpetrators in these cases? Related to this question was how these cases differ from other types of cases such as robbery or rape?

Perhaps the most important questions were, however, "Is this research important enough to warrant further enquiry?" and, "Does something already exist that fulfill the needs of these cases?" The process of answering the previous questions is one of research, both in academic journals, the 'grey' literature (e.g., police documents and government reports) and publicly available information such as the Media.

5.3.2 Researching the Background (seeking previous research)

A first question is whether the problem warrants further enquiry? The parameters around determining this lie in the prevalence of these cases, the amount of public interest in these cases and the impact on victim's families and the broader community. Generally, these cases are rare. Although there are no definitive statistics on how many intentional homicide cases involve a missing body and a willing perpetrator, it is well known that homicide is a comparatively rare crime compared to other types of crime such as assault. The rate of homicide in Australia (the country the research was conducted in) is around 1 in 100,000. This is low compared to the global rate of 6 in 100,00 (UNODC, 2013). Of these homicides, most cases in Western countries are referred to as 'self-solvers', that being there is a clear

suspect, a clear motive and evidence to solve the crime. It could be assumed that cases where the body of the victim is missing would not fall into this category of homicide, while a body is not necessary for a conviction, finding the body would make it easier to convict. Therefore, missing body homicide cases fall into a rarer subset of an already relatively rare crime. The assumed prevalence rates alone might indicate that the research may have minimal value.

Indeed, the decision of what is of import to research has become a research topic itself. Research by Lawrence Sherman and his colleagues at the University of Cambridge has sought to identify what are the most consequential crimes in terms of the harm they cause and the most important offenders to target (Sherman, 2007). Sherman's work provides an important framework to guide police and academic research because it provides a way of measuring the consequences of different crimes and different criminals. Of course, not all research needs to be focused on the most harmful crimes and criminals, we need to understand less serious crimes too. However, it would be concerning if most research is focused on the least serious crimes and criminals.

With regards missing body homicide cases, it became clear that there is great public concern in these cases and there is a great impact on victims' families and the community. In the words of Sherman (2007), these offences caused a great deal of 'harm'. One example of a missing body homicide case where the perpetrator was willing to disclose the location of the victim's remains was the murder of Matthew Leveson. Matthew Leveson died and had his remains disposed of by Michael Atkins in Sydney in 2007 (State Coroner's Court of New South Wales, 2017). After an investigation Atkins, the suspected perpetrator, was charged with Leveson's murder but was acquitted due to a lack of evidence. Subsequently a Coroner's Inquest into the investigation was started in 2008 but was suspended and resumed in 2015. It was during this inquest that Atkins was compelled to give evidence about the death of Leveson. Atkins perjured himself but was granted immunity from further prosecution for the

perjury or for the murder, if he disclosed the whereabouts of Leveson's remains (State Coroner's Court of New South Wales, 2017). This removed any motivation for Atkins to lie about the whereabouts of Leveson's remains and provided an incentive to do so. Atkins ultimately disclosed the location of the body deposition site, claiming that Leveson overdosed on drugs and Atkins panicked and hid the body (State Coroner's Court of New South Wales, 2017).

At this point a period of 10 years had passed between the death of Leveson and the attempt to locate his remains, therefore, the location of the deposition site was not easily found. During Atkin's first visit he identified three possible deposition sites (State Coroner's Court of New South Wales, 2017). Search teams were deployed but were unsuccessful at locating the remains. A second attempt was made with investigators employing relaxation techniques with Atkins in a bid to improve his recollection of the location. This eliminated one possible location. A new search effort was launched, but again was unsuccessful. A third site visit was conducted. With the advice of a forensic psychologist, the investigators chose to conduct a re-enactment of the events, using the car used by Atkins to dispose of Leveson's remains and drive to the scene with a weighted dummy. Atkins was then required to drag the dummy into the bushland and place it at the deposition site. A third search attempt was launched. In the last hour of the last day of this final search, the remains of Leveson were found. In total the search effort lasted six months and 7,500m² of soil was searched, excavated and sieved (State Coroner's Court of New South Wales, 2017). The Leveson case held nationwide interest and the suffering of the Leveson family was apparent.

5.4 Current interview techniques

A literature review of the investigative interviewing literature showed that there are many interview models in use by practitioners. This literature review relied on access to journal articles. Sadly, many academic journals are kept behind pay-walls, meaning that access to

these articles is very expensive for police. This gives another incentive for police to work with academics who typically have access via their University. The review showed several commonly used interview models in the academic literature these are: Conversation management (CM), the Cognitive Interview (CI)/ Enhanced Cognitive Interview (ECI) and the PEACE model (Fisher & Geiselman, 1992; Shephard & Griffiths, 2013). Essentially each of these models overlap in their use of the mnemonics developed by Fisher and Geiselman (1992) with the development of the CI/ECI. The issue found with the research around these interviewing models is that, with the exception of one research study, no research has looked at the retrieval of memory for location. This may not seem like an important distinction to the practitioner, but in the field of cognitive psychology this distinction is important and will be addressed later. The common research paradigm used to study the CI is to play participants a visual recording of a mock crime event, then allocate them to one of several interview conditions and measure the information generated by correct information, incorrect information, confabulations and omissions (Ginet & Verkampt, 2007; Köhnken, Milne, Memon, & Bull, 1999; Memon, Meissner, & Fraser, 2010; Odinot, Memon, La Rooy, & Millen, 2013; see Ginet & Verkampt, 2007, for a good example).

5.4.1 Spatial versus Episodic memory

Simply put, episodic memory is the memory of events and spatial memory is the memory for relationships between objects in space (Thorndyke, 1981; Thorndyke & Hayes-Roth, 1982; Tversky, 2003). To someone who is not familiar with this distinction this might seem not an important distinction. Afterall, the memory of an event may also contain aspects of spatial memory such as in the case of a bank robbery, where the perpetrator is standing, how far the witness is from the bank teller, etc. However, while this is overlayed with the memory of the event, the way that the spatial memory is encoded differs from that of an episodic memory (Jones & Martin, 2009; Kelly, Avraamides & Loomis, 2007; Robin et al., 2015;

Ruddle, Volkova, Mohler, & Bülthoff, 2011; Tversky 2003). As a person moves through an environment, they are judging distances and angles and encoding them. This can happen in several ways and will change as a person becomes familiar with an environment (Meilinger, Frankenstein, Wantanabe, Bülthoff, & Hölscher , 2015; Mou & McNamara, 2002). When a person moves through an unfamiliar environment, they tend to judge distances, angles and relationships between objects by the positioning of their physical selves i.e. the distance from themselves to a street corner, known as an egocentric perspective (Mou & McNamara, 2002). As a person becomes familiar with the environment, they may start to encode the memory in the form of relationships between objects external to themselves i.e. the distance between a street corner and a house, known as an allocentric perspective (Mou & McNamara, 2002). All of this is done in a specific frame of reference. This refers to the division in the way a spatial memory has been encoded based off either an eye-level view or a topographical view. If a memory has been encoded at the eye-level, it is best retrieved at this same level (Meilinger et al., 2015; Thorndyke & Hayes-Roth, 1982). The same is true of a topographical encoding of the memory. If a spatial memory has been encoded via the use of a map, it is best retrieved using a topographical method, a map (Thorndyke & Hayes-Roth, 1982).

The link between physically interaction with an environment and the retrieval of spatial memory was evidenced in a study conducted by Kelly et al. (2007). In this study they explored a phenomenon known as the ‘sensorimotor alignment effect’. Kelly and colleagues found that participants were much better at remembering the location of the objects if they remained at the orientation in which they were encoded (Kelly et al., 2007). It must be noted that this is only one example of the role sensorimotor systems play in the encoding and retrieval of spatial memory (Burgess, 2006; Ruddle et al., 2011). However, this has important implications for the field of investigative interviewing in missing body homicide cases as the orientation of an interviewee may play a role in the ability to retrieve spatial information and this may affect the

outcomes of locating a victim's remains. These were some of the theoretical perspectives we brought to the design stage.

5.5 Design

While there is a wealth of research in the investigative interviewing and memory fields, it is clear that there was no synthesis of the two and that this was an issue that is salient for investigators in missing body homicide cases. Therefore, the need to conduct research on an effective way to interview in these cases was needed. If there is no research to demonstrate the best way to interview people in this context what were practitioners doing? And, what are the issues that practitioners deem important in these cases? These questions are important to place parameters around any experimental designs that might test interviewing techniques. Previous research has shown that interviewees and legal professionals are reluctant to accept some interviewing techniques as they feel that they are misunderstood in a courtroom (Kebbell, Milne & Wagstaff, 1999). Therefore, it is important to test methods that will be used, essentially a synthesis between the theoretical literature and the applied.

5.5.1 Analyse the context

The first step in analyzing the context was to consult with practitioners and ask them about how they interview and what issues they face in these cases. This was the focus of the first study. Eleven homicide detectives were interviewed with direct experience in missing body homicide cases or prominent homicide cases where a key object in the investigation was missing (weapon) and needed to be located (Ryan, Westera, Kebbell, Milne & Harrison, 2016). Again, as we mentioned in the beginning of this chapter, involving police at the outset was critical to ensuring the research would provide findings that were useful to police. The importance of talking to police about what is important is not confined to the current program of research. Another example, of using interviews to find out what matters, is illustrated by Hunter, May, and Hough (2019). Hunter and colleagues interviewed police officers about

using evidence-based practice. The interviews revealed practical challenges, such as putting those educated in evidence-based research back in front-line roles that may not have occurred to the researchers otherwise. The point of this being that the interviews were useful in helping to identify what was important. In our research the investigators were asked to give detail about a specific case they were involved in, how they interviewed the suspect, what they thought went well, what they thought went wrong, what they could improve on next time, and what advice they would give to someone about to conduct an interview in these circumstances.

The results showed that practitioners were divided about whether to take the suspect on-site (taking them into the field) or interview them off-site (in an interview room). This is an important distinction as the previously mentioned research into spatial memory suggested that the sensorimotor nature of encoding will have an effect of the retrieval of the interviewee (Jones & Martin, 2009; Kelly et al., 2007; Ruddle et al., 2011; Tversky 2003). Therefore, from a theoretical perspective, the choice to take a suspect to the site is clear, they must be taken to the site to help facilitate memory retrieval. However, there was also a list of practical concerns identified that make this a much more complex issue. Problems with the security of the suspect, staff and public were all worthy of consideration (Ryan et al., 2016). Often these cases cause outrage in the public and have intense coverage in the media. Due to this the suspect may be well known and may draw negative attention to themselves from interested parties that cause danger to all involved. Further, the community impact on returning a suspect to the site in an emotionally-charged situation may damage relationships between the police and the public or cause general stress to members of the community. Often there are memorials constructed and vigils held at locations important to the investigation and the probability of encountering the public would be high (Ryan et al., 2016). There were also issues with the ECI/CI and their acceptability as evidence.

Consistent with previous research, the practitioners found that certain aspects of the ECI/CI were not useful to them because the interviewees found them difficult or were confused by their purpose (Kebbell et al., 1999; Ryan et al., 2016). The reverse order and change perspectives mnemonics were rarely if ever used by practitioners. Several cited instances where interviewees became confused and the instructions needed to be re-stated or the process abandoned altogether (Ryan et al., 2016). Further, it was a commonly held belief that the presentation of the evidence in court when using the full CI would be confusing to jurors and may jeopardise the chances of a successful conviction. It was found that practitioners chose what mnemonics to apply based on the circumstances they are presented. While most were consistent with their use of interview strategy in an off-site setting, including the use of maps and sketch-plans to get spatial information, when taking the suspect to the site, there were no consistent strategies and the use of the ECI/CI mnemonics were largely unused.

From this study there were many avenues of research that could have been pursued. Ultimately the choice of which area to pursue came back to one of need. Which area is most in need of research? The off-site interviews were being conducted in a systematic, evidence-based way (albeit lacking adequate spatial research), whereas the on-site interview seemed to have little to no consistency and no research to support the retrieval of spatial memory. From this point it was determined to investigate an on-site interviewing strategy. Spending time interviewing police about a problem helps to develop a useful program of research. Perhaps as importantly, the interviews are means for the police and the researchers to get to know one another, establish rapport and trust. The importance of an honest relationship cannot be underestimated.

5.5.2 Formulate a trial solution to the problem and design the study

The ECI/CI has been proven be an effective interview technique in many settings for willing interviewees (or willing suspects; one of the parameters of our research). Therefore, the first step in exploring this issue was to test the ECI in a situation that simulates a missing body homicide scenario. When considering the previous research, it was clear that the practitioners are reluctant to use the reverse order and change perspective mnemonics, so these were not included in the study. Further, the previous research had participants engage in an episodic memory task (watching a video of a crime event) where our research required something mainly focused on spatial memory retrieval. Again, the desire was to create something that could be applied by practitioners and previous spatial memory research had been conducted largely in a VR environment. It was decided that using a real-world setting would provide the study with a more ecologically valid result. Therefore, a natural bushland setting was used.

To replicate a missing body homicide is impossible. We cannot ask participants to commit a murder and hide a body, therefore, the goal was to induce the mindset of someone in that situation. A mock scenario was used to engage the participant in the thought process involved in hiding an object from someone who was searching for it. A timeframe of one hour to choose a location and hide the object was introduced to put some pressure around the task and the size of the object to be hidden, a white sack filled with empty drink bottles, was chosen to replicate the size of a human torso or small child. No weight was added to the bag. This decision was made due to the difference in motivation between a participant in an experiment and someone who has committed a homicide. It is believed that a participant would not have the same level of motivation and therefore would not drag a weighted sack as far as a person in an actual homicide.

The example we have chosen for this chapter concerns an interview with someone who is co-operating with police. This is easy to get participants to simulate because

experimental participants are already cooperative. However, more challenging aspects of interviewing can also be tested. For instance, Vrij and colleagues have conducted studies looking at detection of deception using students that are motivated to lie by being asked to steal money and then to deny doing so (Vrij et al., 2008). Some researchers have gone further and used real, high-stake lies (e.g., Wright Whelan, Wagstaff, & Wheatcroft, 2014). Wright Whelan, Wagstaff & Wheatcroft (2014) looked at public appeals for help with missing or murdered relatives. They found that some behaviours discriminated between honest and deceptive appeals. Deceptive appeals contained more equivocal language, gaze aversion, head shaking and speech errors, and expressions of hope of finding the missing relative alive. From an evidence-base of these studies like these, Vrij and Fisher (2016) were able to identify lie detection techniques that have potential for use. The potential for experimentally studying ways of improving policing are limitless and the growth of the "evidence-based-policing" movement is giving new examples every day (see, Sherman, 2015).

5.5.3 Conduct the study

The study required participants to enter a large section of natural bushland and hide the sack under the premise that they had committed a murder and were disposing of incriminating evidence. They were told that after an hour had elapsed another participant was to enter the bushland and attempt to locate their object. Participants were then required to return to the bushland 30 days later and locate their object after being randomly allocated to either an ECI or free recall condition. The distance between where they had initially hidden the sack in the first phase and where they had indicated they had hidden the sack in the second phase was measured. Further the quantity and quality of the information generated from these interviews were also coded an analysed. The results showed that participants were no more accurate in locating their object in the ECI condition than the free recall condition. However, the amount

of information generated, and the level of detail provided through the ECI was significantly higher than the free recall condition.

5.5.4 Analyse the results

At this stage of the research process the question is ‘are the results helping?’. Although the ECI did not improve the participants’ accuracy in locating the object, it did increase the amount of information and detail generated. In some cases, particularly in the fine grain detail of landmarks on the journey to the deposition site, the level of information generated in the ECI condition was three times that of the free recall condition. This is a great increase in the amount of information generated. Information is the lifeblood of any criminal investigation and increasing the amount of information generated by a perpetrator in this situation may have great benefits for investigators. Therefore, the answer to this question is ‘yes’. Although there was no direct improvement in the likelihood of locating the victim’s remains (the participants finding the exact location), an increased level of information and detail will add to the pool of evidence at the investigators’ disposal. Therefore, the preferred interview technique in this scenario is the abbreviated version of the ECI. However, more research needs to be conducted. As the current technique needs to be refined to improve the ultimate outcome for investigators - finding the body.

5.6 Reporting, selling and implementing the results

As identified in the first study there is a need to develop an interviewing protocol for missing body homicide cases. The two studies reported here are now being used, to inform the development of a missing body homicide manual for practitioners. This research is in its infancy and any manual created will need to be amended as the research is refined. As, such the research has been implemented through the production of this manual, with a possibility of investigating its effectiveness in the future by consulting practitioners who have used the

protocol. This is essentially a never-ending cycle. Alter, the protocol as new research comes to light, seek feedback on the amendments and conduct more research to seek improvements.

The question of whether the research is helping with the problem should not be a yes or no response: it is rarely a clear answer. As demonstrated in this research, the main goal of increasing accuracy was not achieved. However, the results arguably help with the problem. The use of the ECI will increase the amount of coarse and fine grain details regarding key information that can assist in locating a victim's remains. In this way, the response to this stage of the model should be open. Although, in its current form this could be immediately used to assist investigators in generating more information within the investigative interview, there should be a refinement of the process through the feedback from reporting, selling and implementing the results. There should also be a search for other research questions that can assist with the problem. In this example patterns in the hiding behaviours of the participants were noticed. This opened another line of enquiry, another search of the literature and another research project. This is to investigate if the behavior of the participants' contains patterns that may also assist investigators. Similar, to those of the opportunistic/organised classifications mentioned above, patterns of hiding behaviors may also yield valuable information to narrow search areas and increase the probability of locating a victim's remains. This involved the comparison on experimental data and secondary data collected by investigators. Again, the process of linking researcher with practitioners to achieve a practical outcome that benefits both research and practice.

Research is of no consequence unless the findings make some difference. Even negative findings can be helpful if it discourages others from wasting time on something that will not be useful. Nevertheless, for research to make a difference the findings must be communicated. Academics can be useful here for three reasons. First, they have the luxury of the time to write articles. For many police officers, their case-load is too high for them to

devote time to recording what they have done and what was the influence. Second, academics offer a stability of focus. Academics tend to specialize and maintain an interest in a subject over a long time, whereas police officers are often transferred or promoted to different roles. This means that the police officers' interests, enthusiasm and experience are lost while academics are able to see a project through, and record the results, so they are available for people in the future. Third, the rigor of academic research and reporting can give a credibility to ideas that might otherwise be lacking – especially in a hierarchical organization such as the police where lower ranked officers may be overlooked. The implementation process is critical to the research having been worthwhile and this stage must not be neglected (Powell, Davies, & Nutley, 2016).

5.7 Implications of a psychological research base for criminal investigations

We will end with a quote from Sherman and Murray (2015). They point out, "It is a hallmark of a science-based profession that its members conduct and publish research." (p.7). It is not a coincidence that Sherman is an academic and Murray is a police officer. In this chapter we have outlined how academics and police can work together to do just that - with regards practical, important problems. This was achieved through the model for real world enquiry (Figure 1) that uses relationships with practitioners to identify a problem, analyse the context, formulate a potential solution based existing evidence, develop a way of testing this 'solution' and refining it based on the results of research and practitioner feedback (Robson, 1995). This is important for police who then have access to the research literature, academic knowledge and rigor, and to findings that are published and consolidated. This is also important for academics who gain access to what is happening in their community and what are the most important challenges with regards crime (Kebbell & Westera, 2017). Most importantly academics and police working together can be beneficial for the public by

creating a knowledge-base that can be used to investigate crime more effectively to ensure those who have committed serious offences are held to account.

5.8 References

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5.9 Chapter Summary

Chapter 5 presented a series of studies as an example of the application of the ‘Model for real world enquiry’. This is a practical model that can be used when researching problems faced by professionals in the field and is the basis for the logic behind the flow of studies in this thesis. The research provided revolved around issues with investigative interviewing techniques used by homicide investigators in missing body homicide cases. This was an issue brought to the researchers by an experienced investigative interviewer who believed there was a need to develop a protocol around these rare but often high-profile cases.

Chapter 6: Discussion

Research Significance and Innovation

Overall, this thesis provides an evidence base for investigators to use in on site interviews when eliciting information from a willing suspect. The thesis has focused on three perspectives that impact the investigation process: (a) the practical experience of the investigator; (b) the empirical evidence of current research; and (c) the behavior of the interview subjects - the perpetrators. The preceding three studies have advanced the empirical evidence base regarding investigative interviewing in the context of missing body homicide cases and more broadly provides information to assist in the missing body homicide investigation process. This thesis has used the 'Model for real world enquiry' as outlined by Robson (1995) to develop this line of research. This commenced with the identification of an issue by a field expert, followed by the seeking of the broader perspective of a collection of field experts (homicide investigators) to corroborate the existence of this issue and expand on broader issues in the investigation and interviewing methods used in missing body homicide investigations (Ryan & Kebbell, 2019). The information gained by these experts was then combined with the extant literature on spatial memory, and investigative interviewing, particularly the CI, to develop an experimental design that tested the effectiveness of the aspects of the CI most useful to homicide investigators, due to the constraints outlined in the first study, and the current strategy used by investigators, that most aligns with a free recall strategy (Ryan et al., 2018). Finally, a third paper focused on the hiding behaviours of the participants and demonstrated a pattern of behavior in non-perpetrators that reflects similar behaviours found in perpetrators (see chapter 4).

Overall, this thesis has shown that there is a deficit in the current practices of homicide investigations when interviewing on-site for information regarding the whereabouts of a victim's remains and provided an evidence base for a more effective method of

interviewing that can be applied in the field when returning a perpetrator to the deposition site and expanded the literature on human hiding behaviours in a naturalistic setting.

The Perspective of the Practitioner

The first study focused on the perspective of the practitioner to examine the issues faced by investigators in missing body homicide investigations. It was found that there is no consistency among homicide investigators when approaching the problem of assisting a perpetrator in locating a victim's remains (Ryan et al., 2019). There were inconsistencies between investigators on key issues such as whether a perpetrator should be taken to the site, with sound reasoning presented for both perspectives. This argument of whether to take a perpetrator to the site largely revolved around contamination of the perpetrators account or physical contamination of the deposition site through DNA (Ryan et al., 2019).

Regarding taking the perpetrator to the deposition site, it was found that the majority of interviewers did not have an on-site interview strategy outside the protection of contamination of the perpetrator's account (Ryan et al., 2019). That is, the detailed information regarding the crime and details of the environment and location were elicited in an offsite interview to a point where the investigator was satisfied that the perpetrator could not alter their statement once being taken to the deposition site. Once on site the interview process reverted to a free recall/ unstructured interview (Ryan et al., 2019). This is seen as largely due to the current interview techniques such as the CI, Conversation management and other interview techniques being designed for an interview room, rather than conducted in the field as is the common occurrence with missing body homicide investigations (Fisher & Geiselman, 1992; Shepard & Griffiths, 2013). Therefore, a need was identified to test the current interview techniques when taking a perpetrator to the deposition site.

This study provided a valuable composite of knowledge and experience of skilled homicide investigators that could be used by other investigators in these rare and previously

un researched area. The importance of helping an investigator to gain knowledge from other investigators' experience in these types of cases cannot be understated. There are serious negative consequences for the community, and the relatives of victims (Morrall, 2011) that could be minimized with a swift resolution to a case. Further, helping other investigators to tap into the collective experience of the investigative experience displayed in this study, may help assist in cases reaching a resolution.

The Research Perspective

The second study used the practical limitations identified by the practitioners in the first study ie. the lack of applicability of the reverse order and change perspective mnemonics etc., and the empirical research and theory in spatial memory and investigative interviewing to design an experiment that would test a current evidence-based interview technique, the ECI, against a free recall condition (Ryan et al., 2018). The spatial memory literature is clear regarding the decision to take a perpetrator to the deposition site. Considering the importance of proprioception, in the encoding and retrieval of spatial memory (Jones & Martin, 2009; Ruddle et al., 2011; Tversky, 2003), the most logical choice, from a spatial memory perspective, is to take the suspect back to the site. The physical interaction with the environment will aide in the accuracy of the spatial memory retrieval (Jones & Martin, 2009; Ruddle et al., 2011; Tversky, 2003) and therefore lead to a smaller search area for investigators. Of course, the practical constraints mentioned in the first study such as, the inability to take a suspect to site for security, investigative concerns around contamination of evidence or community impact, may make this imprudent (Ryan et al., 2019).

The most important finding from this research is the level of increased information generated by the ECI compared to the FR condition. Participants were much more likely to give more fine- and coarse-grained detail about important features of the environment and behaviours that might assist investigators in narrowing a search area and increase the

probability of locating a victim's remains (Ryan et al., 2018). This is particularly salient in cases where external factors, such as the impact on the community, may restrict the number of times a suspect can be taken to the site (Ryan et al., 2019). With possibly only one chance to conduct an onsite interview, and the demonstrated possibility that the perpetrator will not accurately identify the deposition site, the level of detail generated becomes extremely important. Identifying more detail about landmarks on the way to the deposition site should increase the chances of investigators locating the general area in which the victim was disposed. Increased detail of landmarks at the deposition site will assist in narrowing down possible locations to commence more refined search efforts. In this same vein, the increased detail generated regarding the actions at the deposition site will give investigators some indication of what to expect once at a possible deposition site. If the perpetrator has buried a victim, the investigators may be able to expect some more preserved remains than if the participant has merely left the victim in the open (Mann, Bass & Meadows, 1990). This will assist investigators in operational matters such as the types of equipment required to conduct the search. In the case of buried remains, excavation equipment would be required, and in the case of exposed remains, more nuanced methods such as soil testing for DNA may be more suitable. This application of the increased detail generated by this interview could save valuable time and resources in the search for the victim's remains.

One of the more interesting findings in this study was the error rate of the participants when locating their deposition site (Ryan et al., 2018). In the confirmation process of this thesis, it was the position of some academics that all participants would remember the location of the object. It was suggested that the task was not complex enough and the level of novelty involved meant that the object would be located with ease. This was also consistent with the researcher's observations of commentary on social media platforms around missing body homicide cases where the perpetrator was not accurate in locating a victim's remains,

with many believing that there must be deception involved. It is a common belief that a perpetrator could not forget such a significant action. Further, this may be the underlying belief of the 'no body, no parole' laws that are becoming more common in jurisdictions around the world (Unlawful killing (recovery of remains) Act (2017); (No Body, No Parole) Amendment Act (2016). Although this is not clearly stated in the legislation, the belief is that many perpetrators are willfully withholding the location of the victims remains. It must be acknowledged that this may be the case, but the findings in this study suggest that it is not always the case. After a one-month period, 17.5% of participants were more than 20m away from identifying the deposition site with one participant more that 200m away (Ryan et al., 2018). While it could be argued that the tasks are not comparable due to the impact on encoding a memeory that would be attached to the task of hiding a victim's remains, as opposed to hiding a bag as part of an experiment, I agree with the initial assertion of the informal opinions of the academics involved in the confirmation process of this thesis. With the increase in popularity of online surveys (Evans & Mathur, 2018) this was a novel task for participants, the action of hiding a bag in a tract of bushland would result in a strongly encoded memory when compared to what students typically face with online surveys. While the actions of a perpetrator may result in a more strongly encoded memory, due to their level of arousal (Revelle & Loftus, 1990; Van Damme, 2013; Mirandola & Toffalini, 2016), the interval in time between encoding and retrieval would, in many cases, be much longer than one month between hiding the victim's remains and being required to retrieve them. Therefore, this finding suggests that perpetrators may indeed struggle to remember the location of a victim's remains regardless of how prominent the event may have been (Ryan et al., 2018). Further, this finding validates the position of homicide investigators, who have consistently suggested that there are cases where the perpetrator cannot remember where they

have buried the victims remains due to many factors such as the decay of memory over time, or the complexity of the site (large tracts of bushland).

While more research is required to test the ECI and its various mnemonics, this research has started to provide an evidence base that can be applied by practitioners (Milne & Bull, 1999). Information is the life blood of any police investigation, and the generation of more information and more fine grain detail should provide a valuable resource for homicide investigators. Ultimately as this research is in its infancy the interest will lie in how investigators could apply this new information to their practical expertise and what, if any effect this may have on the outcomes of the investigation. The on-site interview and the way it is implemented could have important implications for determining the veracity of a perpetrators statement. If this technique is applied in a way where perpetrators are required to identify what features of the environment will be found ahead of time, as suggested by one investigator in the first study, then the discovery of these features, or lack thereof, may provide an indication of whether the perpetrator has been to this site before (Ryan et al., 2019). This may add to a pool of evidence indicating whether the perpetrator is being truthful. Of course, this would have to be interpreted in the context of the investigation and the possible changes to the environment in the intervening period between hiding the victim's remains and the requirement of locating them, as many features may change over an extensive period of time. However, these types of innovative applications of interview techniques require the input of researchers, with their knowledge of research methodology, to assess their effectiveness.

The Perspective of the Perpetrator

In the same vein as the previous study, there is a need to examine the context of the individual hiding the object and their decision making during this process to provide additional information to investigators. The final study looked at the hiding behaviours of

participants in a naturalistic bushland setting to determine if individuals tend to make similar choices when hiding objects. This study found that there were distinct points along pathways where participants chose to exit while hiding their object. This implies that there are features of the environment that impact on participants' decision making. While it is not clear what aspects of the environment were influencing the decisions of these participants, the most parsimonious explanation is that they travelled a distance far enough from the start point that they could not be observed by the experimenter and then travelled far enough off the pathway that they could not be observed from the pathway. It could also be explained by way of the salience of landmarks. A hiding place that seemed suitable for the object was observed from the pathway and this is the point they chose to exit. Those that travelled further may have noticed a second more suitable hiding spot and moved further from the pathway. Although this study was not able to determine the nature of these features, this evidence leads to the possibility that future research may be able to predict the probable exit points from a pathway/ roadway and lead to accurate detection of a victim's remains with or without the assistance of the perpetrator. Of course, this would require the culmination of several lines of research in this area. For example, the ability to predict where perpetrators exit pathways/ roadways coupled with research on distances travelled from a perpetrator's home, the types of general locations typically chosen (forests or bushland), the distances typically travelled within these general locations, and the hiding choices typically made within these general locations (hollow logs etc.) could lead to a higher success rate when locating a victim's remains by significantly reducing the number of possible search areas, and therefore reducing the time and resources required by police.

In addition to this finding, there were distinct differences found between male and female participants when hiding their objects. This information is particularly important for the rarer cases that involve female perpetrators. The existing research using secondary data to

guide search efforts, is largely drawn from a male population as males are by far the most common perpetrators of homicide (Burton, 1998; Nethery, 2004; Ressler et al., 1988; Rossmo, 2000). This current study was able to compare the hiding behaviours of male and female participants under the same conditions, indicating the effect of gender and demonstrating the differences between male and female hiding decision making. These findings will allow investigators to make more accurate judgments when involved in cases with a female perpetrator.

It must be acknowledged that police organisations routinely collect and analyse data on the environmental and circumstantial details of homicide cases. The main issue with using this type of data is that it only contains information on remains that have been found. Of course, it is impossible to collect the spatial details of remains that have not been found. Therefore, the current research indicating where perpetrators tend to hide their victims' remains, may have a key piece of the puzzle missing. The results of this study, although not the focus, show some indication that there are similarities between the hiding behaviours of the participants and those of actual perpetrators. Participants tended to bury or cover the object at similar rates to perpetrators and the distance that participants travelled from the pathway was also similar to homicide perpetrators who dispose of their victim's remains (Burton, 1998; Nethery, 2004; Ressler et al., 1988; Rossmo, 2000). Although, there are many factors in an actual homicide case that cannot be replicated in an experimental design, these results go some way to indicating that these behaviours are comparable and adds to the validity of this study. This is one of the main benefits of this final study. Essentially, we have commenced building a pool of data that might highlight this missing piece of the puzzle. Perhaps there are systematic differences between perpetrators and experiment participants that might shed some light on the victims that cannot be found. This information might

provide a clearer picture of the hiding behaviours of humans in these circumstances and assist with more accurate predictions of the location of a victim's remains.

Future Directions for Research and limitations

Ultimately any police investigation takes information from several different sources. In this spirit, research should follow this example and provide ways of improving this by examining individual elements such as the investigative interview as part of the entire context of the investigation. The practitioner's expertise should be applied as suggested by Robson and involved at multiple stages of the research process. Further, it is suggested that the perspective of the perpetrator must also be incorporated into this model as any interview is an interaction between interviewer and interviewee and the context in which the perpetrator has encoded the memory will have implications for how it should be retrieved. The first of such is the emotionality of the perpetrator.

It is unknown what the emotional state of a perpetrator is when they are disposing of a victim's remains. It could be argued that they may be in a heightened state of arousal and therefore, based on previous research this may affect the way they encode details of the environment. Research into the 'weapon focus effect' has discovered that witnesses to criminal events, such as armed robbery, will focus on features of the environment salient to the level of threat, such as the weapon a robber may be holding (Loftus, Loftus & Messo, 1987; Pickel, Ross & Truelove, 2006). In this case the interviewer may focus on this level of detail and the features of the perpetrator as a starting point to gain more information, such as the skin colour of the hand holding the weapon as a way of activating the witness's memory of the perpetrator's ethnicity etc. (Fisher & Geiselman, 1992). In the same vein, it may be that due to the heightened state of arousal perpetrators when hiding a victim's remains may notice different features of the environment than those in an experiment and therefore the line of questioning pursued by investigators may not be suitable based on the findings provided in

this thesis. This is an area of research that needs to be investigated by gaining the insight of perpetrators.

While the emotionality of the perpetrator may affect the memory of the perpetrator, the environment may also impact upon the way memory is encoded and retrieved. The tract of bushland used in both the second and third study was located in the sub tropics. This area is largely populated with evergreen trees with relatively mild environmental changes occurring across seasons. While this is a strength for the experimental design, holding the environment constant, it raises questions about other environments that are not as static and how this may alter the interview process. Environments that contain large seasonal changes, such as those that contain largely deciduous trees, and heavy snow in winter will add another level to an investigation. If a victim's remains were hidden in summer or spring, will taking the perpetrator to the site in autumn or winter alter the chances of retrieving the victim's remains? Some landmarks may become easier to identify and others may become more difficult with the changing environment. The same question can be applied to the factor of time of day. Will a perpetrator notice different landmarks during the night as opposed to the day? Again, the perspective of the perpetrator and the context in which they have encoded the memory must be considered in this process and a line of research should be conducted to examine these questions.

In addition to aspects of the environment or the perceptions of the perpetrator that may affect the information retrieved, there are mnemonics in the CI/ECI that may also be more effective in eliciting spatial information from the perpetrator that should be a focus of future research. Reverse order is one mnemonic that may have some benefits in the retrieval of spatial information. Considering how information is encoded with phenomena such as the primacy and recency effect, where individuals are more likely to remember information that is presented at the beginning or end of a spatial sequence, such as a sequence of positions on

a chess board (Bonani, Paqualetti, Caltagirone, & Carlesimo, 2007), it is also possible that this applies to landmarks in a journey. Participants may remember the beginning of the journey and the end of the journey (the deposition site), more clearly than the details between. Therefore, recalling the journey in reverse order may assist to activate memory nodes from each end of the clearly remembered features and elucidate those between. Essentially, if a perpetrator is leading an investigator to a deposition site and becomes disoriented, recalling the journey in reverse order from the deposition site back to the starting point may facilitate retrieval of the more difficult to remember landmarks and assist them in moving to the next step in their journey. There are many factors to consider in the application of this strategy. For example, where to commence the reverse order from in the journey. It may be effective to start the reverse order from the deposition site, or from where they have exited the site to return to their vehicle etc. Considering this, whether the perpetrator exited the site in the same way they entered may impact on the encoding of the memory, reinforcing the location of the deposition site by viewing the same landmarks and spatial details on the return journey. Further, if the perpetrator was to exit the site through a different path, this may assist with finding another way to approach the interview. Aside from the reverse order mnemonic, the interview could focus on the path taken away from the deposition site as a way of working backwards to locate the victim's remains in either case.

Another interesting aspect to modern police interviews is the use of technology to assist in locating deposition sites. The use of software such as Google maps offers some avenues for novel applications. In the spatial memory literature, there is a distinction between topographical memory of space and those memories encoded at the eye level known as the frame of reference (Mou & McNamara, 2002). Essentially, memories encoded at the eye level are best retrieved in the same way (Thorndyke, 1981). However, as individuals become more familiar with navigating environments in this way, they begin to develop a

topographical representation of the space known as a ‘cognitive map’ (Mou & McNamara, 2003; Tolman, 1948). This cognitive map will allow individuals to take novel routes through an environment without any prior navigation of this route and may mean that using a topographical map is adequate. However, options available in Google maps like ‘street view’ which allows the user to view the environment from eye level, may be considered by investigators as a more viable option than taking a suspect to the site or relying on traditional methods like sketch plans. Of course, this is limited by the amount of content that is available in this format which is generally restricted to roadways. In the case of bushland, this would have to be acquired in a different way. With the development of three dimensional cameras it is quite possible that investigators could capture a location indicated by a perpetrator and create a representation that would allow the interview to be conducted without an on-site interview, but still have the benefit of retrieving the memory in the frame of reference in which it was encoded. This still negates the somatosensory benefits of allowing a perpetrator to walk through an environment which would be more effective than the eye level stimulus alone (Tversky, 2003; Thorndyke, 1981). However, a growing interest in virtual reality technology in many fields may be able to address these issues with increasingly immersive systems that allow the inclusion of physical movement (Wang, Wu, Wang, Chi & Wang, 2018).

Overall Conclusions

This thesis presented a series of studies using a ‘Model for Real World Enquiry’ which incorporates the experience of practical knowledge experts with the research expertise of academics to produce a line of applied research with useable evidence-based outcomes for practitioners. These outcomes are critical for police organisations globally who are increasingly pushing for a focus on evidence-based practice. Using the vast experience of a sample of homicide detectives from around the world, with direct experience in missing body

homicide cases or cases that were applicable, we identified a number of practical challenges faced by homicide investigators in these rare but often high-profile cases. Further, practical suggestions to deal with these challenges were identified with a view to placing parameters around future studies, ensuring that outcomes could be of practical use to investigators. This was demonstrated in the second study with an experiment testing the effect of the Enhanced Cognitive Interview in a real-world spatial memory retrieval task. This study provided a crucial evidence base to assist investigators in making decisions around conducting interviews where the perpetrator can return to the deposition site and assist with the search effort. The results of this study provided a practical and usable version of this interview technique that will assist investigators in generating substantially more information from the perpetrator. Further, the final study provided a rare analysis of the differences between genders in their spatial choices when hiding an object in a bushland setting. This final study demonstrated the differences between males and females with distinct patterns evident. As a whole, this thesis has contributed significantly to the literature in this field and generated a practical, applied, evidence base for researchers to develop in the future, and as importantly an evidence base for practitioners to assist in making critical decisions in missing body homicide cases that will result in better outcomes for investigators, the families of victims and the broader community.

Finally, from the findings in this thesis it is recommended that a renewed focus is applied to investigative interviewing and a distinction is made between interviewing to gain evidence to uncover the truth of a crime to build a case against a suspect, and the need to investigate to locate a victim's remains after a 'suspect' has become a 'perpetrator'. I believe that this is the core of the difference found between investigators when taking a suspect to the deposition site. The goal of investigators is to gain a conviction and then search for the victim's remains if there are complexities that make the location of the victim difficult. While

the investigative interview will look much the same between these two circumstances, determinations of veracity must still be made, and contamination of memory must still be guarded against, many of the challenges that investigators have raised around taking the suspect to the deposition site are not present after a conviction. Of course, the conviction and locating the victim's remains may go hand in hand and these are circumstances that will be considered by experienced practitioners within the context of the investigation. From a spatial memory retrieval perspective, it is recommended that the best course of action is to return a perpetrator or suspect to the site to locate the victim's remains where practicable. This will engage the body-based movement required to generate the most accurate indication of where the victim's remains are located. Further it is also recommended that the same level of planning and structure used when conducting an interview off site be applied to an onsite interview; that is, existing models such as the PEACE model are implemented and the ECI is used within this model as an evidence-based strategy when applied to interviewing a perpetrator who is required to locate a victim's remains as it generates more details relevant to the task of locating a deposition site.

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6.0: APPENDICES

Appendix A: Informed consent form (Study 1)

Interviewing suspects to locate hidden bodies or exhibits in homicide cases

To whom it may concern

You are invited to participate in an interview about the investigative interview of suspects in homicide cases to locate bodies or other exhibits that they have hidden. This research aims to identify how best to interview suspects in these types of cases to maximise the chances of locating this hidden evidence. The findings will be used to assist investigators in future homicide cases and to inform future research projects. We have attached some information about your rights. If you require any further information please contact us either via the email address below, or via the contact details below.

Who is conducting the research?

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What you will be asked to do

If you agree to participate in this study you will be interviewed for approximately one hour about a homicide case where you were involved in the process of interviewing the suspect in an attempt to locate a hidden body or weapon.

Where the interviews will take place

Interviews will be undertaken at a mutually agreed time and place. However, due to the sensitive nature of the topic discussed, the interviews must be conducted in a private location. Depending on your availability these interviews can be conducted over the telephone, via Skype or another form of VOIP.

Why this research is being conducted and expected benefits

The purpose of this study is to identify the major challenges to investigators when interviewing the suspect in these cases and to document any strategies that have been used to overcome these challenges. This study is the first in of many in a research project that aims to identify how best to interview suspects in these cases to maximise the chances of locating hidden evidence in homicide cases. This research will inform investigative interview practice and future research studies. In addition, this research is being conducted as part of the requirements of a Doctoral thesis.

Risks to you

There are no anticipated risks to you. However, in the event that you are experiencing any difficulties as a result of this research, please contact the services listed below.

Beyond blue: 1300 224 636

Lifeline: 13 11 14

Your participation is confidential and voluntary

Your participation is completely voluntary and you can withdraw at any time during the data collection period. If you wish to withdraw your consent please contact one of the researchers. Your decision to participate in the research is completely confidential. The organisation you work for will not be informed of whether or not you have participated in this research. If you decide to participate in the study you will be asked not to name any member of police that is discussed. No record will be kept of any person that is accidentally named. **By participating in the interview, your consent to participate in this study is implied.**

The conduct of this research involves the collection, access and/ or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. This information will be de-identified by the researcher. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. Any identifying information will be removed from transcripts and your identity will not be revealed in any reports or publications arising from this research.

After completion of this research a summary of the findings will be made available to participants and other interested parties. To obtain a copy of this summary send a request via email to one of the researchers listed below**.**

As required by Griffith University, all audio recordings will be erased after transcription. However, other research data (interview transcripts and analysis) will be retained in a locked cabinet and/or a password protected electronic file at Griffith University for a period of five years before being destroyed.

Ethical conduct of this research

Ethical approval to conduct this research has been granted by the Griffith University Ethics Committee. Griffith University conducts research in accordance with the National Statement on Ethical Conduct in Human Research (2007). If you have any concerns or complaints about the ethical conduct of this research please contact: the Manager, Research Ethics, Office for Research, Bray Centre, Nathan Campus, Griffith University (ph: +61 7 3735 4375 or research-ethics@griffith.edu.au. Please keep this information sheet for your future reference.

Thank you for your assistance.

Nina Westera Mark Kebbell Nathan Ryan

Appendix B: Abbreviated Enhanced Cognitive Interview

Script Part 2 ECI

Once at the meeting point use these exact words to instruct the participant:

Ok. We will just stop here for a moment while I give you some instructions

The purpose of today is for you to show me, as accurately as you can, where you hid that object a few weeks ago.

The person who is most accurate at finding the location where object was hidden will win the (Samsung tablet),

Do you have any questions? (answer any questions as best you can)

Now I'm going to give you some instructions that may help you remember where you hid the object

I want you to take a moment to think back to when you were here to hide the object. I want you to concentrate hard when thinking about this.

I want you to think about the route you took (Pause 5 secs)

Think about the features in the landscape that you noticed along the way (pause 5 secs)

Think about how it felt to walk along that path. (pause 5 secs)

Think about the choices you made when hiding the object (pause 5secs)

Think about why you made those choices. (pause 5secs)

We are now about to begin the journey back to where you hid the object.

3. I want you to concentrate on the physical features of the environment. Take your time

4. Focus on distinctive aspects of the route or landmarks that you can remember.

2. As you lead me towards that location I want you to tell me what you are thinking as you go in as much detail as you can. Tell me everything even if you think it is trivial unimportant. For example, 'from the start point I walked a short way down this path and remember seeing a sign, this sign was about at eye level, was brown and had some writing on it'.

If at any point you have missed something or made a mistake, please tell me,

It is very important that you tell me what you are thinking as you are going.

Further instructions:

Intermittently instruct the particpant to slow down, take their time and verbalise their thoughts

"Slow down, take your time and tell me what you are thinking as you are going"

During the process if the participant becomes disorientated, advise them to take their time and focus on the previous landmark (as indicated by them).

If the participant states that they do not remember where they have hidden the object, tell them to make their best guess. Geotag this location and end this stage of the interview. Direct them back to the start point and advise them that they now need to fill out the survey.

Warnings: When undergoing this task you are not expected to walk anywhere that you feel is unsafe. I encourage you to walk off the track but beware of trip hazards. I will accompany you at all times and I will be tracking you with a GPS unit and filming your actions. If there is a particular location that you think is suitable but would be too risky to access, please indicate to me where that is and I will make a note of it.

Appendix C: Free Recall Interview Protocol

Once at the meeting point use these exact words to instruct the participant:

Ok. We will just stop here for a moment while I give you some instructions

The purpose of today is for you to show me, as accurately as you can, where you hid that object a few weeks ago.

The person who is most accurate at finding the location where object was hidden will win the (Samsung tablet),

Do you have any questions? (answer any questions as best you can)

I want you to try really hard to remember where you hid the object and in a moment lead me to that location.

As you lead me towards that location I want you to tell me what you are thinking as you go.

You can say anything you like but the more detail you can provide about what you are thinking the better.

OK. Let's start.

Please lead me to where you hid the bag.

Further instructions:

During the process if the participant becomes disorientated, advise them to take their time.

If the participant states that they do not remember where they have hidden the object, tell them to make their best guess. Geotag this location and end the interview.

Warnings: When undergoing this task, you are not expected to walk anywhere that you feel is unsafe. I encourage you to walk off the track but beware of trip hazards. I will accompany you at all times and I will be tracking you with a GPS unit and filming your actions. If there is a particular location that you think is suitable but would be too risky to access, please indicate to me where that is and I will make a note of it.

Appendix D: Opening script (study 2 & 3)

Imagine you have committed a homicide at this location (Start point). You now have the task of disposing of an incriminating object (present object). You have decided to hide this in a section of bushland near here. You are about to walk through this section of bushland and as you do so I would like you to consider where you might hide this object and how you would go about doing this. After you are fairly familiar with this site, return to me and I will ask you to take the object and walk to the place you would like to hide it. You will have an hour to hide this object before a second participant will enter this area and attempt to locate the object. Essentially your task is to outsmart the second participant that is trying to find your object.

Warnings: When undergoing this task you are not expected to walk anywhere that you feel is unsafe. I encourage you to walk off the track but beware of trip hazards I will be tracking you with a GPS unit and filming your actions.

The second part of this study will take place in 4 weeks time. This part of the study will involve a brief interview and an abbreviated IQ test. After completing the second part of the study you will become eligible for a chance at winning an (item). **Choosing to withdraw before completion of both phases of the experiment will make you ineligible for a chance to win the Samsung tablet.**

Appendix E: International Fitness Scale (IFIS)

Fitness

SELF-REPORTED PHYSICAL FITNESS

It is very important that you do this test by yourself. Your answer is only useful for the progress of science and medicine.

Please answer all the questions and do not leave any blank. Mark only one answer per question, and more important: be sincere.

Thank you for your cooperation.

Please try to think about your level of physical fitness (compared to your friends) and choose the right option.

Your general physical fitness is:

Very poor

Poor

Average

Good

Very good

Your cardiorespiratory fitness (capacity to do exercise, for instance running, for a long time) is:

Very poor

Poor

Average

Good

Very good

Your muscular strength is:

Very poor

Poor

Average

Good

Very good

Your speed / agility is:

Very poor

Poor

Average

Good

Very good

Your flexibility is:

Very poor

Poor

Average

Good

Very good

Appendix F: Santa Barbara Sense of Direction Scale (SBSODS)

SANTA BARBARA SENSE-OF-DIRECTION SCALE
Sex: F M Today's Date:_____
Age:_____ V. 2

This questionnaire consists of several statements about your spatial and navigational abilities, preferences, and experiences. After each statement, you should circle a number to indicate your level of agreement with the statement. Circle "1" if you strongly agree that the statement applies to you, "7" if you strongly disagree, or some number in between if your agreement is intermediate. Circle "4" if you neither agree nor disagree.

Questions to reverse code in bold. Add scores and dived by number of questions

1. I am very good at giving directions.
strongly agree 1 2 3 4 5 6 7 strongly disagree

2. I have a poor memory for where I left things.
strongly agree 1 2 3 4 5 6 7 strongly disagree

3. I am very good at judging distances.
strongly agree 1 2 3 4 5 6 7 strongly disagree

4. My "sense of direction" is very good.
strongly agree 1 2 3 4 5 6 7 strongly disagree

5. I tend to think of my environment in terms of cardinal directions (N, S, E, W).
strongly agree 1 2 3 4 5 6 7 strongly disagree

6. I very easily get lost in a new city.
strongly agree 1 2 3 4 5 6 7 strongly disagree

7. I enjoy reading maps.
strongly agree 1 2 3 4 5 6 7 strongly disagree

8. I have trouble understanding directions.
strongly agree 1 2 3 4 5 6 7 strongly disagree

9. I am very good at reading maps.
strongly agree 1 2 3 4 5 6 7 strongly disagree

10. I don't remember routes very well while riding as a passenger in a car.
strongly agree 1 2 3 4 5 6 7 strongly disagree

11. I don't enjoy giving directions.
strongly agree 1 2 3 4 5 6 7 strongly disagree

12. It's not important to me to know where I am.
strongly agree 1 2 3 4 5 6 7 strongly disagree

13. I usually let someone else do the navigational planning for long trips.
strongly agree 1 2 3 4 5 6 7 strongly disagree

14. I can usually remember a new route after I have traveled it only once.
strongly agree 1 2 3 4 5 6 7 strongly disagree

15. I don't have a very good "mental map" of my environment.
strongly agree 1 2 3 4 5 6 7 strongly disagree

Appendix G: Interviewer Demeanor Scale

Interviewer Bias

Rate the interviewer on the following scales. 1 strongly disagree, 2 disagree, 3 neither agree or disagree, 4 agree, 5 strongly agree

In this interview the interviewer:	SD	D	N	A	SA
Encouraged the participant to give information	1	2	3	4	5
Was friendly	1	2	3	4	5
Seemed to build good rapport	1	2	3	4	5
Did not encourage the participant to give information	1	2	3	4	5
Had welcoming body language	1	2	3	4	5
Had a warm disposition	1	2	3	4	5
Had a flat disposition	1	2	3	4	5
Seemed grumpy or unhappy	1	2	3	4	5

Appendix H: Informed consent form (Study 2 & 3)

The nature of geographic decision making in homicide cases

Who is conducting the research?

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What you will be asked to do

If you agree to participate in this study you will asked to hide an object in a natural environment. Whilst undergoing this task you will be tracked using a GPS and video recorded. After approximately one month you will be required to fill out a short survey, and undergo a test of spatial intelligence. Each phase of this study is expected to take approximately 1 hour (total 2 hours)

Where the study will take place

The study will be undertaken at Griffith University Mt Gravatt campus.

Why this research is being conducted and expected benefits

The purpose of this study is to identify the decision making process of suspects who hide objects in homicide cases. This research will inform forensic investigative practice and future research studies. In addition, this research is being conducted as part of the requirements of a Doctoral thesis.

Risks to you

Due to the nature of walking through bushland there is a minor risk of slips and falls. Please wear sensible footwear. However, in the event that you are experiencing any difficulties as a result of this research, please contact the services listed below.

Beyond blue: 1300 224 636

Lifeline: 13 11 14

Benefits for you

On completing both phases of the experiment, you will be eligible to win a Samsung Galaxy Tab A Tablet. If you are a student enrolled in a course that offers credit for participation, you may be eligible for this course credit.

Your participation is confidential and voluntary

Your participation is completely voluntary and you can withdraw at any time during the data collection period. If you wish to withdraw your consent please contact one of the researchers. **Choosing to withdraw before completion of both phases of the experiment will make you ineligible for a chance to win the Samsung tablet.** Your decision to participate in the research is completely confidential.

The conduct of this research involves the collection, access and/ or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. This information will be de-identified by the researcher. A de-identified copy of this data may be used for other research purposes. However, your confidentiality will at all times be safeguarded. Any identifying information will be removed from transcripts and your identity will not be revealed in any reports or publications arising from this research.

After completion of this research a summary of the findings will be made available to participants and other interested parties. To obtain a copy of this summary send a request via email to one of the researchers listed below**.**

As required by Griffith University, all audio and video recordings will be erased after transcription. However, other research data (interview transcripts and analysis) will be retained in a locked cabinet and/or a password protected electronic file at Griffith University for a period of five years before being destroyed.

Ethical conduct of this research

Ethical approval to conduct this research has been granted by the Griffith University Ethics Committee. Griffith University conducts research in accordance with the National Statement on Ethical Conduct in Human Research (2007). If you have any concerns or complaints about the ethical conduct of this research please contact: the Manager, Research Ethics, Office for Research, Bray Centre, Nathan Campus, Griffith University (ph: +61 7 3735 4375 or research-ethics@griffith.edu.au. Please keep this information sheet for your future reference.

Thank you for your assistance.

Nina Westera Mark Kebbell Nathan Ryan