

An Experimental and Qualitative Study of Equivocal Death Investigation

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### Statement

I declare that this thesis is my own work and that, to the best of my knowledge and belief, it does not contain material from published sources without proper acknowledgement, nor does it contain material which has been accepted for the award of any other higher degree or graduate diploma in any university.

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## Abstract

Within the field of decision-making research, the process by which police form their initial hypotheses during equivocal death investigations is yet to be investigated. The present literature review examined the outcomes of previous research relevant to the area of police decision making, to recognise the limitations and contradictions within this body of research. It was concluded that future researchers should investigate the way in which police investigators respond to equivocal deaths with particular emphasis on identifying the decision making approach used by police in this context and what may influence the initial conclusions they form. It was recommended that exploratory mixed methods approaches be initially employed to investigate this area, to inform later research intended to develop directional research hypotheses.

## **Equivocal Deaths and the Role of Tasmanian Police**

Equivocal deaths are those in which the manner of death is ambiguous, meaning it is unclear whether the death was due to accident, suicide, homicide or natural causes (Young, 1992). Manner of death is distinct from medical cause of death, for example cause of death may be determined as drowning or hanging while the manner of death remains unclear (Geberth, 2005).

While a medical examiner is able to establish a medical cause of death, manner of death in equivocal cases requires police investigation to ascertain the likelihood of death being due to accident, suicide, homicide or natural causes. In addition, equivocal deaths invariably meet the requirements of what is called a reportable death, a death that must be referred to the coroner for further evaluation due to a characteristic of the deceased, the death, or the context in which the death occurred, as stated below. Specifically, the Magistrates Court of Tasmania (<http://www.magistratescourt.tas.gov.au/divisions/coronial> visited on 19/07/2011) notes the following descriptors for deaths that must be reported to the coroner.

For characteristics of the deceased, the death of any child under the age of one year (and where the death was sudden and unexpected) requires reporting. Characteristics of the death which require a death to be reported to the coroner are those which are violent, unnatural or unexpected, or which have resulted from injury or accident. In addition, those deaths which occur during or as a result of anesthesia or sedation, where the death was not due to natural causes are reportable. Any deaths in which the medical cause is unknown, or a medical practitioner declines to issue a cause of death medical certificate are reportable.

Further, any death that occurs in one of the following contexts requires reporting to the coroner: while the deceased was in care or custody; while the

deceased was escaping from prison, police custody or an institution; the death occurred during a police officer or prison officers' attempt to detain the deceased; or the death occurred in the deceased person's workplace as the result of accident or injury (where death does not appear to have been natural causes).

Between five and twenty percent of all reportable deaths have been estimated to be equivocal in nature (Shneidman, 1981). In Tasmania, an equivocal death investigation is often initiated by police attending the scene. In many cases, police are responsible for coordinating the initial death investigation, crime scene management, evidence gathering, ensuring that correct protocols are adhered to, fully documenting this process and also reporting a death to the Chief Clerk (Coronial Division), or coroner's clerk who act as the coroner's legal and administrative assistants (Freckelton & Ranson, 2006). As the coronial office cannot actively seek cases for a coronial review, deaths must be reported to the coroner's office for an assessment to take place. As such police and medical practitioners have been considered "gate keepers" (Freckelton & Ranson, 2006) of whether a coronial investigation ensues. This is important to recognise as despite the guidelines for a reportable death it has been found that these deaths may often go unreported (Charles, Ranson, Bohensky & Ibrahim, 2006 cited in Freckelton & Ranson, 2006). Therefore, police officers' assessment of equivocal deaths are particularly important as they may impact upon whether the case is sufficiently investigated. Should there be doubt about the nature of the death the attending police would typically involve local detectives, or a specialist police unit that specialises in investigating crimes of that nature (Freckelton & Ranson, 2006). Once the coroner's office is advised of a reportable death, they assist the coroner in any capacity within the guidelines of the *Coroners Act 1995* (Tas) and those issued by the Chief Magistrate (Freckelton &

Ranson, 2006). Police provide evidence and statements gathered during an investigation to the coroner's office and in some cases police may be authorised to act as a coroner's officer, providing specialist opinions, assisting with clerical duties, liaising with operational police or leading an investigation on behalf of the coroner's office. In addition, coroner's police assistants have a regular role in investigating equivocal deaths (Freckelton & Ranson, 2006). At the end of an inquest the coroner makes a finding and recommendations where appropriate.

In short the response to an equivocal death indicates there is a close professional relationship between police and coroners. Indeed, Freckelton and Ranson (2006) have confirmed that the quality of the initial death investigation, particularly within the first 48 hours, has a large impact upon subsequent investigations and establishing that a sufficient investigation occurs, as inadequate initial investigations often cannot be rectified later. The decision making of police in the early stages of an investigation therefore may have crucial implications for the investigation and ultimate determination of equivocal deaths.

### **Psychological Autopsy**

In addition to the role of police in responding to equivocal deaths and medical examiners in establishing cause of death it should be noted that a coroner may also engage a psychologist or psychiatrist to conduct a psychological autopsy. A psychological autopsy is a complex procedure that primarily aims to identify whether the deceased showed evidence of suicidal intent in the lead-up to their death (Blinder, 1982; Shneidman, 1981; Scott, Swartz & Warburton, 2006). This expert opinion is based on a psychological assessment of the deceased's personality, mental health profile, pre-death behaviours, and the events and circumstances leading to the

death (Scott, Swartz & Warburton, 2006). Psychological autopsies include a thorough analysis of relevant documents and items that belonged to the victim as well as conducting interviews with relevant parties. A growing body of research has focused upon the psychological distinction between accidental and suicide deaths in equivocal cases, for example Litman (1984); Litman (1989) and Crepeau-Hobson (2010). This research has focused on the identification of suicidal intent in the deceased by mental health professionals who examine the death from a psychological perspective. While psychological autopsies have increasingly been accepted in the legal forum (Dattillo, 2006), they remain contentious as their validity relies largely on the quality of data gathered from interviews and other materials (Young, 1992).

### **An Alternative Police Investigative Approach: Equivocal Death Analysis**

In contrast to the role of Tasmanian police in responding to an equivocal death, police from the Federal Bureau of Investigation (FBI) in Quantico for example have a broader role in investigating equivocal deaths. The Federal Bureau of Investigation (FBI), Quantico, in partnership with Virginia Commonwealth University, identified a number of features that require extensive analysis in an equivocal death investigation by FBI police, which they termed 'equivocal death analysis.' This included the body recovery scene, the autopsy, the forensic evidence, laboratory tests, the victimology and the behavioural history of the deceased (Lacks, Westveer, Dibble & Clemente, 2008). As well as having extensive analysis of these components, thorough documentation was also identified as central to an equivocal death analysis approach advocated by FBI police. The equivocal death analysis approach used by the FBI is defined as "an investigative process that can aid in determining manner of death by examining existing forensic evidence and the

behavioural and psychological history of the deceased” (Lacks et al., 2008, p. 150). Therefore, the approach to equivocal death investigation advocated by the FBI encompasses both an extensive police investigation of the death and a process of psychological autopsy to assist in determining manner of death. Lacks and colleagues state that equivocal death analysis by FBI police investigators has been positively regarded as an effective approach for many years, however little research exists in the area of equivocal deaths and the methods used to investigate them from a policing, rather than mental health, perspective. This study highlights the need to not only describe the process undertaken by police in response to equivocal deaths but also to initiate research which qualifies the approaches taken and provides opportunities to improve this process where necessary.

### **Literature Regarding Equivocal Deaths**

The literature concerning equivocal death outcomes is predominantly limited to the coronial process of equivocal death determination (Goodin & Hanzlick, 1997; Huusko & Hirvonen, 1988; Stanistreet, Taylor, Jeffery & Gabbay, 2001). However, it has been acknowledged that initial police investigations may have a role in these coronial outcomes (Jobes, Berman & Josselson, 1986).

A recent study examined the coronial decision making process in an Australian context following changes to the Coroners Act in the state of Queensland. As a result of changes to the Act, investigating police were required to gather a greater amount of evidence at the scene and additional information concerning the circumstances of a death, as well as additional statements from family, friends and witnesses (Carpenter, Barnes, Adkins, Naylor, Tait & Begum, 2008). As such, the

changes required more extensive examination and investigation by police when faced with a reportable death.

Carpenter and colleagues stated that in the majority of cases coroners were correct in their prediction of manner of death prior to an autopsy – and therefore this step could have been avoided. It was identified that wherever practicable the least invasive autopsy possible should be performed, which provides a rationale for building on the strength of evidence and information that police can present to a coroner in the case of an equivocal death. These findings provide a further rationale for researching police investigations into equivocal deaths.

Jobes, Berman and Josselson (1986) suggested that the type of information sought in a police investigation, the level of suspicion felt by police regarding manner of death, case difficulty, and variability between officials were features of the police investigative process that could influence the variability and error in subsequent coronial determinations of equivocal deaths. Despite this acknowledgment, research is yet to examine any features of interest in police investigations regarding equivocal deaths in an Australian context. Due to the lack of research in this area and the hypothesised influence of the police investigative stage on subsequent coronial determinations, the initial police investigative process concerning equivocal deaths warrants investigation.

### **Key Areas for Review**

Understanding police investigation of equivocal deaths must begin by understanding and clarifying each of the relevant areas of literature that may impact upon police investigations of this type. This literature review will focus on key areas of relevance for police investigations of an equivocal death: decision making; the

interpretation of evidence and how organisational expertise may impact upon performance and judgement. Due to a lack of literature on police equivocal death investigations specifically, these topics for review will be directly related back to how they may impact upon a police investigation of equivocal death wherever possible. As the psychological aspects of police investigations into equivocal deaths is of most interest in this case, the practical process of investigation will not be a focus of review.

### **Decision Making**

Decision making has been defined as “selecting and committing oneself to a course of action” (Anderson, Deane, Hammond, McClelland & Shanteau, 1981, p. 73). Entire research journals have been devoted to the topic of decision making but due to the restrictions of this thesis, this discussion will be limited to a sample of the literature most relevant to police investigations into equivocal deaths.

#### *Historical Perspective on Decision Making*

Historically, it was concluded that to a large extent people employ a similar processing style to that of computer programs, in that individuals’ beliefs are formed and revised in the manner of statistical models (Peterson & Beach, 1967; Slovic & Lichtenstein, 1971). Tversky and Kahneman, (1974), suggested that rather than using a computational type of information processing strategy, basic intuitive heuristics may be crucial in explaining the decision making process. A heuristic process is one that is automatic – completed quickly and without requiring cognitive resources (Evans, 2006; Bonner & Newell, 2010). As such, reasoning processes that employ a heuristic approach may be defined as a type of intuition based reasoning

style while analytic processes are slower, depending on working memory capacity to complete a rule based progression (Evans, 2006). The use of cognitive scripts was also suggested by Abelson (1976) as a simple alternative to analytical models to better explain the decision making process. Cognitive scripts being internal scripts that individuals have developed to guide their behaviour, provide instructions to complete specific tasks and represent knowledge that has been learnt. Script theory, based on cognitive scripts was proposed by Schank and Abelson (1977). This theory aimed to explain the process individuals undertake during an action or experience. It was theorised that cognitive scripts occur because memories are encoded episodically, with learned information being able to be recalled to a greater extent when an individual has related it to their own existing personal experiences. In this sense, script theory suggested an element of story level understanding that assisted the individual with future experiences by providing a way of going forward based on past experiences and knowledge. Police investigators may possess a number of cognitive scripts for an equivocal death investigation informed by their prior experiences, which would have the potential to impact upon police responses.

#### *The Story Model and Information Integration Approaches to Decision Making*

A debate exists within the literature regarding the application of opposing decision making theories within the context of criminal law proceedings. The story model of decision making and information integration models of decision making have been proposed to describe the decision making process of jurors when presented with evidence during the course of a criminal trial. The story model (Pennington and Hastie, 1986, 1988) denotes a decision making style in the form of a narrative story structure which is developed by the individual to organise and

interpret the available evidence and to inform decision making by attending to some pieces of information and disregarding others, depending on whether they fit with an assumed narrative. The theory of cognitive scripts appears to tie into the story model approach to decision making as an individual's cognitive scripts regarding how an accident, suicide, homicide or natural death typically occurs is based upon prior experiences of these manners of death and may provide the decision maker with a likely narrative. Therefore the story model is largely a heuristic approach, while information integration approaches by their nature approach decision making in a rational and analytical manner.

Information integration models of decision making have also typically focused on juror samples but unlike the story model, propose that individual pieces of evidence are independently evaluated as the trial progresses and that at the end of a trial, all pieces of evidence are weighted and averaged to gain an impression of the defendant's guilt. This theory therefore states that there is a continuous pattern of updating in decision making as new pieces of evidence are presented (Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom, Werner & Saks, 1978).

Despite the story model and information integration approaches to decision making being contradictory, there is not a consensus on which approach best describes the decision making process engaged in by jurors in the criminal justice system. Further, it is unknown which decision making model is likely to best fit the process of evidence evaluation in an investigation process for police. Given that the decision making theories of the story model and information integration approach have been qualified in jurors' evidence evaluation process, it appears suitable that research into police investigators' decision making styles should commence by evaluating the pertinence of these decision making theories. By doing so,

researchers may either discount their relevance in the decision making processes engaged in by police investigators, confirm their role, or find that for professional police responses to evidence only one of these decision making approaches is relevant.

When assessing the differences between a story model approach and an information integration approach to decision making, it could be said that the story model comprises an inductive process whereby the individual extrapolates from known features of a case to infer a possible narrative – while the information integration approach conversely utilises deductive reasoning in order to reach conclusions. In current research, Heit and Rotello (2010) investigated the relationship between inductive and deductive reasoning, concluding that reasoning and decision making tasks involve both intuitive heuristic processes and analytic processes in combination. Should this be the case, it may be that police would use aspects of both story model and information integration model approaches to decision making when responding to an equivocal death.

A demarcation between styles within the decision making literature relates to the process of judgements being made in either a one-process manner or a two-process manner. These alternative accounts are two conflicting hypotheses for the way an individual approaches decision making. Heit and Rotello (2010) discussed whether some judgements are the result of heuristic familiarity alone, or the use of an accurate recollective process in addition to heuristics.

Tulving's (1985) remember-know paradigm has been associated with attempts to understand this aspect of decision making. The remember-know paradigm was coined when Tulving asked research participants to first make a recognition judgement and then state whether they remembered seeing the item, or if

they just knew that they had. There are two ways that the remember-know paradigm can be interpreted, a one-process explanation and a two-process explanation.

A one-process account suggests that an individual applies the same reasoning approach to both inductive and deductive reasoning tasks, rather than switching his or her approach between task types. This interpretation of the remember-know paradigm means that a “remember” judgement is simply characterised by a stricter response criterion of the same process as a “know” judgement (Heit & Rotello, 2010). In a one-process account, Rips (2001) stated that deductive reasoning corresponds to the act of remembering, where the person is required to be more certain of their response and therefore use a stricter criterion in their judgement. The alternative explanation of the remember-know paradigm is a two-process account to reasoning. In this theory there are two separate processes at work, with “remember” judgements being made by a process of recollection while “know” judgements are made by a sense of familiarity. It is theorised that in this case, individuals would use both heuristic and analytic processes in a reasoning task, with each type of processing being evaluated as strong or weak within a task (Evans, 2008; Stupple & Waterhouse, 2009). In evaluating the relationship between inductive and deductive reasoning, Heit and Rotello (2010) also concluded that a two-process account of reasoning was supported, with arguments being assessed as either strong or weak in both processes – intuitive and analytical.

Heit and Rotello’s study provides evidence for an organisational rationale toward holistic decision making approaches, however the way in which an individual might incorporate both intuitive and analytic processes in a holistic approach to decision making remains unknown (Heit & Rotello, 2010). Initial research into the decision making approach of police responding to an equivocal death would provide

information regarding the decision making styles that are relevant, however it is unlikely that initial research will be able to answer the question of how the approaches combine at this stage. However, as questions around how intuitive heuristic processes and analytic processes may combine, cooperate, conflict or exchange information are certainly of interest (Evans, 2007, 2008; Newell, 2009), this provides a further topic of research once the decision making styles of police have been identified.

The body of literature regarding decision making contains many suggested descriptors for the way in which decisions are made. While they may be classed broadly as having intuitive or analytical bases (as has been the case here), there are additional ways that reasoning processes have been described. The intuitive approach to decision making has been termed experiential (Denes-Raj & Epstein, 1994), associative (Sloman, 1996) and System 1 (Evans, 2008; Stanovich & West, 2000). Descriptors for analytical approaches have also been termed rational (Denes-Raj & Epstein, 1994), System 2 (Evans, 2008) and rule-based (Sloman, 1996).

### **Police Interpretation of Evidence and Decision Making Biases**

Prior to engaging in a decision making process however, police responding to an equivocal death are required to interpret the evidence of a case. It could be said that there are certain features that are likely to be associated with a particular manner of death. For example, it may appear reasonable in cases where there has been previous suicidal behaviour to infer an increased likelihood that an ambiguous death is the result of suicide rather than an accident. In this sense, certain features of a death (or the deceased person themselves) may appear intuitively related with a particular manner of death, such as a suicide, regardless of whether there is evidence

to support this link. It is important to understand not only the factors that are associated with a particular mode of death, but also how certain features might be *interpreted* at the time of a police investigation, as this is likely to guide the police investigation process and investigator hunches regarding manner of death. This knowledge may be in a practical sense what drives many police investigations and as such deserves to be a topic of study. While the presence of previous suicidal behaviour is an example of one such feature that may be interpreted as indicative of a suicide by police investigators, there are many more aspects of an investigation, a death or a deceased person that may influence police investigator hunches, or the interpretation of evidence that have not been sufficiently researched. The decision making style of police detectives overall has been examined in a very limited amount of research, however the decision making process has been said to play a vital role in the outcomes of police investigations and also legal consequences (Greene & Ellis, 2008).

The decision making of police in real life burglary investigations in Midwestern America was studied by Brandl (1991). Brandl investigated the impact of case and victim characteristics on the decisions made by detectives, regarding follow up efforts and the amount of detective time that was allocated towards this follow up, if any. It was found that many victim features did not affect the detective's decision making – including age, race, sex, income or employment status. In this case the features of a burglary that did have an impact on detective decision making were identified as the dollar value of the stolen property, the strength of suspect information and the presence of physical evidence.

The importance attributed to varying types of evidence within a police investigation was also studied by Ask, Rebelius and Granhag (2008). Police trainees

in Sweden were instructed to act as investigators when reviewing the background of a homicide case. The study found that participants considered any subsequent information that did not fit with their suspicion against a suspect as less credible than if subsequent information supported their theory. It was also found that when subsequent information was received that did not fit with the participant's theory, the participant generated a larger number of arguments against the reliability of this new information, than the objections generated for new information that provided support for their theory. This research demonstrated the presence of a bias in the decision making of this sample of trainee police that the authors termed asymmetrical scepticism. These findings regarding police investigations highlight the need to understand decision making but also how individual features of an equivocal death are interpreted by police. In addition the findings indicate the potential for biases affecting police decision making in the specific context of an equivocal death investigation.

A number of biases of decision making and judgement may be relevant to police investigations. These biases include those that lead an individual to further support an existing belief that they hold, as detailed by the asymmetrical scepticism bias (Ask et. al., 2008). It appears that this bias supports the story model of decision making (Pennington & Hastie, 1986) by involving a narrative story structure and discounting pieces of information that do not corroborate this chosen narrative. A number of further biases and heuristics may also be important to police investigator decision making, heuristics being mental shortcuts that individuals often employ in judgements and decision making (Guthrie, Rachlinski & Wistrich, 2001). Beliefs, attitudes, emotions, social forces and cognitive processes often affect individual judgements and decision making (Langevoort, 1998) with biases and heuristics in

judgements being well documented in social and cognitive psychology disciplines. Studies have demonstrated biases in many professions including medical professionals, engineers, military leaders and psychologists (for a review see Guthrie et. al., 2001). In short, biases and heuristics in the workplace are common (Thompson, 2003; Betts, 2009).

As biases in judgement are pervasive across both experienced and inexperienced individuals in a number of occupations (Guthrie et. al., 2001), it appears likely police judgement and decision making would be affected by bias. Indeed, it has been acknowledged that biases may result during a criminal investigation due to the complex nature of decision making in this context (Greene & Ellis, 2008). Despite this, specific types of bias have not been investigated in police responses to equivocal deaths, nor has the presence of bias in general been confirmed for this area. This literature review will highlight eight forms of common bias that have potential to impact upon police decision making when responding to an equivocal death.

### *Confirmatory bias*

Biases relating to a predisposition towards seeking out and processing additional information that reinforces an original view point have in some cases been termed as examples of a confirmatory bias. Examples of confirmatory biases have been documented in the search stage of information gathering (Doherty, Mynatt, Tweney & Schiavo, 1979). In addition confirmatory biases have been found to occur in the processing stage of decision making. For example, in the area of memory, individuals have been found to recall more salient information than the information that contrasts with an initial theory (Perkins, Faraday & Bushey, 1991). A further

example of this type of bias in the processing stage includes the manner in which an individual interprets information, with the bias resulting in information being interpreted as supporting a theory or hypothesis already held (Kelley, 1950). A common type of confirmatory bias is the anchoring and adjustment bias. It has been found that people tend to “anchor” onto an initial belief, thought or numerical value early on in the process of decision making and it is more difficult to move away from this belief than it is to remain convinced of it. In other words, a decision maker will fail to accurately adjust their view as new information comes to light.

Tversky and Kahneman (1974) found that judges’ responses were indeed significantly altered by initial values manipulated by the experimenters, providing strong evidence for the anchoring bias in criminal justice. Anchoring and adjustment biases have also been demonstrated in the context of jury decision making, where both monetary and causal anchors were shown to affect jury decisions in many aspects, including the probability that the defendant caused the injuries to the plaintiff (Chapman & Bornstein, 1996). This finding provides further support for the relevance of decision making biases for police investigators as it suggests that investigators would be more likely to attend to information that is salient with their existing theories. Anchoring and adjustment biases suggest a number of difficulties for decision makers in many contexts, particularly for those decisions which may result in serious consequences such as is the case for police enquiries into an equivocal death.

### *Cognitive dissonance*

In addition to the effect of confirmatory biases that encourage individuals to seek out and attend to information that supports their initial beliefs, it has long been

recognised that people make decisions and have attitudes that support and justify the beliefs, attitudes, decisions and actions that they have made previously (Langevoort, 1998). This construct was labelled cognitive dissonance and was proposed by Festinger (1957). Cognitive dissonance is a type of bias that has a motivational element to it. While the concept of cognitive dissonance has at times been criticised, it has been said that any difficulties in replicating the effect may be attributed to poor study design and that this historical bias is clearly able to be demonstrated (Cotton & Hieser, 1980). In terms of police investigations, it is possible that a cognitive dissonance bias may further exacerbate any reluctance of police to consider alternative hypotheses and may contribute to police investigators continuing to make decisions that support their original theory, while to some extent neglecting other alternatives. Specifically, the cognitive dissonance bias may encourage police investigators to try to justify the time and effort already allocated to one theory when investigating an ambiguous manner of death by further extending the time and effort spent in following up this scenario.

### *Belief perseverance*

Belief perseverance has been described as a cognitive phenomenon whereby people maintain their original beliefs, even if the evidence for this belief becomes questionable or non-existent (Davies, 1997). The belief perseverance phenomenon is therefore a bias in judgement whereby people are reluctant to explore other alternatives and are further motivated to maintain their original beliefs. In the context of equivocal death investigations, belief perseverance may further inhibit investigators from exploring alternative possibilities particularly where the investigator holds a strong theory for how a death is likely to have played out.

### *Prototypes*

While many biases encourage a person to maintain their original beliefs, a further consideration is how an individual's original beliefs or hypotheses might occur. Research has found that jurors typically compare the features of a case to prototypes they already possess for the particular crime and how it would typically occur (Smith, 1991). For police investigations it could be expected that officers hold a number of prototypes that encompass common features of a particular crime and the role of different pieces of evidence. Should police investigators hold prototypes for the ways that deaths by accident, suicide, homicide or natural causes typically unfold, this may guide their original hypotheses regarding likely manner of death. Evidence suggests this is the case in coronial decision-making, with coroners especially vulnerable to influence by the presence/absence of suicide notes and by the age of the deceased. For example many coroners will not deem suicide if the deceased's age is below some arbitrary cut-off (most commonly 10 years of age) or if there is no suicide note at the scene (Robertson & Crawley, 2009).

### *The availability heuristic*

The availability heuristic relates to judging the likelihood of a particular development or event where people base this probability rating on how quickly and easily they are able to recall similar examples (Tversky & Kahneman, 1973; 1974). It is said that the availability heuristic results in individuals overestimating the likelihood of an event when they are able to easily recall such examples, causing judgements that are inaccurate (Perry, 2003). As such, it has been found that people attend more to information that is highly salient or available despite being faced with statistical unlikelihood (Langevoort, 1998).

Perry (2003) suggested that the availability heuristic could be countered in the instance of jury deliberations by way of providing instructions to the jury that explains this bias or by employing expert witnesses to educate jurors on the true likelihood of an event. In terms of police investigations, the presence of an availability heuristic effect is yet to be tested and any approach to counter such an effect is therefore unlikely to be understood in the short-term. However, the available research suggests that police investigators may, like individuals in general, find themselves biased by the ability to recall examples of similar deaths and the findings in those cases. In this sense any existence of an availability heuristic for police investigators may directly relate to personal and professional experiences. Overall, the availability heuristic may impact upon police investigators and influence decision makers to less accurately consider the likelihood of a scenario or event occurring.

#### *Simulation heuristic*

It has been said that juries often use a type of cognitive shortcut called a simulation heuristic in determining the probability of events within a trial (Heller, 2006). Kahneman and Tversky (1982) also coined the term simulation heuristic, to describe a process whereby individuals attempt to imagine *alternatives* to a given (or initially imagined) scenario. In this case juror research has indicated that individual jurors use a simulation heuristic in decision making by attempting to envisage the way in which a crime played out and basing their judgements on how easily an alternative scenario can be imagined (Loftus, 1980). This heuristic is therefore a cognitive shortcut used by individuals to estimate probabilities. It is clear that this heuristic is not an objectively accurate method and may actually result in poor

estimation of event probabilities (Heller, 2006). Findings indicated that jurors were more likely to imagine a narrative for an event (which concurs with a story model of decision making) while listening to testimonies than they were to weigh up individual pieces of information, as would have been the case if using an information integration approach to decision making. While jurors may certainly make attempts to weigh up probabilities, they are also likely to have a 'gut-level' reaction and it has been said that where both approaches occur that the instinctive, intuitive reaction will be the overriding factor that a decision will be based upon (Heller, 2006). For police investigators, evidence of a simulation heuristic has not been tested and a greater understanding of how this heuristic may affect police judgements in response to an equivocal death is warranted.

Of relevance to police decision making within an investigation is the fact that police do not receive or uncover information sequentially and cohesively, as jurors are likely to in a trial. It is of interest to discover whether this means that police are less inclined to develop narratives that may explain the sum of evidence available so far. It should also of course be noted that juror samples consist of laypeople, while police investigators are skilled professionals in this area. This distinction, in conjunction with police investigators familiarity and experience at decision making in their field indicates that police investigators' decision making may be affected to a different extent by a simulation heuristic than has been found to be the case for jurors.

#### *Errors in evaluating evidence*

In addition to the simulation heuristic, it has been identified that jurors make two fundamental errors during the course of a criminal trial. The first of these errors

is incorrectly evaluating the importance of individual pieces of evidence, as being more or less significant than they should (Heller, 2006). The second error identified for jurors was an incorrect evaluation of the reliability of a piece of evidence (Heller, 2006). These findings appear commonsense given the context of a criminal trial, with both the prosecution and defence presenting their own version of key pieces of evidence. However, in the context of a police investigation the potential for errors in judgement may be even more amplified. This statement is based on the fact that police investigators make judgements on potentially larger amounts of information (both relevant and irrelevant) that has not been already filtered by legal professionals, unlike in a trial. The pieces of evidence are therefore potentially more ambiguous. Police investigators are not only required to judge the level of significance and reliability of a piece of evidence, but also to find and evaluate whether every aspect is relevant at all. Therefore the decision errors of jurors may provide relevant clues for the decision making errors that face police in investigations into an equivocal death, however the presence of this bias in police samples is yet to be tested.

#### *False consensus effect*

In terms of police decision making, a further bias requires discussion that has not been investigated in the area of criminal justice to this point. The false consensus effect acknowledges that individuals tend to overestimate the extent that other people believe and feel the way that they personally do (Wojcieszak & Price, 2009; Glynn, Herbst, O'Keefe, Shapiro & Lindeman, 2004). The false consensus effect has been demonstrated in a large number of experiments where participants responded to questions on contentious topics, such as physician-assisted suicide (Gunther & Christen, 2002). This bias may have consequences for police investigations into

equivocal deaths. Should police investigators be affected by this bias they may not adequately assess the motivations, interests or likely actions of others. Investigators may indeed believe that their own emotions, thoughts, opinions and moral values are widely held by the general population, a perpetrator or a victim. This egocentric view would mean that the motivations of others that do not correspond with a police investigator's own outlook may be difficult to imagine, be overlooked or even dismissed. In this instance, police investigators may inadvertently ignore the multitude of differences in personality, circumstances, experience and preferences that occur across individuals, by assuming that everyone else can be likened to themselves. While police would be accustomed to hearing of actions and motivations that they would not engage in themselves (such as murder), it appears more likely that the false consensus bias may affect police investigator interpretations in certain circumstances. For example, an investigator may strongly believe that children do not commit suicide or elderly people do not get depressed – both of which would be incorrect (Australian Bureau of Statistics 2008, published 2010). The false consensus bias may therefore be relevant to decision making in the area of criminal justice and deserves investigation.

Although a number of the above biases have been discussed in isolation, the literature has also demonstrated that biases occur in combination. In an early study that related to judgement decisions in cases of uncertainty, Tversky and Kahneman (1974) found that the availability heuristic and heuristics of anchoring and adjustment were most often employed. Greene and Ellis (2008) have stated that short cuts are often made in legal decision making through the use of heuristics, including the availability heuristic, anchoring-and-adjustment and the simulation heuristic. Also a number of heuristics and biases were found to significantly impact upon a

sample (n=167) of American federal magistrates' decision making, including anchoring and adjustment biases (Guthrie et. al., 2001). Despite judges' experience and skill they have been found to be susceptible to errors in judgement due to common biases (Guthrie et. al., 2001).

While biases have not been demonstrated in professional police populations, evidence of bias in decision making has been found in a sample of trainee police (Ask et. al., 2008). Based on this finding, and the documented evidence of bias in other areas of criminal justice including court jurors and judges, it is likely that police investigators may also be susceptible to judgement biases and subsequent errors, regardless of their level of experience.

Should biases impact upon police investigator perceptions, police investigators may fail to explore and search for further evidence regarding alternative manners of death, providing only a biased collection of evidence and information for a resulting coronial process. Therefore, the decision maker can neglect to invest appropriate resources into investigating these alternatives. It is clear that this may have negative consequences in the investigation of equivocal deaths. In cases where information becomes more difficult for potential witnesses to recall or physical evidence becomes more difficult to locate and analyse over time, a premature case closure may detrimentally impact upon any subsequent coronial investigation due to the extent that further evidence may be recovered if required (Freckelton & Ranson, 2006).

Despite the acknowledged risks of biases and heuristics in judgement, biases and heuristics may also result in some benefits to a decision maker. A heuristic process is a more intuitive approach to decision making than rule-based approaches and provides a faster result with less demand on an individual's cognitive resources

(Evans, 2006). Also, given that rational rule-based approaches to complex judgements have been found to be inaccurate fifty percent of the time (Nutt, 1999), a greater understanding of the potential positive implications of using heuristics in decision making is of interest. While the role of intuition in police judgements has lacked research, one study of American police academy attendees (Tussey, 2007) found that in real life situations the police academy attendees frequently used, trusted and relied upon their intuition in law enforcement decision making.

However as previously noted, individuals are said to employ both heuristic and analytic processes when responding to a reasoning task, with each type of processing being strong or weak within this task (Evans, 2008; Stuppel & Waterhouse, 2009; Heit & Rotello, 2010). These holistic approaches to decision making have been adopted by organisations as an alternative to a singular rational or intuitive approach (Wally & Baum, 1994).

In the area of criminal justice decision making, judges have been found to seek a middle ground approach between an overconfident use of heuristics and a more cautious approach, seeking out independent sources of judgement and proceeding cautiously in order to progress their judgements effectively by minimising bias (Wolfram, 1986 cited in Bonner & Newell, 2010). As a result, it has been suggested that judges largely make good decisions by learning to see a problem or situation from multiple perspectives and by being trained to recognise and limit the negative impact of heuristics during their decision making process (Guthrie, Rachlinski & Wistrich, 2001). This finding presents a potentially successful approach for other professionals engaged in decision making and judgement, such as police investigators, should they be made aware of the biases in their thinking.

One aspect of decision making within sentencing decisions has been recognised as impacting upon these complex decisions. The consider-the-opposite strategy, proposed by Lord, Lepper and Preston (1984), states that where people attend to information that contrasts with their initial beliefs they are successfully able to improve their judgements by reducing overconfidence.

These findings provide optimism for combating biases in criminal justice decision making and provide a rationale for in the first instance identifying which biases occur during initial police investigations of equivocal deaths, so that future research may address the impacts on a case – both positive and negative.

### **The Role of Experience and Expertise**

When investigating police decision making in the context of equivocal deaths it must be noted that some police will be inexperienced in this area while others will have extensive experience. For this reason, the role of experience for police investigators is of interest. Although the effect of experience level has not been previously examined for police investigators concerning equivocal deaths, the effect of experience has been discussed in other areas.

Level of experience has been found to have a beneficial effect on performance or outcome measures. Early research regarding expertise centred on the memory and knowledge of master chess players, for example de Groot (1946) found that chess players with a higher level of expertise were able to more successfully recall the placement of pieces on replicated chess board presentations. This outcome was largely attributed to a greater knowledge base and extended amounts of experience for chess masters, in comparison to less experienced players. Further areas where expertise has traditionally been investigated and found to result in

superior performance include sporting prowess, musicality, card playing and in scientific fields. For example, the impact of expertise has been studied in physics (Larkin, McDermott, Simon & Simon 1980; Chi, Feltovich, & Glasser, 1981) and it was found that experts solved problems more quickly and appeared to have less burden upon their short term and working memory, but also that experts used different approaches than novices in solving these problems (Larkin, McDermott, Simon & Simon 1980; Chi, Feltovich, & Glasser, 1981). Therefore, research in a number of traditionally recognised areas of expertise has indicated that experience can result in superior performance outcomes, greater knowledge and alternative approaches to task completion, as well as more efficient cognition and memory skills.

One of the first recognised theories of relevance to explain the superior performance of experts was Simon and Chase's (1973) theory of pattern recognition and chunking. This theory recognised an advantage for experts in being able to effectively recall and process information by way of "chunking" their knowledge into larger and larger knowledge bases over time. The theory progressed to acknowledge that short term memory is indeed limited for both experts and non-experts, with the advantage for experts being that increasingly complex chunks of information can enable a vast knowledge base to be utilised.

Simon and Chase's (1973) theory of expertise indicated that experts possess an advantageous pattern-based retrieval process. The recognition of patterns and connections between individual pieces of information may be of particular interest for police officers in the process of investigating an equivocal death. Police may construct a number of cognitive scripts for how events commonly play out, based on their prior experience and observations. These experiences and interpretations may

lead police to see patterns within evidence, potential links between certain pieces of information, or a likely scenario that the evidence would support. In this sense, experienced police may benefit from a pattern-based retrieval system within their judgements, in a similar way that expert performers can recognise patterns in areas such as chess.

It has also been suggested that experts have an element of automation in their progression through problems, which allows them to quickly progress through a series of steps that tends to require more consideration for novices (Larkin, McDermott, Simon & Simon 1980). It has been said that this automation is the result of practice and knowledge, but also the ability to see patterns and successfully access information from memory.

However, an expert's skill cannot simply be in their ability to store larger chunks of information for use during a task, or by having an automatic response triggered by a task. Indeed, skill has also been found to be related to an expert's recognition capabilities, perceptual knowledge and the way that information tends to be stored in long term memory (Larkin, McDermott, Simon & Simon 1980). In terms of cognitive scripts for example, it has been found that experienced and inexperienced elementary school principals differed in the content of their job-related cognitive scripts (Cernogorsky, 1991). This study found that experienced principals possessed well defined, procedure-specific scripts while inexperienced principals had only moderately well defined scripts for the same task that was common to both groups' practice. This effect was described as one of experience. In the area of auditing, knowledge-based cognitive scripts were also found to be more developed in experienced auditors (Choo, 1996). The more developed cognitive scripts of experienced auditors were also found to relate to superior performance, in

comparison to less experienced auditors. Choo (1996) concluded that experienced auditors possessed greater knowledge within their cognitive scripts due to repeated exposure to situations which developed and reinforced their internal scripts.

While a level of automation may exist in expert behaviour, it is now recognised that experts are also found to anticipate, reason and plan – features that indicate their responses are much more than an automatic response to a stimulus (Ericsson, 1996). In fact, experts often have the capacity to perform more successfully than non-experts at each level of a task – including anticipating, planning, execution, problem solving and evaluation (Ericsson, 2005).

Despite the positive impacts of experience that have already been reported from early research, research at this time also acknowledged that experience in itself was not a guarantee of better performance. For example, in investigating the recall ability of chess masters, de Groot (1946) found that non-experts actually performed comparably to the masters when chess boards were set with a random and illogical pattern of chess pieces, rather than a correct game pattern of pieces. This finding indicated that experience may result in task-specific advantages, but not an overall superiority in memory or cognitive abilities.

Indeed, the belief that innate capabilities in memory and intellect play a dominant role in successful performance is no longer the dominant theory, with the impact of innate talent being more recently considered as small or negligible in many areas (Ericsson, 1996). In this vein, the previously held belief that perceptual and cognitive capacities cannot be gained by engaging in training and practice, has also been increasingly rejected in the literature (Ericsson, 1996, 2004). In fact, the correlation between an individual's IQ and their performance success has been shown to decrease over the years and to be completely unreliable after a period of

just five years (Hulin, Henry & Noon, 1990). It has been said that it is through experience that a person is able to learn by doing, thus enabling them to learn from past mistakes and add to their knowledge base in a specific area (Larkin, McDermott, Simon & Simon 1980). It is education and deliberate practice that have been recognised as the cornerstones to expertise (Ericsson, 2005). For example, the amount of time spent engaging in deliberate practice has been found to be directly related to performance proficiency for expert athletes and musicians (Ericsson, 2005). However, a level of practice maintenance is also required, with ongoing expert professional performance requiring deliberate practice to be continuously maintained (Ericsson, 2004). Without continued practice, skills and attributes regress towards the mean. This finding further indicates that an expert's skills are not innately possessed. A further benefit of repeated practice has been suggested in the literature, being that with sufficient practice an expert may progress their approach to tasks from a merely repetitive one to one of innovation (Haerem & Rau, 2007), through a deeper level of understanding of the task at hand.

Haerem and Rau (2007) found that experts and novices not only react differently to tasks, but also perceive tasks in different ways. In terms of the representations that people form for a task and the way that people solve problems, experts have been found to understand problems in a different (Chan, 2006) and more complex way than novices (Ericsson, 2005). This suggests that experts not only become more proficient at a standard approach, but also that experts' perceptions and approaches evolve to be categorically different than those of non-experts. Therefore, investigations into the nature of expert and non-expert performance should be tested in a task-specific way, which allows an individual's perceptions to be disclosed.

For police investigations into equivocal deaths it is unknown whether experienced police form a different perception of the death than inexperienced police. It would be of interest to investigate the perceptions of manner of death in not only a task-specific way, but also to collect experienced and inexperienced police responses as distinct participant groups.

Researching police decision making has been identified as an area that benefits from utilising both quantitative and qualitative data in order to understand not only what police appear to do, but also what police acknowledge doing and for what reasons (Schulenberg, 2007). Therefore, as well as examining this area in a task specific way, a mixed method approach should be employed in order to gather the most information possible from experienced and inexperienced police responding to an equivocal death.

The above comments relate to the way that experts may outperform non-experts and the differences in the way that experts and non-experts respond to tasks. However, it is important to note that non-experts can and do outperform experts. This is an important consideration for research into the differences between these groups, as care must be taken not to assume that the comments, actions and judgements of experienced individuals are more accurate than those of non-experts.

Experience level is not necessarily tantamount to successful performance. While the relationship between experience and superior performance has been disputed (Ericsson, 2004), the area of judgements in particular has shown that even extensive experience does not provide a decision making advantage. In fact it has been said that experts' judgements typically hold a low level of validity and reliability, in addition to being unrelated to the extent of experience possessed (Shanteau & Stewart, 1992). Regarding decision making and judgement for

example, financial experts have been shown to have low accuracy for their decisions and financial advice on stock purchases, an effect which did not successfully improve with increased experience (Shanteau & Stewart, 1992). In another field of decision making, a study investigating the accuracy of auditor decisions and their level of experience found that more experienced auditors did not perform more accurately than comparatively inexperienced auditors (Bonner, 1991). For police investigators therefore it seems important to test the perceptions of experienced and inexperienced police separately but not to assume that experienced police perceptions are superior.

It must be recognised that a further distinction exists within the literature regarding what constitutes an 'expert.' An individual who possesses knowledge gained by extensive experience within a given field has in some cases been described as an expert, however expertise or experience in professional contexts such as police work or medical professions presents a very different kind of expertise to traditionally defined fields of expertise such as musical achievement and sport. Typically, it had been estimated that expert performance requires approximately ten years of continuous deliberate practice (Ericsson & Lehmann, 1996). Although, importantly authors have now shown that this definition of expertise does not correlate with superior performance indicators within an occupational setting. The number of years of experience in a particular field has actually been found to have a weak relationship to performance (Ericsson, Krampe & Tesch-Romer, 1993). Therefore, spending an extended period of approximately ten years in an occupation may provide little benefit to performance, or impact upon whether an individual should be recognised as an expert.

In considering the reasons why experienced individuals do not necessarily have the superior performance expected from an expert, a number of features can be identified. One contrasting feature of traditionally defined experts and those with extensive experience in their chosen occupation is the age that they typically commence their training. The age at which an experienced professional begins their training in adulthood is much later than training that typically begins in early childhood for expert performers in areas such as ballet (Twitchett, Koutedakis & Wyon, 2009) and music (Manturzevska, 1990).

A second contrasting feature between experts and novices may be their approach to practice and study. This may differ markedly for experts in areas of sport, music, chess or some other skill in comparison to the approach of an experienced professional during the course of their job performance. Motivation to continually improve one's knowledge and engagement in an occupational field is likely to play a large role in whether a person becomes an expert, or simply completes their professional obligations to a satisfactory degree. When aiming to improve a skill or skilled occupational task, it has been said that the practice engaged in requires a goal focused approach, whereby individuals primarily seek to improve their performance as part of this practice (Ericsson, 2004). In the area of job performance, it may be that sufficient worker satisfaction, a busy career, disinterest, or reduced motivation to continue learning may all result in the completion of occupational tasks without the required improvement-focused approach. In support of this, research has indicated that providing additional training to individuals has been only weakly associated with improvement on objective performance measures (Ericsson, 2004). This finding shows that increased time commitment alone is not enough to improve performance, or establish expertise.

A further potential difference between a traditionally defined expert and those with extensive experience in a domain is that by the time professionals start their occupational training, they already have a set of experiences and life views formed, which may in turn impact upon their job response. Police officers in training for example may have opinions and interpretations (both valid and invalid) regarding mental illness, suicide, family violence, political activism and a number of other contentious topics. As a consequence, trainers and teachers have a role in educating their employees with new information, but also in moulding any existing skills and perceptions to appropriately meet the job demands (Ericsson, 2004).

Therefore in occupational areas of expertise, individuals begin their training later in life and with their own experiences but also may not exhibit the same motivation for improvement as expert performers in the typical sense. These features may at least in part explain why care must be taken in defining an individual as an expert within psychological research, without having an objective performance measure that this sample of people indeed excel in their area of experience. Once again, the research has shown that in studying the differences between experts and non-experts – especially in the area of decision making or judgement – that it is important not to assume that expert responses are superior. While care has been taken to reinforce the finding that experience does not automatically qualify someone as an expert, it must be acknowledged that many professionals with extensive exposure, experience and motivation to continue learning in their field of employment do attain and deserve an expert status and possess a vast amount of knowledge.

The possibility of transferring advantageous knowledge from more experienced to less experienced employees is of interest. As expertise has been

shown to improve performance, the potential for an expert's knowledge to directly inform non-experts, without requiring them to slowly build up their own knowledge base has been recognised (Ericsson, 2005). This provides a clear rationale for organisations to understand the features of expert behaviour. However, the finding that deliberate, goal-directed practice and education are vital to expertise emphasises that the skills experts possess cannot simply be explained and passed on to those with less experience. Instead, this understanding may provide avenues for education and training, to optimise the speed of development for those with inexperience within a particular domain. Longitudinal studies of performance further support this suggestion, as findings indicate that performance improves in a gradual fashion rather than taking staccato jumps forward (Ericsson, 2004).

The effect of experience on police decision making is yet to be investigated experimentally, although a likely societal assumption would be that in general experienced police would be more competent decision makers than their less experienced peers. However the impact of experience on performance (and decision making in particular) can be a contentious topic, as has been discussed. Therefore, the effect of experience for police officers deserves study, particularly in a complex police investigation such as that of an equivocal death.

In terms of police investigations into an equivocal death it appears that researchers should conduct studies using task-specific experiences, use police investigators rather than lay people and incorporate qualitative aspects within the study that enable disclosure of participant perceptions, for both experienced and inexperienced police. By doing this, it is expected that a greater understanding of the influence of expertise may be gained – which can only provide the literature and any

organisations that commission research for their own purposes, with more complete, useful and advantageous information.

### **Summary**

To summarise, a number of points can be made. Firstly, very little literature exists relating to a police investigator's role in an equivocal death investigation, despite the recognition of the important role that they play. Police investigators are required to gather, assess and respond to evidence, as well as make decisions and progress a police investigation in a way that the investigator believes is appropriate. It has been identified that interpretations and judgements made by police may end or change the investigation significantly (Freckelton & Ranson, 2006). Follow on effects of these decisions and judgements can therefore greatly affect the knowledge gained about the circumstances of a death and the outcomes for any coronial process, the justice system response and also the emotional outcomes for friends and family of the deceased. While equivocal death investigation, decision making and the interpretation of evidence may be considered as inexplicably linked in the context of death investigation by police, the literature does not provide clear direction regarding decision making in this context, nor has it researched the initial hunches or tentative conclusions that may be formed during police equivocal death investigations.

Although research is scarce on this topic, a number of areas of literature relevant to investigating equivocal deaths have been identified. In the area of decision making it has been identified that it is unknown which of the existing decision making models are likely to best fit the process of evidence evaluation in a police investigation process, such as the investigation of an equivocal death.

As noted the key theories are the story model and information integration models, the story model theory being a decision making process whereby an individual creates a narrative or story to make sense of the existing evidence, dismissing evidence that does not appear to fit with this theory. While information integration models suggest that decision makers weigh up individual pieces of evidence for validity and (once all information is collected) that this pool of “valid” information is weighted according to perceived importance and integrated to result in a decision. The relevance of the story model and information integration approaches are yet to be investigated in relation to police decision making, despite their acknowledged role in jurors’ evidence evaluation and decision making process.

A further area of research that has been discussed regarded the potential impact of evidence interpretation and bias on decision making and judgement, which identified that potential biases for police equivocal death investigations should be investigated as bias and heuristics may affect the conclusions of police investigators. In addition, it is unknown which features of an equivocal death may affect the judgements and progression made within a police equivocal death investigation.

The role of experience for police investigators has been discussed and this literature review has recognised that an investigator’s own experiences may contribute to perceptions and decisions made within a police investigation. The investigation of both experienced and inexperienced police responses to equivocal deaths therefore provides an avenue for investigation.

Of most relevance is the fact that regarding equivocal deaths, the literature has to this point focused on the coronial process and the psychological distinction between accidental and suicide deaths in equivocal cases, as explored in psychological autopsies. Research is however required into the earlier stages of an

equivocal death investigation by police. Due to the lack of literature regarding this topic and the large range of factors that may influence a police investigator's interpretation of evidence, research into the area of equivocal death police investigations appears timely. The lack of prior research and multitude of potential impacts upon police responses to equivocal deaths indicates that initial research requires a descriptive exploratory focus with a mixed methods approach in order to gather the most useful information possible (Schulenberg, 2007). This literature review finds that initial research should begin by identifying whether police investigators responding to equivocal deaths use either a story model or information integration approach to decision making. In addition initial research should identify whether decision making biases indeed affect police responses and establish whether experienced and inexperienced police investigators' differ in their responses to equivocal deaths. It is hoped that this initial research stage may begin to illuminate the complex area of police equivocal death investigations as well as guide and inform subsequent research hypotheses.

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## Abstract

The aim of the study was to investigate the decision making, initial conclusions and biases of police investigating equivocal deaths. The study involved 38 participants from Tasmania Police, 25 of whom were trainee police and 13 experienced investigators. Participants completed a research questionnaire investigating their responses to four fictional equivocal death scenarios, from which quantitative results were analysed using MANOVA, Univariate tests and Pairwise Comparisons. The study found initial conclusions regarding manner of death differed across the equivocal scenarios. Overall, experienced police investigators believed accidental death was significantly more likely than other manners of death, compared with inexperienced police. Pre-planned comparisons also found that experienced investigators rated suicide as significantly less likely than other manners of death, compared with inexperienced police, in a fictional scenario where a drug addicted woman died following drug use. Support was found for both the story model and information integration models of decision making, indicating that police do not use one decision making approach but a dual process – assessing likely narratives to explain the death, while also being able to focus solely on the evidence to hand. Qualitative responses from the questionnaire indicated common decision making biases for both experienced and inexperienced police. It was recommended that future research continue to use mixed methods to investigate the dual-process of police decision making and to identify individual features which impact upon police conclusions regarding manner of death, preferably using real cases with a coronial verdict. Given

their differences, it was recommended that research continue to investigate both experienced and inexperienced police responses.

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When it is unclear whether the manner of a death is accident, suicide, homicide or natural causes, the death is termed equivocal (Young, 1992). While equivocal deaths have an unclear manner of death the medical cause of death may be known, for example a medical examiner may have established that the medical cause was drowning or hanging (Geberth, 2005). Therefore, an equivocal manner of death relates to the circumstances in which the victim died rather than the medical cause of death. Although equivocal deaths have been estimated to represent between five and 20% of all reportable deaths (i.e., deaths requiring a coronial determination as to manner of death; Shneidman, 1981), this area has been the topic of little research. Of the research that has been conducted, the predominant focus has been upon the coronial process of death determination, with the complexity of this task for coroners being highlighted (Goodin & Hanzlick, 1997; Huusko & Hirvonen, 1988; Stanistreet, Taylor, Jeffery & Gabbay, 2001). For example, in the area of equivocal death determination the literature has found that coroners are largely influenced by the presence or absence of a suicide note when delivering a verdict of suicide (Robertson & Crawley, 2009).

Due to their ambiguous nature, equivocal deaths also highlight the important role that police investigators have in establishing manner of death as a result of their initial enquiries (Freckelton & Ranson, 2006). Specifically, it has been recognised that investigating police officers are likely to have an important role in guiding investigations and the subsequent determination by the coroner of equivocal deaths

as being due to accident, suicide, homicide or natural causes by a coroner (Jobes et al., 1986). Jobes et al., (1986) indicated the role that the police investigative process may have in the outcome of equivocal death determinations, noting that some degree of the variability and error in coronial determinations in ambiguous cases may be due to aspects at the police investigation stage. The authors suggested that the type of information sought in a police investigation, the level of suspicion felt by police regarding manner of death, case difficulty and variability between officials were among the features of the police investigative process that could possibly influence coronial outcomes (Jobes et al., 1986). In an alternative area of police decision making, Brandl (1991) found that certain features of a burglary case indeed impacted upon both police decision making and police responses. Brandl's (1991) study therefore demonstrates the potential follow on effects for police investigations due to police officers' initial perceptions of a case.

The initial conclusions and subsequent actions of police officers in the early stages of death investigation are likely to influence whether an investigation is prematurely closed, as well as how extensively alternative theories for the manner of death may be investigated (Freckelton & Ranson, 2006). These potential implications for the investigation of a death may have significant impact upon a coroner's ability to reach a finding regarding manner of death. Despite acknowledgments that the initial police investigation may have a significant impact upon successful equivocal death determination, research is yet to investigate the initial stages of a police investigation into equivocal deaths. This gap in the literature provides a rationale for beginning to research the area of equivocal death investigation with specific reference to policing.

The decision making process has been identified as having a vital role in the outcomes of police investigations and legal consequences (Greene & Ellis, 2008). Although no theories currently exist specific to the nature of police decision making in equivocal deaths, two decision making theories have been discussed in the context of criminal law proceedings that appear pertinent. These theories are the story model of decision making (Pennington & Hastie, 1986, 1988) and information integration models of decision making (Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom, Werner & Saks, 1978). These theories have been detailed regarding the decision making process of jurors presented with evidence during a criminal trial, however research is yet to compare how well these contrasting theories explain this decision making process.

The story model (Pennington and Hastie, 1986, 1988) suggests that an imagined narrative is developed by the individual, which allows them to organise and interpret the available evidence. This process would inform an individual's decision making style by encouraging the person to attend to some pieces of information and dismiss others, depending on whether they corroborate or add to an assumed narrative.

Conversely information integration models of decision making have been proposed by a number of authors (e.g., Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom et al., 1978). This decision making theory proposed that individual pieces of evidence are independently evaluated as a trial progresses with all pieces of evidence judged as credible being weighted and averaged to gain an impression of the defendant's guilt. The information integration models state that there is a continuous pattern of updating in decision making as new pieces of evidence are presented.

As the process of police decision making in equivocal deaths is unknown, it is of interest to first establish whether either an intuitive story model approach or a rational information integration approach to decision making is reflective of the process employed by police in this context. In a study of American police trainees, some use of intuition in professional judgements was acknowledged, however the trainees stated that intuition was not the predominant driving factor in these judgements (Tussey, 2007). Therefore, police populations may incorporate aspects of each decision making style, however this would require investigation in Australian contexts and with qualified police.

In addition to whether the decision making style of police investigators when faced with an equivocal death is characteristic of a story model or information integration approach, biases and decision making heuristics may affect police responses to equivocal deaths. Biases and decision making heuristics have been found in the responses of both experienced and inexperienced individuals across many professions such as engineers, military leaders, psychologists and medical professionals (for a review see Guthrie, Rachlinski & Wistrich, 2001). Indeed, biases and heuristics in the workplace are regarded as common (Thompson, 2003; Betts, 2009).

Greene and Ellis (2008) noted that biases may result during a criminal investigation due to the complexity of decision making in this area. Biases have indeed been found in samples of trainee police (Ask, Rebelius & Granhag, 2008) and judges (Guthrie et al., 2001). Based on these findings and the prevalence of biases in general, it is likely that police investigators may also be susceptible to judgement biases and subsequent errors. However, despite the likelihood of bias in police

decision making and judgement, it is yet to be studied whether biases exist in professional police populations.

Specific biases that have been documented in other contexts may provide an insight into the potential biases affecting police decision making and judgement when responding to an equivocal death. Biases that reinforce or otherwise encourage an individual to maintain an original belief include the anchoring and adjustment bias, cognitive dissonance and belief perseverance, as will now be discussed.

The anchoring and adjustment bias states that individuals will “anchor” onto an initial belief, thought or numerical value early on in the process of decision making with a decision maker failing to accurately adjust their view as new information comes to light. Evidence of the anchoring bias has been found in criminal justice settings for judges (Tversky & Kahneman, 1974) and jury decisions (Chapman & Bornstein, 1996), where individuals have demonstrated that it is more difficult to move away from an original belief than it is to remain convinced of this belief. For police investigators the anchoring and adjustment bias may encourage police investigators to attend to information that is salient with their existing theories, as well as seek out and attend to information that supports their initial beliefs.

The cognitive dissonance bias (Festinger, 1957) states that individuals are motivated to make decisions and have attitudes that support and justify the beliefs, attitudes, decisions and actions that they have already made (Langevoort, 1998). For police investigations, a cognitive dissonance bias would encourage police investigators to continue to make decisions that support an original theory. The time and effort already allocated to one theory when investigating an ambiguous cause of death would therefore attempt to be justified by further investing time and effort to

follow up this scenario, with a reluctance to consider alternative hypotheses regarding an equivocal death.

The belief perseverance bias results in individuals maintaining their original beliefs, even if the evidence for this belief becomes questionable or non-existent (Davies, 1997). For equivocal death investigations, belief perseverance may further inhibit police investigators from exploring alternative possibilities and instead focus on a theory that may otherwise be considered improbable.

Additional biases that may affect police decision making involve those relating to an individual's prior experience or preconceived ideas, as detailed below

Prototypes have been found to occur in the area of criminal justice, with jurors comparing the features of a case to prototypes they already possess for the particular crime and how it would typically occur (Smith, 1991). In addition, coroners have been found to be influenced by prototypes of a death due to suicide (Robertson & Crawley, 2009). For police investigators, prototypes of a death due to accident, suicide, homicide and natural causes may be possessed and as a result guide the investigators' hypotheses regarding likely manner of death in equivocal cases.

The availability heuristic (Tversky & Kahneman, 1973; 1974) results in individuals overestimating the likelihood of an event if they can easily recall examples of such an event (Perry, 2003). Therefore, individuals attend to information that is highly salient or available even when faced with statistical unlikelihood (Langevoort, 1998). Police investigators who are able to recall examples of similar deaths and the findings in those cases may less accurately consider the likelihood of a scenario or event occurring as a result of their prior personal and professional experiences and the availability heuristic.

A simulation heuristic (Kahneman & Tversky, 1982) occurs where individuals estimate probabilities of events based on how easily they can imagine *alternatives* to an initially imagined scenario (Loftus, 1980). Juries have been found to use this unreliable approach when determining the probability of events within a trial (Heller, 2006). Similarly to the availability heuristic, a simulation heuristic would result in police investigators being unduly persuaded by their prior personal and professional experiences with potentially negative implications for their ability to estimate the probability of the likelihood of accident, suicide, homicide or natural causes when responding to an equivocal death.

During a criminal trial jurors have been found to make errors in their evaluation of evidence importance, significance and reliability (Heller, 2006). As police investigators are required to make judgements on large amounts of both relevant and irrelevant information, there is potential for police investigators to also make errors in this manner.

Lastly, the false consensus effect is a bias well documented within the decision making literature (Gunther & Christen, 2002) that may be relevant in the context of police decision making. The false consensus effect is demonstrated when individuals overestimate the extent that other people believe and feel the way that they personally do (Gunther & Christen, 2002; Wojcieszak & Price, 2009; Glynn, Herbst, O'Keefe, Shapiro & Lindeman, 2004). Should police investigators be affected by the false consensus bias they would fail to adequately assess the motivations, interests or likely actions of others, which may have serious impacts upon an investigation.

By better identifying the biases relevant to police decision making in equivocal death investigations it may become possible to understand the potential

positive and negative impacts of the relevant biases. In addition, it may become possible for police investigators to mediate the impact of bias where necessary. This suggestion is based upon the finding that judges are able to successfully mediate the impact of bias within their practice as a result of education and training on the topic (Wolfram, 1986; Guthrie et al., 2001).

In researching the decision making and initial conclusions of professional police a further aspect of consideration is the experience level of a police investigator. Currently, there is no literature regarding the effect of experience for police investigators in equivocal death investigations, however this appears to be a factor deserving investigation.

Experts have been said to have the capacity to perform more successfully than non-experts at each level of a task – including anticipating, planning, execution, problem solving and evaluation (Ericsson, 2005). In addition, it has been found that experienced individuals possess cognitive scripts (Abelson, 1976; Schank & Abelson, 1977) that are better defined and more procedure-specific for job-related tasks compared to the cognitive scripts of inexperienced workers (Cernogorsky, 1991). These better defined scripts may allow experienced individuals to execute job-related tasks in a manner that reflects their experience or training.

However, experience level is not necessarily tantamount to successful performance, in either task performance (Ericsson, 2004) or judgement (Shanteau & Stewart, 1992, Bonner & Pennington, 1991). Extensive experience within a field has been found to provide no decision making advantage for financial experts, who were shown to have low accuracy in their decisions and financial advice on stock purchases (Shanteau & Stewart, 1992). A study of auditor decisions also concluded that more experienced auditors did not perform more accurately than comparably

inexperienced auditors (Bonner & Pennington, 1991). Due to a lack of prior research, it is unclear whether experienced and inexperienced police differ in their initial perceptions regarding manner of death, their decision making style, or the biases they may exhibit when responding to an equivocal death.

Therefore, a number of aspects require study in order to begin to understand police investigations of equivocal deaths and to provide a basis for future research. The aims of this study directly relate to the gaps within the existing literature. The current study fits within the existing literature on equivocal death and decision making in criminal proceedings by taking the first steps in understanding how police investigators interpret equivocal deaths. Due to this topic being a new research area, this study uses a mixed-methods approach with a descriptive focus by collecting and summarising information.

This study has a number of research questions relating to the police investigation stage of an equivocal death. The decision making style of the policing population is of particular interest, along with biases that may impact upon decisions made within an equivocal death investigation. It is also of interest to know how an investigator's own experience level may influence their conclusions.

The study will investigate whether experienced police investigators form different initial conclusions regarding the likely manner of death in cases of equivocal death, compared with less experienced police. As studies have shown that experience in a professional area alone does not result in superior decision making (Ericsson, 2004; Shanteau & Stewart, 1992; Bonner & Pennington, 1991), this hypothesis is non-directional and seeks to investigate whether experienced and inexperienced investigators respond in similar or different ways to hypothetical equivocal deaths.

The second research question to be investigated experimentally is whether the four equivocal death scenarios produce different initial conclusions concerning manner of death. Due to a lack of research on the way that particular features of an equivocal death may influence judgement, it is not possible to make any directional hypotheses in this area. Any interaction between police officer experience level and the type of equivocal death scenario will identify whether there is a different pattern of initial impressions across the scenarios for inexperienced and experienced police.

The third research question will address the decision making style of participants, with a non-directional hypothesis made regarding support for either an information integration process or the story model of decision making. In addition, any interaction between experience level and decision making style will be of interest.

The fourth research question will investigate the extent to which police form an initial theory regarding manner of death in response to an equivocal death, in their professional life and in the questionnaire scenarios.

The fifth research question will further address the way in which this sample of participants made decisions. Evidence of decision making biases in their approach to the hypothetical equivocal death investigations will be examined. Specifically, it is of interest to see whether there is evidence of anchoring and adjustment, cognitive dissonance, belief perseverance, the availability heuristic, simulation heuristic, errors in the evaluation of evidence, prototypes or the false consensus effect.

Finally, it is hypothesised that participants will indicate that the extent to which they form an initial theory is comparable for their questionnaire responses and the way they respond in real life situations. This hypothesis is based on the findings that questionnaire and scenario based studies provide an acceptable methodology for

investigating judgement and decision making (Fontaine, 2007). This hypothesis will also provide a measure of the study's validity.

The literature regarding equivocal death determinations has noted the potential for the investigative process to impact upon coronial conclusions (Jobes et al., 1986), but has not looked at what features at an investigative level may influence the investigation. Therefore, the current study will begin to fill this gap in the literature by investigating the initial conclusions formed by police in response to an equivocal death, their decision making style and how police experience level may be associated with these features. Qualitative research questions will provide detail where required concerning the experimental findings and gather information regarding possible biases evident in the equivocal death investigative process in order to inform future research in this area.

## Method

### *Participants*

The sample consisted of experienced active Tasmanian police officers (n=13) and inexperienced police recruits (n=25). The sex and age of participants was not collected on participant questionnaires in order to preserve the anonymity of the participants however participants of both sexes and of various ages were invited to take part in the study. Invitation to participate was made via Tasmania Police intranet and announced in person to Police Academy recruits by a representative of Tasmania Police.

The experienced group was comprised of police investigators with between eight and 33 years experience investigating equivocal deaths. The mean number of years experience within this group was 15.62 years ( $SD = 7.74$ ). The inexperienced

group comprised police recruits with zero years of experience. Participants were recruited from throughout Tasmania, with state-wide recruitment of participants achieved via liaison with Tasmania Police's elected representative. Participants were asked to state how many years of experience they had (if any) in investigating deaths where the cause of death was equivocal (unclear), which identified the participant as either experienced or inexperienced.

### *Materials*

#### *Research Questionnaire*

The research questionnaire developed for this study was used to investigate the initial thoughts and decision making processes of participants in response to four fictional equivocal death scenarios, which are summarised in Table 1. The questionnaire explored the participants' perceptions and reactions to these scenarios and took approximately 45 minutes to complete (see Appendix A).

Table 1  
*Summary of Scenario Content*

Scenario Descriptor	Victim Information
Drowning	<p>Male, 16</p> <p>Youth was found in the shallows below a 15 metre cliff with shallow lacerations and bruising. The victim was involved in physical fights at school and was often the target of other students. He appeared sad and told his teacher that things were difficult at home with his father. The victim had an argument with his father and had appeared agitated to witnesses when walking toward the cliffs in the rain the night before his death.</p>
Addict	<p>Female, 38</p> <p>This long term drug addict had consumed illicit drugs in a park with her partner. They argued and she was found dead a short time later. The victim's doctor had prescribed a variety of medications despite signs that the victim was addicted. The victim had a miscarriage two months prior and was experiencing relationship problems.</p>
Elderly	<p>Female, 82</p> <p>Victim was found deceased in her home with blood on her head and hall table. The nearby back door was open and a number of aggravated burglaries had occurred in the neighbourhood. The victim was known to have a large amount of money in the home and a history of heart problems. Her husband died recently and she was prescribed antidepressants.</p>
Coma	<p>Male, 59</p> <p>Victim died following hypoglycaemic coma as a result of over-administration of his insulin. Current stressors included marriage breakdown, features of depression, seasonal flu and a hostile family dispute concerning the victim being a primary beneficiary of his deceased father's estate of \$10 million AUD. Victim was found in his unlocked home by a housekeeper and died soon after in hospital.</p>

*Note.* Scenarios did not always include a confirmed cause of death.

The questionnaire scenarios were fictional and were written by the researcher for this study. In designing the scenarios, the researcher aimed to present deaths where the manner of death would not be immediately apparent. This necessary ambiguity enabled the participants to make their own assessment and interpretation in responding to the scenarios, as well as mimicking the experience of investigators who attend a scene where all information is not yet available. Tasmania Police provided the researcher with feedback in order to make scenarios as representative of this as possible. The scenarios included various information regarding the scene, witness reports, recent events and information about the deceased's background, relationships and current stressors. The researcher informally piloted these scenarios with fellow postgraduate students prior to their use in the study, finding that they were sufficiently equivocal. The use of hypothetical scenarios in research contexts has been supported by Fontaine (2007), who suggested that they are an appropriate format for investigating behavioural decision making.

Participants indicated their opinion regarding the likelihood of each manner of death (accident, suicide, homicide and natural causes) by making a mark somewhere along a series of separate 10cm lines. Participants were told that making a mark at the far left of a line would indicate that the participant thought that particular manner of death was "Not at All" likely. Conversely making a mark at the furthestmost right end of the line would indicate that the participant thought that particular manner of death was "Completely" likely. Participants were encouraged to make their mark anywhere along that line to indicate how likely they thought each manner of death would be. Open ended questions followed each scenario.

These questions asked whether the participant had a theory about what may have happened to the victim in that scenario, what features of the scenario most

influenced their decision regarding manner of death, what features (if any) they found irrelevant in that scenario and lastly, what course of action they considered to be a priority for the investigation.

A series of closing questions, shown in Table 2, gained additional information from participants about their usual approach to investigations, again using scaled response lines. Participants rated their agreement level with four statements that relate to two recognised decision making styles, being the story model and information integration approaches, from “Not at All” to “Completely.”

The validity of investigating this study’s research questions using scenarios was also tested within the questionnaire. This was achieved by asking to what extent the participant formed an initial theory about the manner of death (in cases where it is unclear) during their own professional experiences, as well as asking to what extent they did this in response to the questionnaire’s scenarios. These questions also utilised a scaled response format, with the participants making a mark between “0 - Not at All” and “10 - Completely.” These questions provided the researcher with a comparison point between the scenario responses given by Tasmania Police participants in completing the questionnaire and the manner in which they would be likely to respond in real life situations as part of their professional employment.

Due to the scope of this thesis, additional queries within the questionnaire regarding how an alcohol-intoxicated victim would be perceived were not analysed. This aspect of the questionnaire may be published at a later date.

Table 2

*Closing Statements of Research Questionnaire*

Decision Making Theory	Statement
Information Integration aspect 1 “Individual Information Model”	I tend to evaluate the merit of individual pieces of information separately as they become apparent, disregarding those pieces along the way that do not seem to have merit.
Information Integration aspect 2 “Total Information Model”	I tend to reconsider the total sum of the evidence that I think is important each time I receive new information of merit.
Story Model aspect 1 “Theories Story Model”	I tend to identify different ways in which the incident may have played out, disregarding those pieces that do not seem to add anything to my understanding of what might have happened.
Story Model aspect 2 “Narrative Story Model”	I tend to look for (or think of) a likely scenario that the evidence would support.

*Note.* Participants rated their agreement level for each of the closing statements, from “Not at All” to “Completely.”

*Procedure*

Approval for this study was granted by the Human Research Ethics Committee of Tasmania (ethics approval number H10968) and Tasmania Police.

Tasmania Police assisted in identifying suitable participants for recruitment into the study by identifying suitably experienced Investigators within Tasmania Police and facilitating recruitment of inexperienced police recruits. The researcher compiled questionnaire packs to be sent to each potential participant for their consideration. Each questionnaire pack contained a study information sheet (Appendix B), the research questionnaire and a self addressed stamped envelope for participants to return the completed questionnaire anonymously to the researcher. Within the Information Sheet participants were informed of all potential risks and assured that their participation and all responses would be non-identifiable and confidential. Participants were advised that the Information Sheet was theirs to keep and should they wish to take part in the study, the return of the research questionnaire would signify their informed consent to take part.

Prior to the release of the questionnaires, Tasmania Police Commanders were informed of the imminent dissemination of research questionnaires to a sample of their officers. Police Commanders were advised in order to support the officers' time commitment in taking part in the study if they chose to do so. Tasmania Police's internal mail system was then used to deliver the questionnaire packs to potential participants.

A total of 38 participants from Tasmania Police completed the questionnaire. As the questionnaire was posted via the Tasmania Police internal mail system, participants were able to complete the questionnaire at a time and place that was convenient for them. The presentation order of the scenarios within the questionnaire was counterbalanced across participants in order to prevent any potential ordinal effects.

Participants were advised that they could cease their participation at any point should they experience any distress as a result of reading the fictional scenarios. In addition participants were advised that they may contact the researcher if required so that they may be referred for support free of charge from a counsellor not associated with the study at the University Psychology Clinic.

On receiving the completed questionnaires, the researcher compiled the open ended scenario responses. For the quantitative data within the present study, where the participants had made a mark on scaled lines between 0 and 10, the researcher measured each participant response with a ruler and noted the resulting score in millimetres. The full length of each line was 10 centimetres and therefore the resulting millimetre score could also be considered as a percentage of likelihood for that statement. The quantitative data was then analysed using Multivariate Analysis of Variance (MANOVA).

### *Analysis*

The first part of this study utilised a 4 by 2 mixed factorial multivariate design. The within subjects independent variable was scenario (drowning, addict, elderly, coma) and the between subjects independent variable was experience (inexperienced, experienced). The four dependent variables for this design were ratings of likelihood made by participants on each of the possible manners of death (accident, suicide, homicide, natural causes). The second part of this study had a between subjects independent variable of experience (inexperienced, experienced) with four dependent variables related to the decision making styles used by participants (individual information model, total information model, theories story model, narrative story model). The third part of this study had a between subjects

independent variable of experience (inexperienced, experienced). The dependent variables in this case were ratings of agreement regarding the extent to which participants formed an initial theory about what happened to a victim, the first being in the participant's professional life (professional experiences) and the second being in this study's questionnaire scenarios (questionnaire-specific responses).

Using SPSS, three separate MANOVA were employed. The first analysis investigated the non-directional hypothesis of a between-group effect of experience level and a within-group effect of scenario, on ratings of likelihood for each manner of death option (accident, suicide, homicide, natural causes). In addition to these main effects, an interaction between the factors of experience level and scenario were investigated. An arcsine root transformation was conducted on the data set for this analysis in order to satisfy the assumption of normal distribution. Univariate post hoc analyses and pairwise comparisons were also conducted. The second MANOVA addressed support for features of the story model and information integration approaches with post hoc Univariate analyses. The third analysis assessed the extent to which participants form an initial theory about what happened to a victim of an equivocal death. A significance level of  $p < .05$  was used for this study. Qualitative data was converted to percentages for descriptive purposes.

## Results

### **Multivariate Analyses:**

*Initial Conclusions of Inexperienced and Experienced Police Regarding Manner of Death in Equivocal Scenarios*

In order to investigate whether inexperienced and experienced police differ in their initial conclusions regarding manner of death in equivocal death investigations and whether different equivocal death scenarios would produce different conclusions regarding manner of death, a MANOVA was conducted (see Appendix C1). This analysis also investigated the research question regarding a potential interaction between police experience and the type of equivocal death scenario. The first independent variable was experience level, denoting how much experience the police officer had in investigating equivocal deaths. The two levels of this factor were inexperienced (no experience investigating equivocal deaths  $n=25$ ) and experienced (eight or more years of experience  $n= 13$ ). The within subjects independent variable was scenario, with four independent scenarios presented to each participant. Each scenario presented a different type of equivocal death (drowning  $n= 38$ , addict  $n= 38$ , elderly  $n= 38$ , coma  $n= 38$ ). The four options for manner of death in the scenarios were the dependent variables in this study, being accident, suicide, homicide and natural causes. For each of these dependent variables the participants provided a rating of likelihood, ranging from zero to ten.

Test of Equality of Error Variances indicated that the error variance of the dependent variable was unequal across groups (see Appendix C1). Therefore, the original data set was transformed using an arcsine root transformation to correct this violation (see Appendix C2).

MANOVA indicated a significant main effect of experience on the multivariate test, Pillai's  $V=.32$ ,  $F(4,33)=3.86$ ,  $p=.01$ ,  $\eta^2p=.32$ . This main effect indicated that inexperienced and experienced police differed in their first impressions regarding manner of death. In order to discover where these differences occurred, follow up Univariate analyses were conducted (Appendix C3). A significant main

effect was found for experience on participant's likelihood ratings for accident,  $F(1,36)=7.23$ ,  $p=.01$ ,  $\eta^2p=.17$ , meaning that experienced police rated the likelihood of death being due to an accident as significantly more probable ( $M = 72.62$ ,  $SD = 3.54$ ) than inexperienced police ( $M = 61.36$ ,  $SD = 2.55$ ). Post hoc Univariate analyses showed no significant main effect of experience on likelihood ratings for suicide,  $F(1,36)=3.48$ ,  $p=.07$ ,  $\eta^2p=.09$ , homicide  $F(1,36)=.003$ ,  $p=.96$ ,  $\eta^2p<.001$ , or natural causes  $F(1,36)=1.31$ ,  $p=.26$ ,  $\eta^2p=.04$ . This result indicated that inexperienced and experienced police rated the likelihood of these manners of death in a comparable way to their counterparts. Figure 1 presents the ratings of likelihood for each manner of death (accident, suicide, homicide, natural causes) as judged by inexperienced and experienced police.

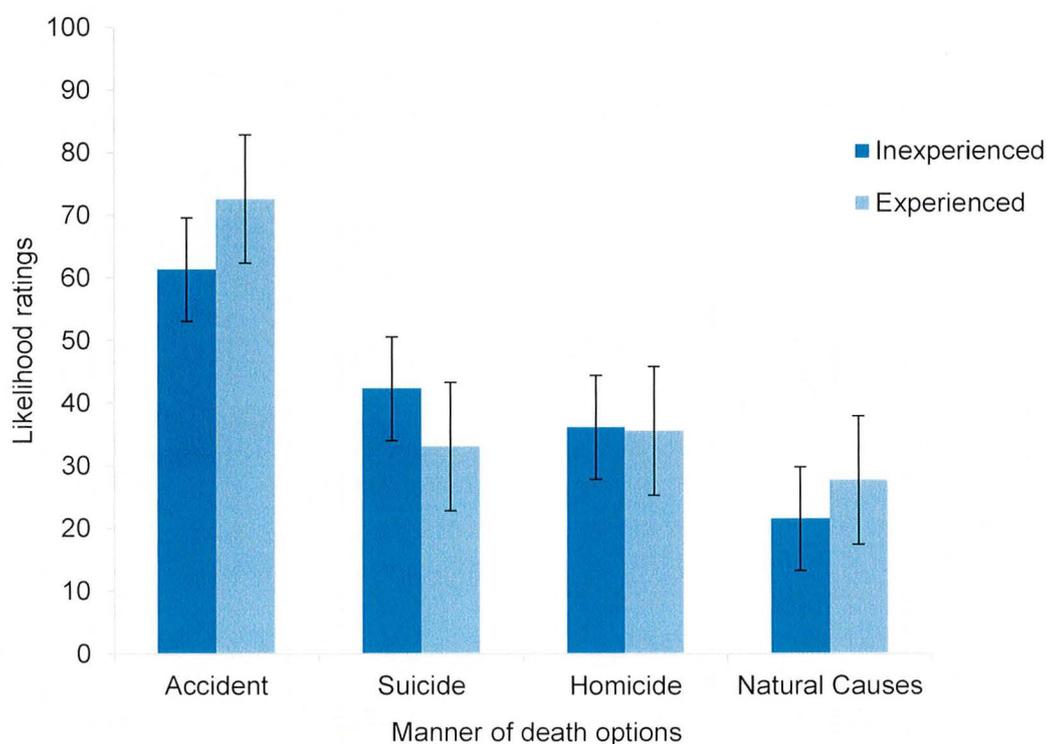
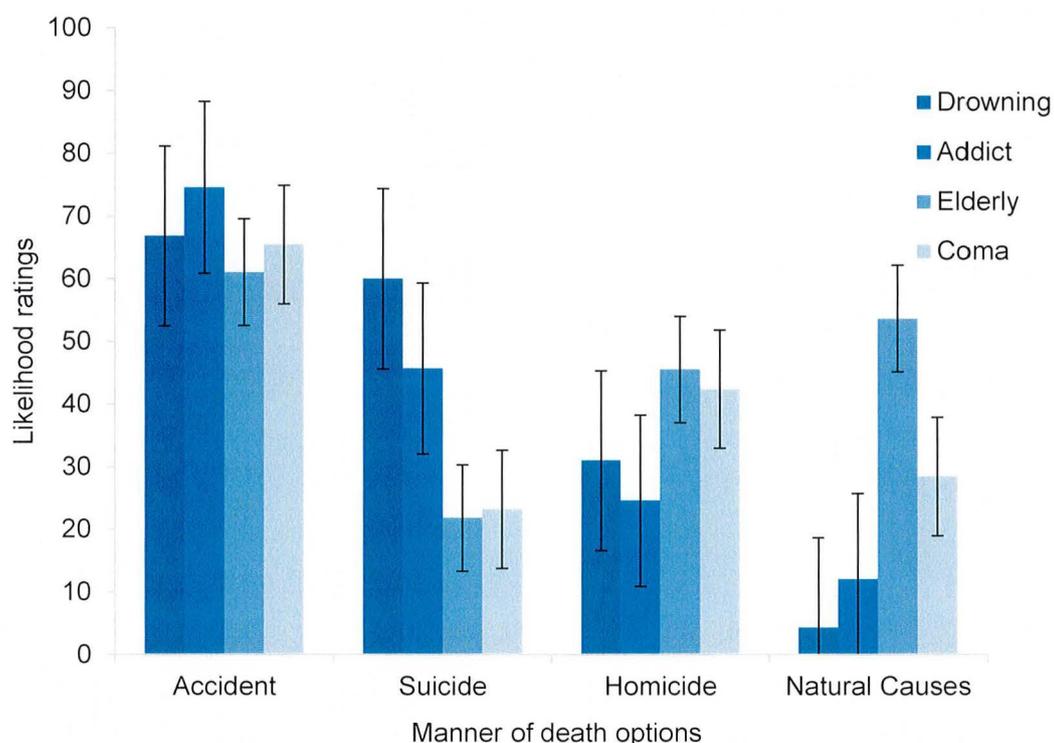


Figure 1. The significant main effect of experience for accident likelihood ratings, with experienced police rating accident as a more likely manner of death than inexperienced police.

MANOVA also showed a significant main effect of scenario, Pillai's  $V=.86$ ,  $F(12,25)=12.30$ ,  $p<.001$ ,  $\eta^2p=.86$  (as shown in Appendix C2). This main effect indicated that the ratings made regarding manner of death differed across the scenarios. Figure 2 presents the ratings for manner of death likelihood (accident, suicide, homicide, natural causes) according to each of the four equivocal death scenarios. The descriptive statistics for the scenario main effect are contained in Appendix C4.



*Figure 2.* The significant main effect of scenario on likelihood ratings for the manner of death options (accident, suicide, homicide, natural causes).

In order to discover where the significant differences occurred, post hoc Univariate analyses with Greenhouse-Geisser corrections were conducted. Significant differences were found across scenarios for ratings of each manner of

death: natural causes  $F(2.4, 87.1)=47.32, p<.001, \eta^2p=.57$ , suicide  $F(2.5,90.2)=25.02, p<.001, \eta^2p=.41$ , homicide  $F(2.6,92.4)=6.64, p=.001, \eta^2p=.16$ , and accident  $F(2.6,92.7)=2.99, p=.04, \eta^2p=.08$ . Post hoc pairwise comparisons were conducted to discover where the scenarios differed, with Least Significant Difference (LSD) corrections made for multiple comparisons. Significant pairwise comparison results are noted in Table 3.

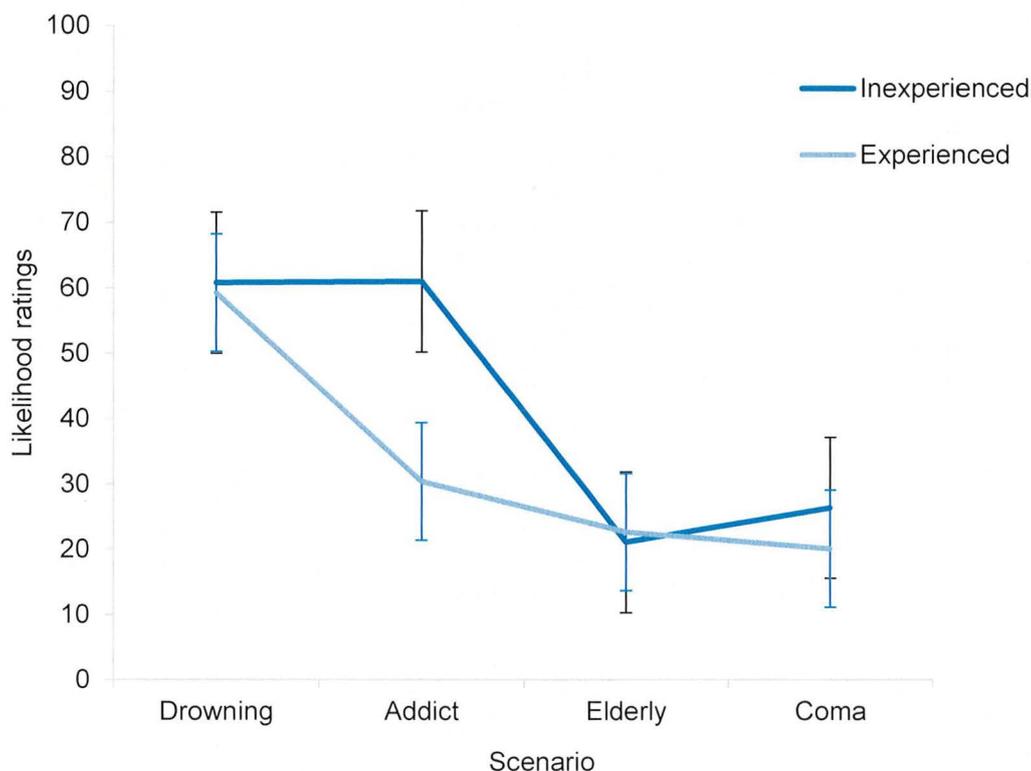
MANOVA results found no significant scenario by experience interaction, Pillai's  $V=.41, F(12,25)=1.42, p=.220, \eta^2p=.41$ . However, given this study's research question regarding the effect of experience on individual scenario first impressions regarding manner of death, a priori Univariate analyses of the scenario by experience interaction were conducted for each potential manner of death. These Univariate results can therefore be considered as tentative only due to the Multivariate scenario by experience interaction being found to be not significant. The scenario by experience interaction was not significant for ratings of accident,  $F(2.58,92.73)=1.11, p=.35, \eta^2p=.03$ , homicide  $F(2.57,92.4)=.67, p=.55, \eta^2p=.02$ , or natural causes  $F(2.42,87.15)=.66, p=.55, \eta^2p=.02$ . A significant scenario by experience interaction was found for ratings of suicide likelihood,  $F(2.51,90.2)=3.21, p=.04, \eta^2p=.08$ , as represented in Figure 3. The scenario by experience interaction for suicide ratings occurred due to significant differences in likelihood ratings on the addict scenario for experienced and inexperienced police, where inexperienced police rated the likelihood of suicide in this scenario as more likely ( $M=61, SD=24.83, 95\% CI [50.59-71.41]$ ) than experienced police ( $M=30.38, SD=27.26, 95\% CI [15.95-44.82]$ ).

Table 3

*Significant Pairwise Comparisons of the Scenarios (Drowning, Addict, Elderly, Coma) According to Manner of Death Likelihood Ratings*

Manner of Death	Scenario Comparison	Mean Difference (Std. Error)	<i>p</i>
Accident	Addict – Elderly	0.16 (0.05)	.005
	Addict – Coma	0.12 (0.05)	.022
Suicide	Drowning – Elderly	0.48 (0.06)	<.001
	Drowning – Coma	0.44 (0.06)	<.001
	Drowning – Addict	0.17 (0.06)	.008
	Addict – Elderly	0.31 (0.08)	<.001
	Addict – Coma	0.27 (0.07)	.001
Homicide	Elderly – Addict	0.27 (0.07)	.001
	Elderly – Drowning	0.18 (0.06)	.004
	Coma – Addict	0.21 (0.06)	.002
Natural Causes	Elderly – Drowning	0.66 (0.06)	<.001
	Elderly – Addict	0.55 (0.07)	<.001
	Elderly – Coma	0.32 (0.08)	<.001
	Coma – Drowning	0.35 (0.05)	<.001
	Coma – Addict	0.24 (0.05)	<.001
	Addict – Drowning	0.11 (0.05)	.025

*Note.* Standard error appears in parentheses. Least Significant Difference (LSD) corrections were made for multiple comparisons. In each case the scenario listed first had a greater likelihood rating.



*Figure 3.* Significant scenario by experience interaction for suicide likelihood ratings, due to a significant difference in suicide likelihood ratings by inexperienced and experienced police for the addict scenario.

#### *Use of Information Integration and Story Model Approaches to Decision Making*

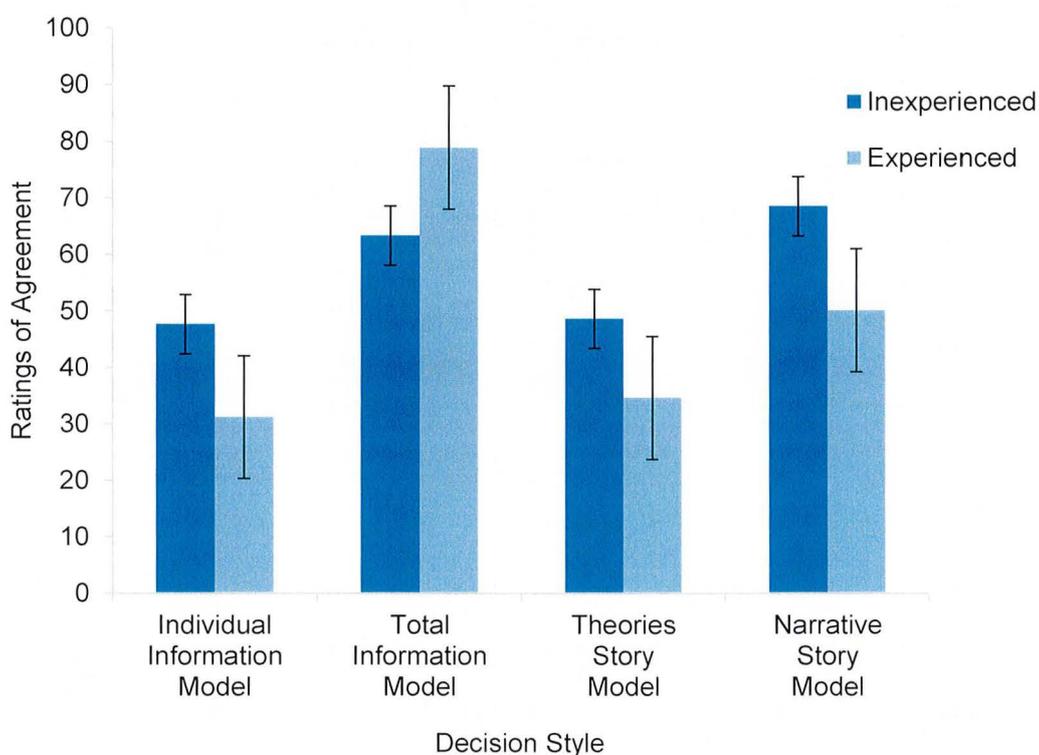
MANOVA was used to test the non-directional hypotheses regarding participants' use of either an information integration or story model approach to decision making (see Appendix D). The research question regarding a potential interaction between decision making style and the experience level of participants was also investigated. The independent variable was again experience level, denoting how much experience the police officers had in investigating equivocal deaths. The two levels of this between subjects factor were inexperienced (no

experience investigating equivocal deaths  $n=25$ ) and experienced (eight or more years of experience  $n= 13$ ). The four dependent variables in this study related to aspects of two recognised decision making approaches, information integration aspects (individual information model, total information model) and aspects of the story model of decision making (theories story model, narrative story model). For each of the dependent variables participants provided a rating of agreement, meaning the extent that this approach applied to them.

MANOVA indicated a significant main effect of experience on the multivariate test, Pillai's  $V=.30$ ,  $F(4,33)=3.47$ ,  $p=.02$ ,  $\eta^2p=.30$ . This main effect demonstrated that there were differences in the way that inexperienced and experienced police acknowledged their decision making style. Figure 4 illustrates the extent that inexperienced and experienced police have acknowledged using the four aspects of decision making that were of interest in the context of equivocal deaths.

In order to discover the nature of the difference in agreement ratings by inexperienced and experienced police, post hoc Univariate analyses were conducted. Univariate analyses showed no significant main effect of experience on individual information model,  $F(1,36)=3.35$ ,  $p=.08$ ,  $\eta^2p=.09$ , or theories story model  $F(1,36)=2.35$ ,  $p=.13$ ,  $\eta^2p=.06$ . These results indicate that inexperienced and experienced police do not differ significantly in their acknowledged use of either individual information model or theories story model aspects of decision making. Significant main effects were found for experience on participant's use of total information model,  $F(1,36)=6.31$ ,  $p=.02$ ,  $\eta^2p=.15$  and narrative story model,  $F(1,36)=4.78$ ,  $p=.04$ ,  $\eta^2p=.12$ . These main effects mean that experienced and inexperienced police differ in the extent that they use these decision approaches. The

mean ratings of total information model indicated that experienced police ( $M = 78.92$ ,  $SD = 18.72$ ) acknowledged using the total information model style of decision making more than inexperienced police ( $M = 63.38$ ,  $SD = 17.82$ ). Conversely, the mean ratings of narrative story model indicated that inexperienced police ( $M = 88.52$ ,  $SD = 17.10$ ) use this approach to a greater extent than experienced police ( $M = 50.15$ ,  $SD = 35$ ).



*Figure 4.* Significant main effect of experience on agreement ratings for the four decision style dependent variables (individual information model, total information model, theories story model, narrative story model).

*Note.* Individual information model and total information model relate to the information integration models of decision making. Individual information model being the extent that participants evaluate each piece of evidence individually, disregarding information without

apparent merit. Total information model regards the extent that the total sum of evidence previously deemed to have merit is reconsidered each time new information of merit is received.

Theories story model and narrative story model relate to the story model of decision making. Theories story model being the extent that participants identify different theories for how the incident may have played out, with pieces of evidence that do not add to these theories being disregarded. Narrative story model regards the extent that participants look for or think of a likely narrative that would explain the evidence.

### *Initial Theories Regarding Manner of Death*

MANOVA was used to test the extent to which police acknowledged forming an initial theory about what happened to the victim in each scenario. In addition, this analysis investigated whether the participants reported their tendency to do so in response to the scenarios reflected their approach to cases in their professional life. The independent variable was again the between subjects factor of experience level, denoting how much experience the participants had in investigating equivocal deaths. The two levels were inexperienced (no experience investigating equivocal deaths  $n=23$ ) and experienced (eight or more years of experience  $n= 13$ ). The two dependent variables in this analysis related to the extent to which participants formed an initial theory about what may have happened to a victim. The first dependent variable was a rating of agreement that an initial theory is formed in the participant's professional life (professional experiences) and the second dependent variable was a rating of agreement that an initial theory was formed when responding to the questionnaire scenarios in this study (questionnaire-specific responses).

Results of the MANOVA showed that the main effect of experience was not significant on this multivariate test, Pillai's  $V=.02$ ,  $F(2,33)=.26$ ,  $p=.78$ ,  $\eta^2p=.02$ .

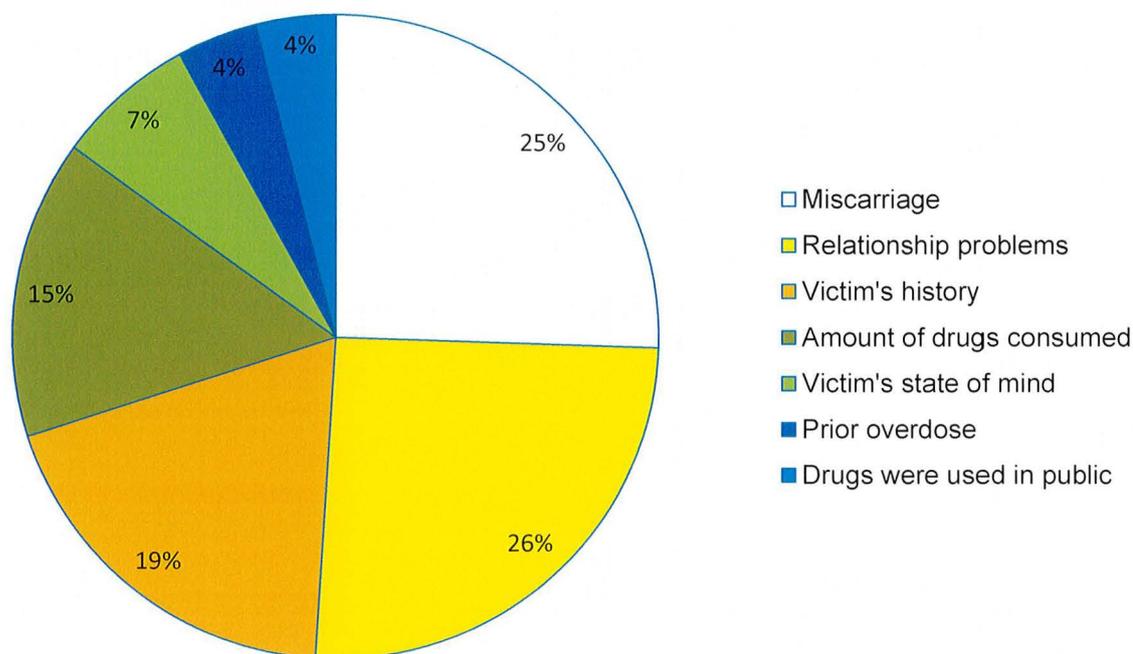
meaning that inexperienced and experienced police responded in a similar fashion to the dependent variables. The descriptive statistics of this analysis indicated that there was not a meaningful difference between the two dependent variables, professional experiences ( $M=59.6$ , 95% CI [52.87 – 66.33]) and questionnaire-specific responses ( $M=61.99$ , 95% CI [53.82 – 70.16]). Therefore participants reported that they form an initial theory about what happened to a victim in their professional life and in response to the questionnaire's scenarios to a comparable extent. Mean ratings of 59.6 and 61.99 indicate that to a moderate extent, police generally form an initial theory of what happened to a victim.

### **Qualitative Results:**

#### *Police Comments Regarding a Suicide Manner of Death for Addict Scenario*

Based on the finding that inexperienced and experienced police differed in their initial conclusions of suicide in response to the addict scenario, the qualitative responses to this part of the questionnaire were assessed. It was found that 10 of the 13 experienced police did not identify any features in response to this scenario that impacted upon a hunch of suicide. The features that were identified by the three experienced police as relevant to a hunch of suicide were the victim's previous overdose (cited twice), the victim's miscarriage (cited once) and the victim's mental state (cited once).

Fourteen out of the 25 inexperienced police identified features that were relevant to a hunch of suicide in response to this scenario. The features that inexperienced police identified that were relevant to a hunch of suicide are represented below in Figure 5. Percentages indicate the frequency with which each feature was acknowledged. Some participants acknowledged more than one feature.



*Figure 5.* The features relevant to a suicide manner of death on the addict scenario are represented, as acknowledged by 14 inexperienced police, some of which acknowledged more than one feature. The percentages represent the extent that a feature was noted within this group of participants.

#### *Evidence of Bias within Police Responses*

Open-ended participant responses were reviewed for evidence of bias. The experimenter screened for evidence of anchoring and adjustment, cognitive dissonance, belief perseverance, the availability heuristic, simulation heuristic, errors in evaluation of evidence, prototypes and the false consensus effect. Table 4 notes how frequently the acknowledged biases were observed, both overall and for inexperienced and experienced police.

Table 4

*Frequency of Biases Detected in Inexperienced and Experienced Police Responses to Open-ended Questions*

Bias Type	Inexperienced Police	Experienced Police	Total
Anchoring and Adjustment	4	3	7
Cognitive Dissonance	10	4	14
Belief Perseverance	10	4	14
The Availability Heuristic	0	0	0
The Simulation Heuristic	0	2	2
Errors in Evidence Evaluation	1	4	5
Prototypes	0	1	1
The False Consensus Effect	1	1	2
Total	26	19	45

*Note.* Inexperienced Police  $n= 25$  Experienced Police  $n= 13$

Some research participants exhibited more than one bias in their responses, while 19 participants either provided no evidence of bias or did not respond to the open-ended questions. Results indicated that both inexperienced and experienced police participants showed evidence of anchoring and adjustment, cognitive dissonance, belief perseverance, errors in evaluation of evidence and the false consensus effect in their response to the equivocal death scenarios. In addition, inexperienced police misread the evidence presented in scenarios on two occasions,

for example one inexperienced participant concluded that it was unlikely that the elderly female victim had committed suicide due to her husband's death because he had been dead for 40 years. The scenario had stated the woman's husband of 40 years had died six months prior.

## Discussion

Using hypothetical equivocal death scenarios the current study investigated the initial conclusions formed by experienced and inexperienced police concerning manner of death and explored the decision making employed by police in this process. It was of interest to determine whether experienced and inexperienced police approached this task differently, or formed different initial conclusions regarding manner of death. A further purpose of this study was to assess police responses to open ended questions regarding hypothetical equivocal death scenarios in order to appropriately expand upon the quantitative findings and better inform future research. It was hoped that the study would indicate whether decision making biases impact upon police during the complex task of equivocal death investigation.

Using multivariate analyses of variance, Univariate tests and pairwise comparisons, the current study's results found that different equivocal scenarios produced different initial conclusions regarding manner of death and that in some circumstances experienced police formed different conclusions regarding manner of death than inexperienced police academy attendees. Additionally, the current study found evidence for both the story model of decision making (Pennington & Hastie, 1986) and an information integration approach to decision making (Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom et al., 1978) for police assessing the likely

manner of death during initial stages of an equivocal death investigation. By reviewing police responses to open ended questions throughout the questionnaire the study also found evidence of recognised decision making biases in the responses of both experienced and inexperienced police.

### *Initial Conclusions Regarding Manner of Death*

The research question of whether experienced police investigators form different initial conclusions regarding accident, suicide, homicide and natural causes where the death is equivocal, compared with a sample of inexperienced police academy attendees was addressed by the current results. Multivariate analysis and follow up Univariate tests revealed that different conclusions were formed by the two participant groups. Experienced police believed that accident was a significantly more likely cause of death in the equivocal cases than did inexperienced police. Due to a lack of research regarding the initial conclusions of police in equivocal death investigations, it is unknown why experienced police judged accident to be a more likely manner of death and future research may investigate this finding further.

Univariate results indicated that experienced and inexperienced police did not differ in their overall ratings of the likelihood of suicide, homicide or natural causes for the equivocal death scenarios. This result means that for the set of equivocal death scenarios presented in this study as a whole, similar judgements were provoked from inexperienced and experienced police regarding the likelihood of suicide, homicide and natural causes. However, further interpretation of this result would be inappropriate as a MANOVA found that the individual scenarios elicited different conclusions regarding manner of death, meaning that the conclusions were to some extent scenario specific. Univariate tests found that this disparity across individual

scenarios occurred for every manner of death option – accident, suicide, homicide and natural causes.

It is of interest to note that despite each scenario being equivocal in nature and providing information that could suggest every possible manner of death, police were swayed in their initial conclusions regarding manner of death. The individual scenarios had many individual features that may account for these differences, including victim's sex, age, background, current circumstance, stressors and environment, as well the way that the victim died. As police rated the likelihood of each manner of death differently across the scenarios, this finding emphasises the role of evidence interpretation for police investigations. This finding provides support to Brandl's (1991) conclusions regarding police decision making in response to burglary, where certain case features were found to impact upon police decision making and police responses. As each manner of death was rated differently across the scenarios, the current study also demonstrates that hunches are formed as a result of certain aspects of a death or victim. These conclusions emphasise the complexity of decision making for police in the initial stages of an equivocal death investigation. The identification of individual aspects of a death or victim that influence police perceptions of accident, suicide, homicide and natural causes was beyond the scope of this thesis. However, the current study's results provide an avenue for future research to determine the individual features of an equivocal death that influence police judgements in this context.

The non-significant interaction between a police officer's experience level and the type of equivocal death scenario means that there was a similar pattern of hunches across the scenarios for inexperienced and experienced police. Due to a pre-planned interest in the potential differences between inexperienced and experienced

police conclusions on individual scenarios this was tentatively investigated despite the MANOVA interaction being not significant. A distinction was found between inexperienced and experienced police in their perceptions of suicide likelihood on the addict scenario – a scenario in which a drug addicted woman died following drug use. It was found that experienced police did not interpret this scenario's features as suggestive of suicide while inexperienced police did. As experienced and inexperienced police did not differ significantly on their perception of suicide for other scenarios, it may be that experienced police held pre-conceived notions regarding the victim or some other feature which led them to discount suicide to a greater extent than was the case for inexperienced police. As police are exposed to drug addicted individuals through the course of their job it may be that experienced police (correctly or incorrectly) made judgements based upon prior experiences with drug addicts, or beliefs about drug use and drug addiction.

Conversely, inexperienced police may be less influenced by the victim being a drug addict in this scenario and as a result recognise the information that could concur with suicide as more credible – such as her acknowledged grief and guilt following a miscarriage and her distress concerning a relationship breakdown. It is unclear why experienced police believed suicide was a less likely manner of death in this case than inexperienced police, however the finding provides further impetus for future research investigating how individual features of an equivocal death are interpreted by police. Further, it highlights the need for the responses of both experienced and inexperienced police to be measured independently in any future research.

*Features of Relevance to Inexperienced Police Perceptions of Suicide for Addict Scenario*

As it was found that experienced police judged suicide as less likely than inexperienced police for the addict scenario, open ended responses to this scenario were explored using a descriptive qualitative approach. As the experienced police as a group did not indicate that they thought suicide was a particularly likely manner of death for this scenario (with ratings of approximately 30% likelihood being attributed) it was not surprising that 10 of the 13 experienced police did not identify any features in this scenario that impacted upon a perception of suicide.

Fourteen inexperienced police noted a number of features that led these participants to believe suicide would be a stronger possibility (with a mean rating of suicide likelihood of 61% for these participants). The key features identified by this group of trainee police were (in order of frequency) the victim's relationship problems, her miscarriage, the victim's history and the amount of drugs she consumed immediately prior to her death. The features noted were relevant to the victim's state of mind at the time of her death. Although this author can do no more than speculate on the reasons for a distinction between experienced and inexperienced police regarding suicide likelihood, the findings suggest that police investigators' understanding and interpretation of suicidal ideation and behaviour may be influential in judgements concerning manner of death during an equivocal death investigation. The finding that police investigators are influenced by their understanding and interpretation of suicide indicators builds upon previous literature which identified that coroners are vulnerable to the influence of certain case features when deeming whether a suicide may have occurred (Robertson & Crawley, 2009).

A psychological autopsy is the reconstruction of events and likely mental state of a victim prior to their death, which has been acknowledged as a complex and difficult task for the trained psychologists and psychiatrists who conduct them (Blinder, 1982; Shneidman, 1981; Scott, 2006). It has also been acknowledged that this expert opinion may be erroneous (Young, 1992; Scott, 2006). Therefore, the task that police have in surmising the likelihood of a suicide when first attending an equivocal death is particularly challenging. As such, the evaluation of suicide likelihood in an equivocal death police investigation presents a particularly complex task for police and one that deserves further attention in the literature.

During the course of police training, academy attendees are educated about the acknowledged indicators of suicide. It is unclear whether this training had been conducted prior to the police academy attendees completing their participation in the current study. If so, this recently gained knowledge may have assisted the inexperienced police to recognise the potential that this victim died from an act of suicide. As these scenarios were hypothetical no conclusion can be drawn regarding whether inexperienced or experienced police best evaluated the likelihood that this death was a suicide, however it presents an interesting example of the type of scenario that elicits varying opinions for the two groups of police participants. This is particularly so given that the inexperienced and experienced police did not differ in their hunches of suicide on the three other scenarios within this research. Should future research investigate the role of experience in judgements and decision making when police attend an equivocal death, it would be of benefit to employ authentic victim summaries that had a manner of death subsequently determined by a coroner. As more extensive experience within a field has not been shown to necessarily result in superior performance (Shanteau & Stewart, 1992; Bonner & Pennington, 1991),

this type of research has potential to build upon the current findings to also assess whether experienced police have more *accurate* hunches. Therefore, building on the findings of this research, future research hypotheses may elucidate individual features of an equivocal death which affect police judgements as well as the accuracy of initial police perceptions regarding manner of death. Such investigations may inform future police investigator training in two ways. Firstly, by attempting to teach the superior skills already learned by experienced investigators if this is found to be the case and secondly to train investigators to avoid any common pitfalls. As judges have been able to successfully mediate the impact of bias upon their own decision making as a result of education and training (Wolfram, 1986; Guthrie et al., 2001), this goal appears achievable. As one of the primary aims of this study was to provide avenues of further research due to the lack of literature in the area, this study's findings and the potential to build upon them in future research is particularly positive.

#### *Police Decision Making Style for Equivocal Deaths*

The third research question of this study addressed the decision making style of participants to assess support for either an information integration process or the story model of decision making using MANOVA. As previously noted in Table 2, individual information model and total information model relate to aspects of an information integration approach, while theories story model and narrative story model relate to aspects of a story model approach. This non-directional research question was addressed by the current results which indicated that each of the queried decision making approaches was used by participants to some extent, ranging between 31% agreement for individual information model by experienced

police to 68% agreement with use of narrative story model by inexperienced police. This finding indicates that police acknowledge using each of the approaches, which provides support for both the story model and information integration theories of decision making in this context. However, the findings of this study also therefore establish that police do not use either decision making approach in isolation when responding to an equivocal death. Individual police responses were observed to contain varying degrees of agreement with each option. The information integration approach to decision making is a more systematic and rule based approach to evidence evaluation (Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom et al., 1978) while the story model relies on the decision maker's imagined construction of a possible scenario based on certain pieces of evidence (Pennington & Hastie, 1986). The current study therefore extends the literature regarding support for a dual processing or holistic approach to decision making, which has previously been advocated by authors in alternative decision making contexts (Wally & Baum, 1994; Evans, 2008; Stuppel & Waterhouse, 2009; Heit & Rotello, 2010). These are important findings as research has not previously been dedicated to the decision making style of police in this area, nor has research evaluated the relevance of both decision making theories within a single research sample concurrently.

However, the interpretation of the participant's decision style cannot be considered in isolation as the current study's results also investigated whether there was an interaction between experience level and acknowledged decision making style. It was found that there were differences in the way that inexperienced and experienced police approached decision making regarding an equivocal death. Although the story model and information integration approaches have been conceptualised as single theories, the author of this study identified two features of

each approach for investigation (refer to Table 2). These features relate to how information is disregarded (individual information model, theories story model) and secondly the manner in which information is consolidated by the decision maker (total information model, narrative story model). For the individual information model, information is disregarded if it does not appear independently of merit (Kaplan, 1975) while for the theories story model information is disregarded if it does not add to a theory of what may have occurred (Pennington & Hastie, 1986). This study's results indicated that the two participant groups acknowledged using an individual information model to a similar extent (with a mean agreement rating of 42%), which was also the case for theories story model (with a mean agreement rating of 44%). Therefore, to a moderate extent, both inexperienced and experienced police would disregard information should it appear to have inadequate merit. It also indicates that to a moderate extent, both inexperienced and experienced police would disregard information if it did not assist with a likely scenario of what occurred. These findings demonstrate a similarity between experienced and inexperienced police in this study regarding the way that information is reportedly disregarded.

However, differences were found in the way that experienced and inexperienced police consolidated information. For the total information model, information is consolidated and reviewed each time a new piece of information of merit is received (Kaplan, 1975) while for the narrative story model information is consolidated if it corroborates a likely series of events (Pennington & Hastie, 1986). Inexperienced police acknowledged using a narrative story model approach that is consistent with Pennington and Hastie's (1986) story model of decision making significantly more (with 69% agreement) than experienced police (mean agreement rating of 50%). Therefore inexperienced police were found to be more inclined than

experienced police to consolidate information based upon a narrative-based hunch regarding manner of death. This finding indicates that while experienced police may possess cognitive scripts (Abelson, 1976; Schank & Abelson, 1977) for the way a typical accident, homicide, suicide or natural causes death occurs, experienced police acknowledge being only moderately influenced by such scripts or narratives. Indeed, the use of a likely narrative was found to be more influential for inexperienced police recruits, whose job-related cognitive scripts have had less time to develop.

Conversely, it was found that experienced police recognised using an total information model approach, consistent with an information integration approach to decision making, significantly more (79%) than inexperienced police (63%). These findings further emphasise that although both inexperienced and experienced police acknowledge at least moderate use of information integration and story model aspects, the decision making approach of experienced police is more substantially geared toward the systematic analysis of credible evidence. These results do however indicate that inexperienced police acknowledge their use of information integration and story model approaches to decision making somewhat evenly. Despite the inexperienced group of police being slightly more influenced by a story model approach, it should be recognised that they were also able to focus on the evidence to hand.

The reason that inexperienced police acknowledge more of a story model approach than experienced police in consolidating evidence is unknown. It may be that police investigator training and on the job experience actively encourages police to limit the influence of intuition during an investigation and instead encourages investigators to focus to a greater extent on the known facts of a case. Indeed, prior research indicates that experienced individuals possess better defined and procedure-

specific cognitive scripts regarding the appropriate completion of occupational tasks in comparison to less experienced individuals (Cernogorsky, 1991). Conversely, it may be that over time experienced investigators have found that moderating their use of intuition during an investigation is the most successful approach.

Given that the current study found that experienced investigators used both story model and information integration approaches to evidence within an equivocal death investigation, but a story model approach to a lesser extent, the results of this study indicate a cautious approach to “likely scenarios” that is taken by experienced investigators within this sample. This middle ground approach to this decision making appears a sensible approach, whereby experienced investigators are able to explore their intuitive reactions to a case, while not abandoning other explanations within an investigation.

Prior research has not found whether an intuitive approach to decision making is generally more or less successful than rational approaches and it is unclear whether investigators would be advantaged by using intuition in their decision making approach. However, given the finding that rational approaches to complex decision making, particularly in judgements concerning human behaviour, are often inaccurate (Nutt, 1999), further research is warranted in order to discover in what way knowledge-based intuition may be effectively employed in order to increase judgement success for police attending an equivocal death.

The results regarding the decision style of police within this experiment is important for a number of reasons. Firstly, this study provides evidence that both the information integration and the story model are relevant to police decision making during the initial stages of an equivocal death. Secondly, the study indicates that individuals use both decision making styles, rather than one or the other, indicating a

dual-process approach. Thirdly, this study shows that each theory can be split into two components (the way in which an individual disregards information and the manner in which they consolidate information that they believe is important). Fourthly, this study has shown that inexperienced and experienced police differ in their decision making approach. The nature of this distinction being that inexperienced police consolidate the information they believe to be important using a story model approach to a greater extent than experienced police, while experienced police investigators place greater emphasis on systematically reviewing the sum of credible evidence when gaining new information which demonstrates an information integration approach. These findings provide beneficial feedback to Tasmania Police regarding the manner in which experienced and inexperienced police evaluate and consolidate evidence.

The current findings establish for the first time within a single study that there is merit in both the story model and information integration approaches to decision making and that these theories can be considered as complementary rather than contradictory. This conclusion was not possible within prior research of each theory in isolation (Pennington & Hastie, 1986; Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom et al., 1978).

#### *Participants' Tendency to Form an Initial Theory, in Questionnaires and Real Life*

MANOVA results addressed the fourth research question regarding the extent to which police would initially form a theory regarding the manner of death in an equivocal death, both in their professional life and in the questionnaire scenarios. The results indicated that overall police form an initial theory about what has happened to a victim to a moderate extent. As the main effect of experience level

was not significant, the current study finds that a theory regarding manner of death in an equivocal case is formed to a similar extent by both inexperienced police recruits and experienced police investigators. This finding is of interest as it could be wrongly assumed that police recruits would be more influenced by personal reactions to evidence than experienced police, who have spent many years being trained to withhold judgement and keep an open mind.

As the participants form an initial theory of what had happened to a victim to a moderate extent, these findings further support the conclusion that police form initial hunches regarding manner of death in an equivocal death investigation. The findings also indicate that police do not rely predominantly on their gut reaction to an equivocal death. Therefore it is concluded that both inexperienced and experienced police form initial conclusions within the investigation of an equivocal death, but that these hunches are unlikely to be the sole driving force of a subsequent investigation. This information is useful for Tasmania Police to review police reactions to evidence and the extent that initial conclusions are formed and progressed.

These results lend support to the findings of Tussey (2007) who found that American police academy attendees acknowledged a role of intuition in their judgements but that this was not the predominant driving factor for their decision making. The current study extends on Tussey's conclusions by finding that this is also the case for police investigators with extensive experience within their field.

This MANOVA also indicated that participants' responses to the questionnaire were comparable to the way they would respond in real life situations. This finding supported the existing evidence that questionnaire and scenario based studies provide an acceptable methodology for investigating judgement and decision

making (Fontaine, 2007). This result indicated that the questionnaire's findings would be accurately representative of the participants' real life approach.

### *Decision Making Biases Within Police Responses*

The personal interpretation of evidence that occurs within an investigation was of interest in this study, particularly whether police identified biases in their responses. A qualitative review of open-ended responses found that both inexperienced and experienced police showed evidence of a number of common biases. These were anchoring and adjustment bias (Tversky & Kahneman, 1974; Chapman & Bornstein, 1996), cognitive dissonance (Festinger, 1957), belief perseverance (Davies, 1997), errors in evaluation of evidence (Heller, 2006) and the false consensus effect (Wojcieszak & Price, 2009; Glynn et al., 2004).

The anchoring and adjustment bias meant that at times police eliminated features of a scenario that would be suggestive of an alternative manner of death while acknowledging those features that were salient with their theory regarding manner of death. This finding indicates that some police anchored onto their original beliefs, which could negatively restrict the focus of an equivocal death investigation going forward. This finding relates to existing literature which found evidence of anchoring and adjustment biases in jury populations (Chapman & Bornstein 1996) and for court judges (Tversky & Kahneman, 1974).

Cognitive dissonance bias was identified where police stated follow up actions that corresponded solely to their hypothesised manner of death, while potential follow up for non-preferred manners of death were ignored. This meant that police made decisions which supported and justified the decisions that they had made previously. The bias of belief perseverance further related to instances where

police were reluctant to explore an alternative manner of death from their initial hypothesis. The danger of these biases is that alternative hypotheses are not explored and the investigation may be negatively impacted as a result.

Errors in evaluating evidence were identified where conclusions were stated that were based on an incorrect interpretation of the evidence. For example, one participant indicated that “suicide due to loneliness and grief is unlikely in an elderly lady.” This conclusion indicates an error in evaluating the evidence to hand as statistics have indicated that elderly women do comprise a proportion of suicide deaths according to the most recent statistics of 2008 (Australian Bureau of Statistics, published 2010; for an overview of suicide demographics in Australia see [www.responseability.org](http://www.responseability.org)). For police populations this bias means that an investigation may be hampered as potential manners of death may be incorrectly ruled out based on personal opinions or interpretations of the evidence. Errors in evidence evaluation were also found by Heller (2006) who documented this bias in juries. The current study indicates that errors in evaluation of evidence do not only occur for laypeople such as jurors, but also professional police populations.

The false consensus effect bias meant that in some cases police also overestimated the extent that a victim would feel the way that they personally do, for example one experienced police investigator stated that suicide was unlikely because a victim was about to receive money. Further, an inexperienced police participant stated that homicide was unlikely in the same scenario because “\$40 million isn’t enough reason to kill someone” in response to this equivocal death. These examples are pertinent as financial success does not ensure a person’s happiness, just as one’s own values regarding what it “makes sense” to kill someone for can be irrelevant. As the false consensus bias may encourage police to think of a victim or assailant as

having the same temperament, logic, emotion and motivations as themselves, this bias could be particularly detrimental to the investigation of an equivocal death. While a number of studies have documented the false consensus effect (Gunther & Christen, 2002), the current study is the first to find evidence of this in police populations.

The finding that biases exist within both experienced and inexperienced police responses to these equivocal death scenarios provides evidence that police have personal reactions within an investigation that may affect both the manner in which existing evidence is perceived and the way that an investigation may progress. As the literature has not previously investigated whether biases occur in police reactions during an equivocal death investigation, this result is important and provides further justification for understanding the nature and impact of these biases. The findings of this study also extend the existing literature which notes that biases occur in other types of organisational decision making, including medical professionals, engineers, military leaders, psychologists and judges (for a review see Guthrie et al., 2001). The current study further supports the pervasiveness of biases in decision making (Thompson, 2003; Betts, 2009).

Interestingly, inexperienced police misread the evidence that was presented in the scenarios on two occasions. The first of these errors related to the amount of time that one of the victims had been a widow (the participant commenting that the woman's husband had been "deceased for decades" and therefore she would not be lonely, while the scenario had stated that the victim's husband of 40 years had been deceased six months). The second of these errors made by an inexperienced police academy attendee was that a diabetic victim's death was likely to be an accident as the man had "recent accidents when injecting himself" with his insulin, when the

scenario had actually stated that the 59 year old had previously misjudged the amount of insulin he required during his adolescence and early adulthood. Experienced police did not display any errors in their reading of the scenarios. This finding suggests that experienced police exhibited greater attention when reading information that is relevant to a case while inexperienced police were more likely to make mistakes when reviewing the information presented to them. The finding that inexperienced police made these errors indicates that attention and care needs to be taken when presented with evidence that has already been gathered by colleagues in order to avoid any subsequent errors.

Conversely two types of bias were found solely within experienced police responses to the scenarios. Firstly, experienced police were found to demonstrate the simulation heuristic on two occasions. This bias is a cognitive shortcut where probabilities are estimated based on the ease with which an alternative series of events can be imagined (Kahneman & Tversky, 1982). For example, one experienced police investigator stated that accident was a very likely manner of death for a scenario because they could not imagine a homicide or suicide having occurred in this instance. Some experienced police therefore disclosed a reasoning style similar to a process of elimination, something that was not found in the responses of inexperienced police. The impact of a simulation heuristic upon police equivocal death investigations would be that potential manners of death may be unduly eliminated from further investigation. The current study contributes further evidence of the simulation heuristic and shows that this bias is not only used by laypeople such as jurors (Heller, 2006) but also by experienced police investigators.

A second bias found only in the responses of experienced police in this study was evidence of a preconceived prototype. A prototype in this study related to how a

victim of that demographic “should” act or how a particular manner of death typically would occur, which guided police hypotheses regarding manner of death in the scenarios. For example, an experienced police investigator stated that the elderly victim would have most likely fallen due to her age. Prototypes may impact upon police equivocal death investigations by affecting the judgements of investigating police. In some instances prototypes may assist an investigator, but in other instances a prototype may be misleading. The finding that experienced police may use prototypes adds to existing research on juror populations documenting this bias (Smith, 1991). Inexperienced police did not provide conclusive evidence of a preconceived prototype.

Caution must be exercised when noting ratios of each bias as 19 participants either provided no evidence of bias or did not respond to the open-ended questions, while some research participants exhibited more than one bias in their responses. In addition, the sample sizes of this study were unequal, with almost half as many experienced police as inexperienced police recruits which further limits the potential to compare the extent of bias in each sample.

While the ratios and extent of each bias can be questioned and is a limitation of the findings of this study, it must be acknowledged that evidence of common bias was found in both inexperienced and experienced police responses. This is important as it provides avenues of further research and understanding how this may – both positively and negatively – impact upon a police investigation.

The finding that experienced police displayed evidence of prototypes and also the simulation heuristic in this experiment while inexperienced police did not, suggests that experience does not prevent the use of decision making biases. Indeed,

it is possible that experience may result in greater use of heuristics and those decision-making biases which are based on previous experiences.

Research has previously shown that the use of heuristics and bias in the workplace are common (Thompson, 2003; Betts, 2009) and may be of benefit (Salas, Rosen & Diaz-Granados, 2010; Betts, 2009). However, given the findings that judgement is not superior in more experienced professionals in comparison to their inexperienced counterparts (Shanteau & Stewart, 1992) this area is of great interest. In the case of police investigations into equivocal deaths, biases may assist a police investigator to more quickly and efficiently form initial conclusions regarding likely manner of death, but there is also potential for an investigator to rule out the correct version of events where its presentation is not typical.

Of particular note for this study is that although experienced police responses indicated decision-making biases, they also frequently acknowledged within their answers that no possibility could be ruled out at this stage of the investigation. This willingness by experienced police investigators to divulge initial conclusions while being mindful that seemingly unlikely manners of death may be responsible is surely the best combination of experience-based intuition and evidence-based investigation.

#### *Additional Comments*

##### *Participant understanding of suicide risk factors:*

Some participant comments (of both experienced and inexperienced police) indicated a clear understanding of suicide risk factors, however it was of interest to find that a number of participants across both levels of experience demonstrated a lack of knowledge in this area. For example, participants were found to conclude that there was “no evidence” of suicide because a suicide note was not found. While

it may be the case that no suicide note was found, each scenario was compiled to provide indicators of suicide risk. The finding that some participants discounted suicide likelihood because no suicide note was found corresponds to previous literature indicating this criteria is used by some coroners (Robertson & Crawley, 2009).

Examples of an underdeveloped understanding of suicide risk factors within the current study was found whereby participants actively discounted the scenario indicators of suicide by crossing them out when given the opportunity to do so, stating that they held no bearing on their impression of manner of death. Participant's understanding of a typical suicide victim was also evidenced in the comments provided. Unfortunately, participants in some cases stated that they had dismissed suicide as a possibility due to the age of the victim (for both the youth and elderly victims). These assumptions are not supported by Australian suicide statistics (Australian Bureau of Statistics 2008, published 2010).

*Participant interpretation of "common" features:*

Some participants discounted homicide or suicide as possible manners of death due to certain aspects of a scenario being perceived as "common." For example participants indicated that homicide was unlikely for the adolescent boy's death as the type of bullying described and the victim bringing a knife to school for protection was schoolyard behaviour that was common. The elderly victim's death was also discounted as suicide by one respondent who said being old and lonely is not uncommon. It must be noted that "common" things can still result in uncommon outcomes, such as homicide or suicide and therefore should not be regarded as proof that such a manner of death did not occur. On a positive note, many participants

stated that they would keep an open mind to all possibilities at this stage of an investigation and indicated follow up actions in each case that related to both their hypothesis regarding manner of death but also alternate manners of death.

#### *Recommendations to Tasmania Police:*

Some participants' lack of understanding of suicide risk factors in this study has drawn attention to the need for further education and training amongst both experienced and inexperienced police regarding suicide risk indicators. Greater knowledge in this area would assist investigators to accurately assess whether a suicide may have occurred when attending an equivocal death and gathering statements.

In addition, the finding of common decision making biases in both experienced and inexperienced police responses indicates that police may benefit from training in this area. Training which educates police about common biases and encourages police to be aware that biases may affect the way a situation, victim or evidence is perceived may alert them to the potential advantages and pitfalls of bias in their practice. This step may assist police to be informed and aware of biases as they occur and to be better equipped to recognise alternative ways to progress an investigation where appropriate. As judges have been reportedly able to successfully negate the impacts of bias in their practice (Wolfram, 1986; Guthrie et al., 2001), this appears worthwhile.

#### *Limitations of Current Study*

A number of limitations must be considered in order to provide context for interpreting the results. Firstly, the sample size for this study was limited and

therefore detracts from attempts to generalise the findings to other police recruits or police investigators. While attempts were made to gather police participants from throughout Tasmania, future research would benefit from recruiting police in greater numbers and from a wider geographical distance. Secondly, as it has been shown that participants responded differently to the individual equivocal death scenarios this must also be considered. Future research should explore how the particular features of a victim or cause of death influence police hunches regarding manner of death.

A limitation of the methodology is that police academy students participated as the inexperienced police population within this study. It is acknowledged that inexperienced police officers who had completed their formal training would have been a preferable sample. By gaining the responses of inexperienced field police officers the study results would better represent the variable of working experience, as both groups of police would have been in the field. In addition, the evaluation and interpretation of evidence by police academy trainees may change over the course of their training and education at the police academy. Indeed, as only qualified police would attend an equivocal death scene it would have been preferable to use only qualified police within the study. Unfortunately due to participation being voluntary this study was unable to gain sufficient participant numbers of recent graduate police officers. Future research would benefit from gaining the participation of this sample. A further methodological limitation is that age and gender were not controlled for within the study, which would be recommended in a larger sample. Finally, the current study took an exploratory approach and did not attempt to attribute cause and effect which is a limitation of this study.

*Future Direction of Research*

The current study contributed to the investigation of equivocal death determinations by extending the literature base beyond the coronial process and using a sample of professional police, rather than laypeople. Due to the current study's exploratory nature, it has highlighted a number of areas for future research.

Given that this study found support for both story model (Pennington & Hastie, 1984, 1986) and information integration approaches (Kaplan, 1975; Kaplan & Kemmerick, 1974; Ostrom et al., 1978) to decision making in police responses to an equivocal death, it would be of interest to better understand the role that each of these approaches has and how they work in combination. While many dual-process, or holistic approaches to processing information have been proposed (Wally & Baum, 1994; Evans, 2008; Stupple & Waterhouse, 2009; Heit & Rotello, 2010) the decision making literature is lacking evidence for how such processes coexist.

This study has found that police form hunches regarding manner of death at the outset of a police equivocal death investigation and therefore the nature and potential impact of these hunches require further investigation. This study found that the initial conclusions formed by police in response to equivocal death scenarios varied across scenarios and therefore future research would benefit from isolating which specific features of equivocal deaths lead police to these conclusions.

As differences were found in the initial conclusions of experienced police compared to inexperienced police recruits, it is suggested that future research employ research methodology that uses real-life coronial cases rather than fictional scenarios in order to better understand whether experienced police hunches are not only different but more or less accurate than those of inexperienced police.

As this study found evidence of biases in the decision making of both experienced and inexperienced police it would also be of interest to investigate the impacts of these biases upon decision making in real-life coronial cases. This approach would enable police to view the accuracy of both inexperienced and experienced police perceptions and the potential consequence of decision making biases for these cases.

Importantly, research that builds upon the findings of this study in order to better understand police responses, decision making and biases involved in equivocal deaths may inform future training practices. By using coronial cases this insight into the conclusions of experienced and inexperienced police may also provide police with evidence of how experienced investigators make superior judgements – if this is the case. These extensions to the current research may result in training packages whereby the advantages of experience could be best delivered to inexperienced police investigators.

In conclusion, the current study has provided a basis for continuing to research police investigation of equivocal deaths, including the impacts and biases that may affect this process. This study has demonstrated that this area is worthy of further research, in order to achieve the best possible outcomes for policing, coronial decision making and for the family and friends of victims whose manner of death is unclear. Such findings have profound implications for future training and development of police investigation, particularly in regard to informing subsequent coronial investigations in the most accurate and complete manner possible. The current study confirms the potential for bias and decision making heuristics to impact upon outcomes. In addition, this study has provided further evidence in support of the complexity of decision making in the context of equivocal deaths (Goodin &

Hanzlick, 1997; Huusko & Hirvonen, 1988; Stanistreet et al., 2001) and the important role that initial police investigations may have in subsequent coronial death determinations (Freckelton & Ranson, 2006).

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## Appendix A

### Research Questionnaire



## Scenario 1

Enright's Beach is a small Australian town, with a sand beach that is sheltered on one side by a rocky outcrop descending 15metres to the water below. The area is known to be a dangerous fishing spot as the rocks can become very slippery. Two men were swept off the rocks while fishing in the last ten years and it is well known that an elderly person had committed suicide in the area during 2008. Shortly after 8am on Saturday October 31, 2009 a deceased male was found in the shallows of Enright's Beach. The body remains in situ. The victim was identified as 16 year old JL, who lived with his father approximately 1km from the beach. Preliminary examination by the pathologist indicates that JL died as a result of drowning. Shallow lacerations and some bruising to the victim's head and left side indicate that some trauma had been sustained prior to his death. It is currently unclear whether these injuries are entirely consistent with falling from rocks or from a physical altercation involving one or more individuals.

JL was last seen by his father at 8pm the night before his body was found. JL's father said that following a large "row" between them JL had left the residence slamming the back door. JL's father indicated that he had never resorted to physically disciplining his son however he struggled to communicate with JL without losing his temper. Neighbours stated that JL's father could frequently be heard berating JL, with JL often leaving in an agitated state. Neighbours reported some property damage to fences and cars that they believed had been caused by the youth following arguments with his father. When police enquired about JL's mother they were advised that she had committed suicide six years prior when JL was ten years old.

JL's teachers said that his behaviour had deteriorated following his mother's death and that the family had struggled to cope with her loss and the circumstances in which she died. JL had a very close relationship with his mother and since her death he had become increasingly withdrawn from others. Teachers stated that JL would often appear sad, particularly when daydreaming out the window in class. JL had recently disclosed that things were difficult at home. The principal reported numerous suspensions due to JL's participation in physical fights, at one time breaking another student's nose. The most recent incident involved JL bringing a knife to school. At the time JL told the principal it was "for protection." The teachers and principal noted that JL "gave as good as he got" but agreed that he was often a target.

Three locals witnessed JL walking alone on the beach in the direction of the rocks the night before between 9:30 and 10pm. Despite it being very dark witnesses recognised JL's distinctive hooded top and one of the witnesses said that JL appeared distressed and was acting erratically. This witness was visibly shaken on hearing of the boy's death and recalled feeling concerned for the boy's safety around the rocks, particularly as it had started to rain and they would be slippery. As the weather worsened, all known witnesses had left the area. Residents said that the beach area was often frequented by youths at night, and it was usual for the youths to be drinking or fighting. One resident believes that she heard shouting on the beach last night, but could not be sure due to the weather.

## Scenario 1 responses:

Please make a mark on each of the lines below to indicate your opinion regarding manner of death in scenario 1.

Accident

0 |-----| 10

Completely Unlikely |-----| Completely Likely

Suicide

0 |-----| 10

Completely Unlikely |-----| Completely Likely

Homicide

0 |-----| 10

Completely Unlikely |-----| Completely Likely

Natural Causes

0 |-----| 10

Completely Unlikely |-----| Completely Likely

## Scenario 1 responses:

- Do you have a theory about what may have happened? If so please state it briefly:

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- What features of scenario 2 most influenced your decision regarding manner of death in this scenario?

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- Please go back to scenario 2 and draw a line through any of the features in this scenario that you think are irrelevant to the cause of death. If you decided that any features were irrelevant, answer i) below.
  - i) Overall, why do you think the features you eliminated were irrelevant to the cause of death?

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- What courses of action would you consider to be a priority for the investigation?

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## Scenario 2

At 5pm on December 15, 2008 a female victim, SF, aged 38 was found dead in a children's park in a suburb close to Hobart. SF was lying on the ground near a park bench in the corner of the park. There was vomit next to the body and her lips were purple. Emergency services attended and pronounced SF dead. At the scene there were empty packets of the tricyclic antidepressant that had been prescribed to SF, as well as evidence of morphine and heroin.

The deceased had been addicted to morphine for the last six years. Her general practitioner had also prescribed three benzodiazapines – medications usually prescribed for short-term assistance with anxiety and depression. SF's general practitioner states that he prescribed these medications 14 months ago as he thought they may lessen SF's morphine abuse. He acknowledged that SF had appeared to develop a physical dependence on these prescription medications, although he did not believe this was problematic. When SF asked her doctor for an additional prescription in August 2008 the doctor again prescribed an anti-depressant, this time a tricyclic anti-depressant. The doctor admitted that he was aware of SF's continued morphine habit and dependence on benzodiazapines at this time, also stating that despite prescribing a total of four anti-depressants that he did not believe she was depressed. The doctor believed there were other potentially therapeutic reasons for SF taking these drugs.

The victim's sister was visibly upset on speaking to police, repeating a comment from her own G.P that the physical effects of SF's long-term drug abuse would probably have weakened SF's capacity to survive a mixed drug toxicity or drug overdose. The victim's sister is convinced that SF's doctor is to blame for her death.

SF had spoken with her sister this morning about recent problems with David – the man that SF had been dating for one year. David also frequently used street and prescription drugs and had unsuccessfully attempted to detox with SF two months ago. SF told her sister that she planned to meet with David that afternoon to “sort some stuff out.” The victim reportedly said that she was sure things with David would work out. SF's sister became somewhat concerned, particularly as SF had been quite “up and down” since a miscarriage two months earlier. The deceased had (according to her sister) been surprised by the pregnancy and attempted to stop doing drugs but failed. SF reportedly experienced considerable guilt following this loss.

SF indeed met with David that afternoon, a shop owner saw the pair at 2pm. That afternoon SF and David were observed using intravenous drugs and swallowing what appeared to be pills in an open public space. Five independent witnesses indicated to police that they appeared heavily affected by drugs and oblivious to those around them. The conversation between SF and David became loud and abusive around 4pm and was overheard by school children passing by. David shouted at SF and walked away from her. Following this altercation there are no further witness reports until SF was found deceased by a female walking through the park.

SF's housemate has told police that she recalls SF taking one Valium that morning to “settle her nerves” and two regular pain killers. Police have established that SF had a prior history of overdosing, occurring just prior to her relationship with David. SF's sister is adamant that these overdoses were accidental and were the result of contaminated street drugs.

## Scenario 2 responses:

Please make a mark on each of the lines below to indicate your opinion regarding manner of death in scenario 2.

Accident

0 |-----| 10

Completely Unlikely |-----| Completely Likely

Suicide

0 |-----| 10

Completely Unlikely |-----| Completely Likely

Homicide

0 |-----| 10

Completely Unlikely |-----| Completely Likely

Natural Causes

0 |-----| 10

Completely Unlikely |-----| Completely Likely

## Scenario 2 responses:

- Do you have a theory about what may have happened? If so please state it briefly:

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- What features of scenario 2 most influenced your decision regarding manner of death in this scenario?

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- Please go back to scenario 2 and draw a line through any of the features in this scenario that you think are irrelevant to the cause of death. If you decided that any features were irrelevant, answer i) below.
  - ii) Overall, why do you think the features you eliminated were irrelevant to the cause of death?

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- What courses of action would you consider to be a priority for the investigation?

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### **Scenario 3**

At 3am on Sunday September 4, 2009 police received an anonymous phone call to attend a residence in a wealthy suburb of Sydney. The male caller stated that they were concerned that “something wasn’t right.” On arrival police found the back door of the property wide open. An elderly woman was found lying in the hallway with a bloodied cut to her head. There were no defensive wounds on her body. The home belonged to the victim, 82 year old, RP. Her GP advises that RP has a recent history of heart related problems.

The home did not appear to have been disturbed or ransacked. When investigators examined the scene, they found that blood was also present on a hall table near the victim. It appeared that RP may have struck her head on this table during a fall. Investigators took photos of the deceased, lying face down in the direction of the back door. Further evidence was noted at the scene. The victim’s prescribed antidepressant medication was by her bedside, with her G.P confirming that more pills were missing than if RP had taken the recommended dose daily. Toxicology results are not yet available. The open back door does not appear to have been tampered with.

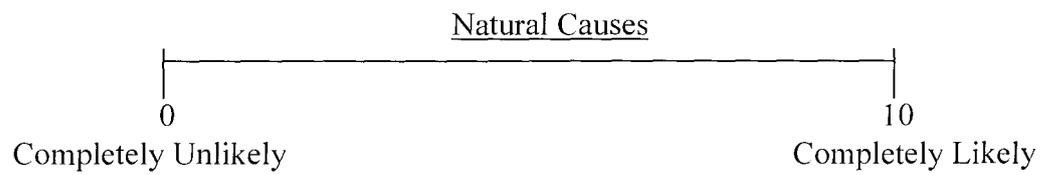
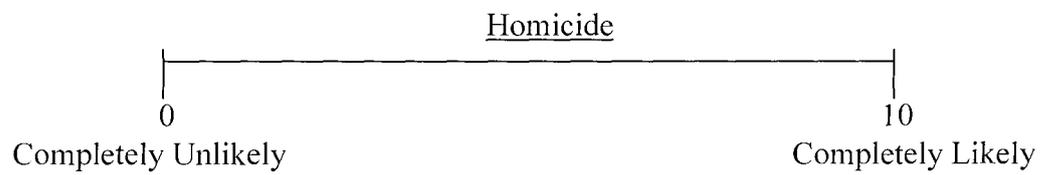
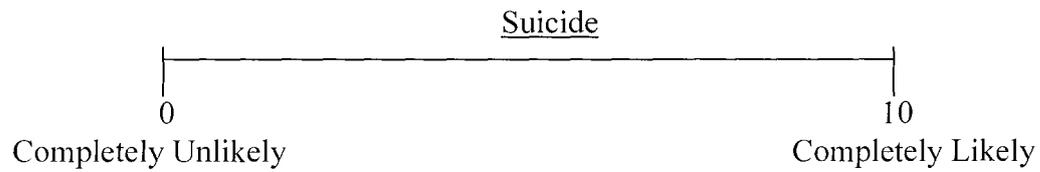
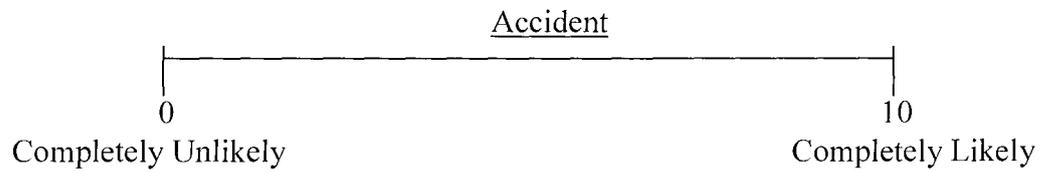
RP had been living alone since her husband of 40 years died suddenly of cancer six months ago. RP’s general practitioner disclosed that RP had found that life without her husband had been very difficult. The doctor said that RP appeared very lonely when she came into the surgery and would often take longer than necessary to finish the consultation. The doctor said that RP had no family or visitors to speak of and that she had been feeling lost now that her husband was gone. RP had only just started taking an antidepressant that her doctor had prescribed, as well as starting on some sleeping tablets. RP’s medical history was also disclosed to police. RP had a family history of heart disease and had a poor history herself with heart problems, mostly angina.

Neighbours of the deceased stated that RP would often have lights on in her home late into the night and that she often had trouble sleeping, they knew this because she would come outside to talk whenever she spotted them in the garden. They stated that they had always tried to be polite and were embarrassed to admit that they were aware the elderly lady had a large amount of cash in the house with no family to bestow it to in her will. The neighbours had quickly added that this stash of money was well known in the community, with RP frequently telling people that she would never trust a bank with her life savings and that it was better off at her house where she could keep an eye on it.

Police are aware of a number of recent aggravated burglaries in the neighbourhood. As no suspects have been identified for these invasions there is mounting concern in the community about safety. RP’s neighbours stated that they had not heard anything suspicious, but admitted that they had been out for some of the evening at a party.

### Scenario 3 responses:

Please make a mark on each of the lines below to indicate your opinion regarding manner of death in scenario 3.



### Scenario 3 responses:

- Do you have a theory about what may have happened? If so please state it briefly:

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- What features of scenario 3 most influenced your decision regarding manner of death in this scenario?

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- Please go back to scenario 3 and draw a line through any of the features in this scenario that you think are irrelevant to the cause of death. If you decided that any features were irrelevant, answer i) below.
  - i) Overall, why do you think the features you eliminated were irrelevant to the cause of death?

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- What courses of action would you consider to be a priority for the investigation?

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## Scenario 4

On June 19, 2009 ambulance officers attended a private residence after an emergency call was placed by a housekeeper employed part-time at the property. The housekeeper stated that her employer was collapsed in the lounge when she arrived at work that afternoon. The deceased was AL, a male aged 59. Ambulance officers rushed AL to the hospital however he died a short time later. AL was determined to have been in a hypoglycemic coma, brought on by an over-administration of his insulin medication.

AL was known to suffer from type 1 diabetes (insulin dependent diabetes), a condition he had been aware of since childhood when he was hospitalised with diabetes related illness. AL regularly tested his blood sugar and administered a dose of insulin in order to balance his levels. According to AL's medical records, he had experienced previous hypoglycemic episodes during adolescence and early adulthood – meaning that the amount of insulin he administered to lower a high blood glucose reading did not match his body's physiological need and resulted in his glucose levels dipping to a below-normal level. During past hypoglycemic episodes AL had become unconsciousness but was revived by an emergency injection of glucagon. AL's G.P reports that it would be possible that AL's insulin requirements had recently changed due to current stressors and also a seasonal flu, stating that this may increase the potential for an accidental overdose.

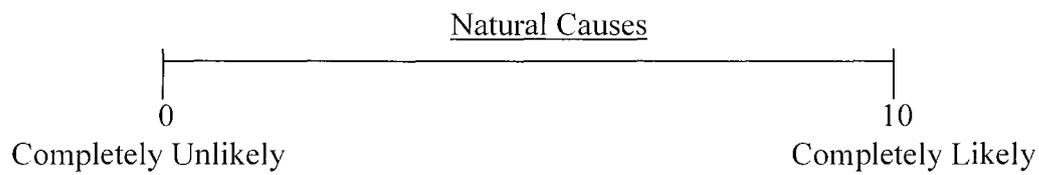
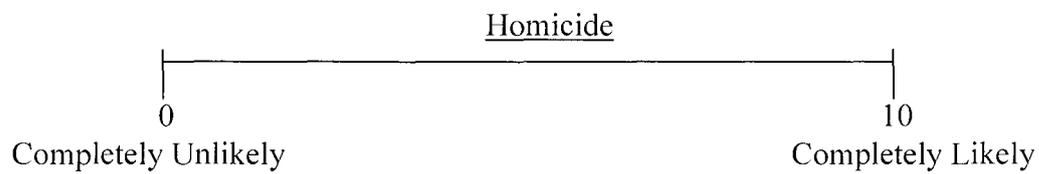
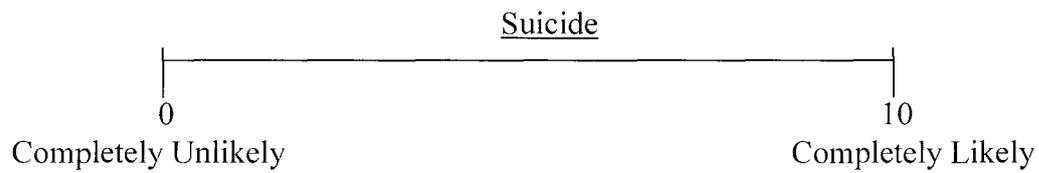
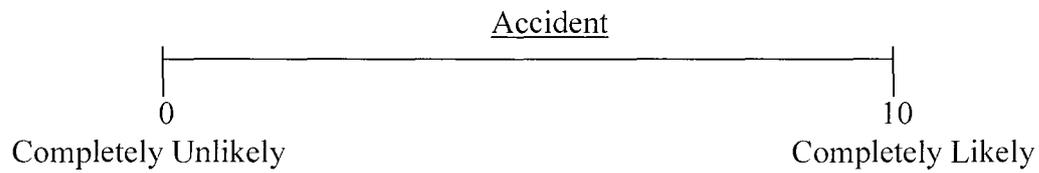
There is evidence to suggest that AL was under a considerable amount of stress. AL's family was not close and after the death of his father five years ago a dispute over his significant assets and property began between AL, his siblings and their respective spouses. The total of these assets is approximately \$10 million AUD. AL's father had made a will but had revoked it just prior to his death. As AL had been named as the primary beneficiary of the will AL's legal representative had announced to the group last week that AL would be petitioning for this will to be reinstated. The dispute between the family was reportedly becoming increasingly hostile and money obsessed. Without AL, there was the potential for a lot of money to be gained by the remaining family members.

In addition to the dispute over assets and property, AL's relationship with his wife had recently broken down, largely as a result of the stress and aggravation that they were experiencing. AL believed that they would not reunite and felt bitter and disappointed with how his life had turned out. AL had also become withdrawn and had ceased to engage in previously enjoyed activities.

AL's home was found unlocked on the housekeeper's arrival, despite her insistence that AL was normally very security conscious.

### Scenario 4 responses:

Please make a mark on each of the lines below to indicate your opinion regarding manner of death in scenario 4.



### Scenario 4 responses:

- Do you have a theory about what may have happened? If so please state it briefly:

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- What features of scenario 4 most influenced your decision regarding manner of death in this scenario?

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- Please go back to scenario 4 and draw a line through any of the features in this scenario that you think are irrelevant to the cause of death. If you decided that any features were irrelevant, answer i) below.
  - i) Overall, why do you think the features you eliminated were irrelevant to the cause of death?

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- What courses of action would you consider to be a priority for the investigation?

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### Closing questions:

People may have different ways of evaluating the information that comes to light during an investigation. The following two questions relate to how you evaluate these pieces of information as they come to hand. **Please remember that there is no right or wrong answer in responding to these questions and that all your responses are anonymous.**

Please make a mark somewhere on **all of the lines** below to indicate how much they apply:

1) I tend to evaluate the merit of individual pieces of information separately as they become apparent, disregarding those pieces along the way that do not seem to have merit.



2) I tend to reconsider the total sum of the evidence that I think is important each time I receive new information of merit.



3) I tend to identify different ways in which the incident may have played out, disregarding those pieces that do not seem to add anything to my understanding of what might have happened.



4) I tend to look for (or think of) a likely scenario that the evidence would support.





**Closing questions:**

- If the victim was under the influence of alcohol in the scenarios would this influence your feelings about the likely manner of death? Please comment:

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- In your own experience, would you say that alcohol intoxication is often associated with one particular manner of death? Please comment:

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**Thank you for your participation in this study.**

## Appendix B

### Study Information Sheet

*Participant Information Sheet*  
*Ethics Approval Number: H10968*



**PARTICIPANT INFORMATION SHEET  
SOCIAL SCIENCE/ HUMANITIES  
RESEARCH**

**Study Title:**

**A Study of Equivocal Death Investigation and the Relevance of Investigator Experience**

**Invitation**

You are invited to participate in a research study into the opinions that people form about a cause of death, where it is unclear whether the death was the result of an accident, suicide, homicide or natural causes. In cases where it is unclear whether death was the result of one of these options it may be referred to as an 'equivocal' death. The study is being conducted by Miss Nicole Rider and her Supervisors, Dr. Tess Crawley from the School of Psychology and Associate Professor Roberta Julian from the Tasmanian Institute of Law Enforcement Studies at the University of Tasmania. The project is being conducted in partial fulfillment of a Masters of Psychology for Nicole Rider and coordinated through Professional Development, Human Resources Tasmania Police.

**1. 'What is the purpose of this study?'**

Little research currently exists regarding the initial interpretations and decision making that is involved in the early stages of investigations into what can be called an equivocal death – a death in which the cause is unclear. It is hoped that this research will provide some insight into the factors that influence interpretations and investigations into equivocal deaths.

**2. 'Why have I been invited to participate in this study?'**

You have been invited to participate in this study because you are employed as a police officer and have been identified as eligible by your executive management.

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### **3. 'What does this study involve?'**

Participation in this study involves the completion of a questionnaire. The only personal information gathered from participants will be the number of years (if any) that they have been involved in the investigation of deaths in which it is unclear whether the cause was accident, suicide, homicide or natural causes.

This study's questionnaire presents four fictional scenarios in which a victim has died in a manner that leaves it open to interpretation whether the cause of death was an accident, suicide, homicide or natural causes. After reading each scenario participants are asked to rate the likelihood of each option and to answer a small number of questions. The questionnaire takes approximately 45 minutes to complete.

It is important that you understand that your involvement in this study is voluntary. While we would be pleased to have you participate, we fully respect your right to decline. You may also choose to discontinue your participation at any time, without providing an explanation to the investigator. No identifying information is requested during this experiment and an individual's participation and responses will remain confidential. Your name will not be used in any publication arising out of the research. All of the research will be kept in a locked cabinet in the School of Psychology.

### **4. Are there any possible benefits from participation in this study?**

This small study may provide initial information about the way that equivocal deaths are understood and considered during an investigation. Future research may capitalise on the results and it is hoped that this field of research may assist investigators to understand their response to different features of an equivocal death investigation.

### **5. Are there any possible risks from participation in this study?**

All scenarios used in this experiment are fictional however, it should be noted that the subject matter may be upsetting to you as it deals with issues such as suicide and death. If you believe that this would be upsetting please choose not to participate in the study. Pregnant women are asked to further consider whether reading the scenarios may result in stress for themselves,

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or their foetus. If you are concerned that this may be the case please choose not to participate. Pregnant women may wish to involve others when deciding whether or not to participate. All participants may also contact the researcher to discuss any concerns prior to participating.

The researcher wishes to sincerely acknowledge her respect for the values, diverse cultures and diverse languages of Aboriginal and Torres Strait Islander peoples. The researcher invites all potential participants to consider whether their participation in the study is suitable, given their own cultural values. If after choosing to participate you find that you are becoming distressed please discontinue your participation and inform the researcher so that she may put you in contact with a counsellor at the University Psychology Clinic. This support would be offered free of charge.

## **6. What if I have questions about this research?**

If you would like to discuss any aspect of this study please feel free to contact either Dr. Tess Crawley at [tess.crawley@utas.edu.au](mailto:tess.crawley@utas.edu.au) or Miss Nicole Rider at [nrider@utas.edu.au](mailto:nrider@utas.edu.au). We would be happy to discuss any aspect of the research with you. Following the submission of a thesis, the results of this study will be available for you to view by accessing the School of Psychology web page at [www.utas.edu.au](http://www.utas.edu.au). You are welcome to contact us at that time to discuss any issue relating to the research study.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee and the Tasmania Police Commissioners. If you have concerns or complaints about the conduct of this study you should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email [human.ethics@utas.edu.au](mailto:human.ethics@utas.edu.au). The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote H10968.

**Thank you for taking the time to consider this study. Please note that should you wish to take part, your completion and return of the questionnaire is deemed to indicate your informed consent. This information sheet is for you to keep.**

## Appendix C1

### Initial Conclusions Regarding Manner of Death in Equivocal Scenarios

#### Descriptive Statistics

#### Multivariate Analysis of Variance (MANOVA)

#### Levene's Test of Equality of Error Variances

Table 5

*Descriptive Statistics: Police Initial Conclusions of Accidental Manner of Death  
Likelihood for Each Equivocal Scenario*

Scenario	Police Experience	Mean	Std. Deviation	N
Drowning	Inexperienced	62.84	18.91	25
	Experienced	70.85	20.46	13
	Total	65.58	19.55	38
Addict	Inexperienced	65.24	23.64	25
	Experienced	83.92	12.37	13
	Total	71.63	22.20	38
Elderly	Inexperienced	59.48	26.30	25
	Experienced	62.62	17.55	13
	Total	60.55	23.47	38
Coma	Inexperienced	57.88	26.77	25
	Experienced	73.08	14.26	13
	Total	63.08	24.17	38

Table 6

*Descriptive Statistics: Police Initial Conclusions of Suicide Manner of Death Likelihood for Each Equivocal Scenario*

Scenario	Police Experience	Mean	Std. Deviation	N
Drowning	Inexperienced	60.80	20.05	25
	Experienced	59.23	27.62	13
	Total	60.26	22.55	38
Addict	Inexperienced	61.00	24.83	25
	Experienced	30.38	27.26	13
	Total	50.53	29.29	38
Elderly	Inexperienced	21.08	19.56	25
	Experienced	22.62	28.32	13
	Total	21.61	22.56	38
Coma	Inexperienced	26.36	26.49	25
	Experienced	20.08	16.76	13
	Total	24.21	23.57	38

Table 7

*Descriptive Statistics: Police Initial Conclusions of Homicide Manner of Death  
Likelihood for Each Equivocal Scenario*

Scenario	Police Experience	Mean	Std. Deviation	N
Drowning	Inexperienced	30.28	21.93	25
	Experienced	31.69	23.31	13
	Total	30.76	22.10	38
Addict	Inexperienced	29.20	27.79	25
	Experienced	19.92	22.30	13
	Total	26.03	26.12	38
Elderly	Inexperienced	45.52	22.94	25
	Experienced	45.54	29.36	13
	Total	45.53	24.92	38
Coma	Inexperienced	39.60	28.06	25
	Experienced	45.15	27.17	13
	Total	41.50	27.52	38

Table 8

*Descriptive Statistics: Police Initial Conclusions of Natural Causes Manner of Death  
Likelihood for Each Equivocal Scenario*

Scenario	Police Experience	Mean	Std. Deviation	N
Drowning	Inexperienced	5.28	6.99	25
	Experienced	3.31	4.21	13
	Total	4.61	6.19	38
Addict	Inexperienced	9.40	13.43	25
	Experienced	14.69	25.15	13
	Total	11.21	18.13	38
Elderly	Inexperienced	48.08	29.82	25
	Experienced	59.23	26.87	13
	Total	51.89	28.98	38
Coma	Inexperienced	23.32	23.35	25
	Experienced	33.54	30.72	13
	Total	26.82	26.15	38

Table 9

*Multivariate Analysis of Variance: Initial Conclusions Regarding Manner of Death in Equivocal Scenarios*

Effect			Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	
Between Subjects	Intercept	Pillai's Trace	0.975	316.346	4	33	0.000	0.975	
		Wilk's Lambda	0.025	316.346	4	33	0.000	0.975	
		Hotelling's Trace	38.345	316.346	4	33	0.000	0.975	
		Roy's Largest Root	38.345	316.346	4	33	0.000	0.975	
		Experience	Pillai's Trace	0.305	3.621	4	33	0.015	0.305
	Within Subjects	Scenario	Wilk's Lambda	0.695	3.621	4	33	0.015	0.305
			Hotelling's Trace	0.439	3.621	4	33	0.015	0.305
			Roy's Largest Root	0.439	3.621	4	33	0.015	0.305
			Pillai's Trace	0.840	10.959	12	25	0.000	0.840
			Wilk's Lambda	0.160	10.959	12	25	0.000	0.840
Scenario*Experience		Hotelling's Trace	5.260	10.959	12	25	0.000	0.840	
		Roy's Largest Root	5.260	10.959	12	25	0.000	0.840	
		Pillai's Trace	0.473	1.872	12	25	0.090	0.473	
		Wilk's Lambda	0.527	1.872	12	25	0.090	0.473	
		Hotelling's Trace	0.898	1.872	12	25	0.090	0.473	
	Roy's Largest Root	0.898	1.872	12	25	0.090	0.473		

Table 10

*Levene's Test of Equality of Error Variances*

	F	df1	df2	Sig.
Accident_Drowning	.121	1	36	.730
Accident_Addict	3.468	1	36	.071
Accident_Elderly	4.217	1	36	.047
Accident_Coma	4.693	1	36	.037
Suicide_Drowning	3.834	1	36	.058
Suicide_Addict	.137	1	36	.713
Suicide_Elderly	4.859	1	36	.034
Suicide_Coma	1.852	1	36	.182
Homicide_Drowning	.079	1	36	.780
Homicide_Addict	1.718	1	36	.198
Homicide_Elderly	1.945	1	36	.172
Homicide_Coma	.230	1	36	.634
NaturalCauses_Drowning	3.202	1	36	.082
NaturalCauses_Addict	2.495	1	36	.123
NaturalCauses_Elderly	.619	1	36	.437
NaturalCauses_Coma	3.976	1	36	.054

## Appendix C2

Initial Conclusions Regarding Manner of Death in Equivocal Scenarios

Multivariate Analysis of Variance (MANOVA) Arcsine Root Transformed Data Set

Table 11

*Multivariate Analysis of Variance Conducted Using an Arcsine Root Transformed Data Set*

Effect			Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	
Between Subjects	Intercept	Pillai's Trace	0.984	520.238	4	33	0.000	0.984	
		Wilk's Lambda	0.016	520.238	4	33	0.000	0.984	
		Hotelling's Trace	63.059	520.238	4	33	0.000	0.984	
		Roy's Largest Root	63.059	520.238	4	33	0.000	0.984	
		Experience	Pillai's Trace	0.319	3.862	4	33	0.011	0.319
	Within Subjects	Scenario	Wilk's Lambda	0.681	3.862	4	33	0.011	0.319
			Hotelling's Trace	0.468	3.862	4	33	0.011	0.319
			Roy's Largest Root	0.468	3.862	4	33	0.011	0.319
			Pillai's Trace	0.855	12.303	12	25	0.000	0.855
			Wilk's Lambda	0.145	12.303	12	25	0.000	0.855
Scenario*Experience		Hotelling's Trace	5.905	12.303	12	25	0.000	0.855	
		Roy's Largest Root	5.905	12.303	12	25	0.000	0.855	
		Pillai's Trace	0.406	1.423	12	25	0.22	0.406	
		Wilk's Lambda	0.594	1.423	12	25	0.22	0.406	
		Hotelling's Trace	0.683	1.423	12	25	0.22	0.406	
	Roy's Largest Root	0.683	1.423	12	25	0.22	0.406		

### Appendix C3

#### Initial Conclusions Regarding Manner of Death in Equivocal Scenarios

#### Descriptive Statistics for the Significant Main Effect of Experience

#### Post Hoc Univariate Analyses of Variance for the Significant Main Effect of Experience

Table 12

*Descriptive Statistics: Main Effect of Experience*

Measure	Experience	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Accident	Inexperienced	61.36	2.553	56.181	66.539
	Experienced	72.615	3.541	65.434	79.797
Suicide	Inexperienced	42.31	2.901	36.427	48.193
	Experienced	33.077	4.023	24.918	41.236
Homicide	Inexperienced	36.15	3.243	29.573	42.727
	Experienced	35.577	4.497	26.457	44.697
Natural Causes	Inexperienced	21.52	2.656	16.134	26.906
	Experienced	27.692	3.683	20.223	35.162

Table 13

*Post Hoc Univariate Analyses of Variance for the Significant Main Effect of Experience*

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	Accident	129.90	1	129.950	1535.601	0.000	0.977
	Suicide	53.298	1	53.298	417.410	0.000	0.921
	Homicide	50.741	1	50.741	314.385	0.000	0.897
	NaturalCauses	26.921	1	26.921	231.50	0.000	0.865
Experience	Accident	.612	1	.612	7.231	.011	.167
	Suicide	.444	1	.444	3.475	.070	.088
	Homicide	.001	1	.001	.003	.954	.000
	NaturalCauses	.152	1	.152	1.305	.261	.035
Error	Accident	3.046	36	.085			
	Suicide	4.597	36	.128			
	Homicide	5.810	36	.161			
	NaturalCauses	4.186	36	.116			

## Appendix C4

### Initial Conclusions Regarding Manner of Death in Equivocal Scenarios

#### Descriptive Statistics for the Significant Main Effect of Scenario

Table 14

*Descriptive Statistics: Main Effect of Scenario*

Measure	Scenario	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Accident	Drowning	66.843	3.323	60.104	73.582
	Addict	74.582	3.518	67.446	81.717
	Elderly	61.048	4.059	52.815	69.280
	Coma	65.478	3.993	57.380	73.577
Suicide	Drowning	60.015	3.907	52.092	67.938
	Addict	45.692	4.388	36.792	54.592
	Elderly	21.848	3.908	13.921	29.774
	Coma	23.218	4.052	15.001	31.435
Homicide	Drowning	30.986	3.829	23.220	38.752
	Addict	24.562	4.461	15.515	33.608
	Elderly	45.529	4.319	36.770	54.288
	Coma	42.377	4.747	32.749	52.005
Natural Causes	Drowning	4.294	1.060	2.144	6.444
	Addict	12.046	3.111	5.737	18.355
	Elderly	53.655	4.936	43.645	63.665
	Coma	28.429	4.453	19.399	37.459

## Appendix D

### Use of Information Integration and Story Model Approaches to Decision Making

#### Descriptive Statistics

#### Multivariate Analysis of Variance (MANOVA)

Table 15

*Descriptive Statistics: Use of Information Integration and Story Model Approaches in Decision Making by Inexperienced and Experienced Police*

	Experience	Mean	Std. Deviation	N
Individual Information Model	Inexperienced	47.68	23.084	25
	Experienced	31.23	31.723	13
	Total	42.05	27.103	38
Total Information Model	Inexperienced	63.38	17.816	25
	Experienced	78.92	18.72	13
	Total	68.88	19.378	38
Theories Story Model	Inexperienced	48.64	25.143	25
	Experienced	34.62	29.678	13
	Total	43.84	27.224	38
Narrative Story Model	Inexperienced	68.52	17.100	25
	Experienced	50.15	34.997	13
	Total	62.24	25.785	38

Table 16

*Multivariate Analysis of Variance: Use of Information Integration and Story Model Approaches to Decision Making*

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power
Intercept	Pillai's Trace	.962	207.781	4	33	.000	.962	831.126	1.000
	Wilks' Lambda	.038	207.781	4	33	.000	.962	831.126	1.000
	Hotelling's Trace	25.186	207.781	4	33	.000	.962	831.126	1.000
	Roy's Largest Root	25.186	207.781	4	33	.000	.962	831.126	1.000
Experience	Pillai's Trace	.296	3.469	4	33	.018	.682	77.103	1.000
	Wilks' Lambda	.704	3.469	4	33	.018	.936	527.221	1.000
	Hotelling's Trace	.421	3.469	4	33	.018	.697	82.909	1.000
	Roy's Largest Root	.421	3.469	4	33	.018	.847	199.68	1.000